

## Contents

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS .....	7
Part B CLASS SURVEYS .....	7
Chapter 1 GENERAL .....	7
1.1 Surveys .....	7
1.2 Specialized Ships, Installations, and Apparatus .....	12
1.3 Definitions .....	12
1.4 Preparation for Survey and Other Items .....	15
1.5 Others .....	17
Chapter 2 CLASSIFICATION SURVEYS .....	18
2.1 Classification Survey during Construction .....	18
2.2 Classification Survey of Ships Not Built under Survey .....	22
2.3 Alterations .....	23
Chapter 3 ANNUAL SURVEYS .....	83
3.1 General .....	83
3.2 Annual Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings .....	83
3.3 Annual Surveys for Machinery .....	84
3.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	86
3.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	86
3.6 Special Requirements for Ships Using Low-flashpoint Fuels .....	86
3.7 Special Requirements for Bulk Carriers and Oil Tankers .....	87
3.8 Special Requirements for Ships Affixed with the Notation “ <i>HCM</i> ” or “ <i>HCM-GBS</i> ” .....	87
3.9 Special Requirements for Ships Affixed with the Notation “ <i>CybR</i> ” .....	87
Chapter 4 INTERMEDIATE SURVEYS .....	109
4.1 General .....	109
4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings .....	109
4.3 Intermediate Surveys for Machinery .....	110
4.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	111
4.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	111
4.6 Special Requirements for Ships Using Low-flashpoint Fuels .....	111
4.7 Special Requirements for Bulk Carriers and Oil Tankers .....	111
4.8 Special Requirements for Ships Affixed with the Notation “ <i>HCM</i> ” or “ <i>HCM-GBS</i> ” .....	112
4.9 Special Requirements for Ships Affixed with the Notation “ <i>CybR</i> ” .....	112
Chapter 5 SPECIAL SURVEYS .....	122
5.1 General .....	122
5.2 Special Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings .....	122
5.3 Special Surveys for Machinery .....	126
5.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	128

5.5	Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	128
5.6	Special Requirements for Ships Using Low-flashpoint Fuels .....	128
5.7	Special Requirements for Bulk Carriers and Oil Tankers .....	128
5.8	Special Requirements for Ships Affixed with the Notation “ <i>HCM</i> ” or “ <i>HCM-GBS</i> ” .....	128
5.9	Special Requirements for Ships Affixed with the Notation “ <i>CybR</i> ” .....	129
Chapter 6	DOCKING SURVEYS .....	174
6.1	Docking Surveys .....	174
Chapter 7	BOILER SURVEYS .....	177
7.1	Boiler Surveys .....	177
Chapter 8	PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS .....	178
8.1	General.....	178
8.2	Surveys of Water Lubricated Shafts .....	186
8.3	Surveys of Oil Lubricated Shafts.....	191
8.4	Surveys of Fresh Water Lubricated Shafts .....	196
Chapter 9	PLANNED MACHINERY SURVEYS.....	200
9.1	Planned Machinery Surveys.....	200
Chapter 10	SURVEYS FOR STEEL BARGES .....	204
10.1	General.....	204
10.2	Classification Survey during Construction .....	204
10.3	Classification Survey of Barges Not Built under Survey .....	205
10.4	Annual Survey .....	205
10.5	Intermediate Survey .....	205
10.6	Special Surveys.....	205
10.7	Docking Survey.....	206
10.8	Boiler Survey .....	206
Chapter 11	SURVEYS OF SUBMERSIBLES .....	207
11.1	General.....	207
11.2	Classification Survey during Construction .....	207
11.3	Classification Survey of Submersibles Not Built under Survey .....	210
11.4	Periodical Surveys .....	210
Chapter 12	SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES	212
12.1	General.....	212
12.2	Classification Survey during Construction .....	212
12.3	Annual Surveys .....	216
12.4	Intermediate Surveys.....	217
12.5	Special Surveys.....	218
12.6	Docking Surveys .....	220
12.7	Boiler and Thermal Oil Heater Surveys .....	221
12.8	Propeller Shafts and Stern Tube Shaft Surveys .....	222
12.9	Planned Machinery Surveys.....	222
Chapter 13	SPECIAL REQUIREMENTS OF PERIODICAL SURVEYS FOR OFFSHORE STRUCTURES .....	225

13.1	General.....	225
13.2	Preparation of Surveys and Inspections .....	226
13.3	Selection of Structural Members to be Inspected .....	226
13.4	Periodical Surveys for Hull Structure.....	227
13.5	Periodical Surveys for Equipment, Machinery Installations and Fire Extinguishing Systems 229	
13.6	Periodical Review of the Inspection Plan and Inspection Procedure.....	229
Chapter 14 SURVEY FOR FLOATING OFFSHORE FACILITIES FOR CRUDE OIL/PETROLEUM GAS PRODUCTION, STORAGE AND OFFLOADING .....		230
14.1	General.....	230
14.2	Classification Surveys .....	230
14.3	Class Maintenance Surveys .....	235
Chapter 15 SURVEYS FOR WORK-SHIPS .....		238
15.1	General.....	238
15.2	Classification Surveys during Construction.....	238
15.3	Annual Surveys .....	239
15.4	Intermediate Surveys.....	240
15.5	Special Surveys.....	241
15.6	Docking Surveys .....	242
15.7	Boiler and Thermal Oil Heater Surveys .....	242
15.8	Propeller Shafts and Stern Tube Shaft Surveys .....	242
15.9	Planned Machinery Surveys.....	243
Annex 1.5.3 CLASS MAINTAINANCE SURVEY BY MEANS OF REMOTE SURVEY .....		244
An1	General .....	244
An1.1	General .....	244
An1.2	Application .....	244
An1.3	Definitions.....	244
An2	Requirements for Equivalency .....	245
An2.1	General .....	245
An2.2	Eligibility of the Remote Survey .....	245
An2.3	Planning of the Remote Survey.....	245
An2.4	Performance of the Remote Survey.....	246
An2.5	Assessment of the Remote Survey .....	246
An3	Scope and Procedures.....	247
An3.1	Scope - Eligible Survey Items .....	247
An3.2	Procedures .....	248
An3.3	Hardware and ICT Solution.....	248
An3.4	Requirements for Connectivity .....	248
An4	ICT.....	249
An4.1	General .....	249
An4.2	Hardware .....	249
An4.3	Internet Connectivity (Coverage and Speed).....	250
An4.4	Software and Data Security .....	250

An5	Recording of Evidence and Reporting of Survey .....	251
An5.1	Recording of Evidence .....	251
Annex 2.1.4	PROCEDURES FOR ON-BOARD FUNCTION TEST OF FIXED FIRE DETECTION AND ALARM SYSTEM IN MACHINERY SPACES .....	253
An1.1	General .....	253
An1.2	Test Details .....	253
An1.3	Other Items .....	253
Annex 2.1.5	TESTING PROCEDURES OF WATERTIGHT COMPARTMENTS .....	255
Chapter 1	SHIPS SUBJECT TO <i>SOLAS CONVENTION</i> .....	255
An1.1	General .....	255
An1.2	Application .....	255
An1.3	Test Types and Definitions .....	255
An1.4	Test Procedures .....	256
Chapter 2	SHIPS SUBJECT TO <i>SOLAS CONVENTION</i> EXEMPT/EQUIVALENT .....	263
An2.1	General .....	263
An2.2	Application .....	263
Chapter 3	SHIPS NOT SUBJECT TO <i>SOLAS CONVENTION</i> .....	265
An3.1	General .....	265
An3.2	Application .....	265
Annex 2.3.1-1	TEST OF SHIP MANOEUVRABILITY .....	267
An1	Guidance for the Test of Ship Manoeuvrability .....	267
An1.1	General Requirements .....	267
An1.2	Test Conditions .....	267
An1.3	Preparation for Tests of Ship Manoeuvrability .....	268
An1.4	Tests of Ship Manoeuvrability .....	268
An1.5	Equipment for Measurement and Record-keeping .....	273
An2	Standards for Ship Manoeuvrability .....	275
An2.1	Scope .....	275
An2.2	Standards for Ship Manoeuvrability .....	275
An3	Prediction of Ship Manoeuvrability by Model Tests and Computer Calculation Using Mathematical Model .....	276
An3.1	Scope .....	276
An3.2	Prediction Method .....	276
An3.3	Prediction Method based upon the Results from Model Tests .....	276
An3.4	Computer Calculation by Using Mathematical Models .....	276
An4	Correcting Method of Manoeuvring Test .....	278
An4.1	Scope .....	278
An4.2	Correcting Method .....	278
An5	Other Manoeuvring Tests .....	280
An5.1	Scope .....	280
An5.2	Tests .....	280
Annex 2.3.1-2	PROCEDURES FOR ON BOARD NOISE MEASUREMENTS .....	284
Chapter 1	GENERAL .....	284

An1.1	General .....	284
An1.2	Definitions.....	284
Chapter 2	MEASURING EQUIPMENT.....	287
An2.1	Equipment Specifications .....	287
An2.2	Use of Equipment.....	287
Chapter 3	MEASUREMENT .....	288
An3.1	General .....	288
An3.2	Personnel Requirements.....	288
An3.3	Measurement Conditions .....	288
An3.4	Points of Measurement.....	289
An3.5	Measurements in Machinery Spaces .....	290
An3.6	Measurements in Navigation Spaces .....	290
An3.7	Measurements in Accommodation Spaces .....	290
An3.8	Measurements in Normally Unoccupied Spaces.....	291
Chapter 4	MAXIMUM ACCEPTABLE SOUND PRESSURE LEVELS .....	292
An4.1	General .....	292
An4.2	Noise Survey Reports .....	293
Chapter 5	ACOUSTIC INSULATION BETWEEN ACCOMMODATION SPACES.....	294
An5.1	Sound Insulation Index .....	294
An5.2	Measurements of Airborne Sound Insulation Properties .....	295
Chapter 6	HEARING PROTECTION AND WARNING INFORMATION .....	296
An6.1	General .....	296
An6.2	Requirements for Hearing Protectors .....	296
An6.3	Warning Notices.....	296
Annex 2.3.1-3	TESTING PROCEDURES FOR CONTROL SYSTEMS FOR CONTROLLABLE PITCH PROPELLERS INTENDED FOR MAIN PROPULSION .....	300
An1.1	General .....	300
An1.2	Tests .....	300
An1.3	Records .....	300
An1.4	Test Results .....	300
Annex 2.3.2	GUIDANCE FOR INCLINING TEST .....	302
An1.1	General .....	302
An1.2	Preparation for the Test .....	302
An1.3	Inclining Test and Record of Data.....	303
An1.4	Postponement of the Test .....	304
An1.5	Inclining Test Report.....	304
Annex 5.2.7	GUIDANCE ON PRESSURE TESTING OF BOUNDARIES OF CARGO TANKS UNDER DIRECTION OF THE MASTER (in reference to MSC.1/Circ.1502 ANNEX) .....	305
An1	Introduction .....	305
An1.1	.....	305
An1.2	.....	305
An2	Objective and applicability.....	306
An2.1	.....	306

An2.2 .....	306
An3   Testing of cargo tanks .....	307
An3.1 .....	307
An3.2 .....	307
An3.3 .....	307
An3.4 .....	307
An3.5 .....	307
An4   Procedure for testing of cargo tanks.....	308
An4.1 .....	308
An4.2   Strength testing using cargo .....	308
An4.3   Combined strength and tightness testing using ballast water .....	308
An4.4   General .....	308
An4.5   Safety .....	308
An5   Master's inspections, assessments and reports .....	309
An5.1   General .....	309
An5.2   Places to be inspected.....	309
An5.3   Reporting .....	309
Annex 9.1.3   PROCEDURES FOR THE APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE	
310	
An1.1   General .....	310
An1.2   Application for Approval.....	310
An1.3   Function.....	310
An1.4   Administration of Software.....	312
An1.5   Verification Test.....	312
An1.6   Approval.....	312

# RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

## Part B CLASS SURVEYS

### Chapter 1 GENERAL

#### 1.1 Surveys

##### 1.1.1 Classification Surveys

1 All ships (except steel barges, submersibles, mobile offshore drilling units etc., floating offshore facilities for crude oil/petroleum gas production, storage and offloading, and work-ships) intended to be classed with the Society are to be subjected to Classification Surveys by the Surveyor in accordance with the requirements of **Chapter 2**. Classification Surveys of steel barges, submersibles, mobile offshore drilling units etc., floating offshore facilities for crude oil/petroleum gas production, storage and offloading as well as work-ships are to be in accordance with the requirements of **Chapter 10, 11, 12, 14** and **15** respectively.

2 Classification Surveys consist of the following Surveys.

- (1) Classification Survey during Construction
- (2) Classification Survey of Ships Not Built Under Survey

##### 1.1.2 Class Maintenance Surveys\*

1 Ships (except steel barges, submersibles, mobile offshore drilling units etc., and floating offshore facilities for crude oil/petroleum gas production, storage and offloading classed with the Society are to be subjected to Class Maintenance Surveys by the Surveyor in accordance with the requirements of **Chapter 3** through **Chapter 9** of this Part. Class Maintenance Surveys of steel barges, submersibles, mobile offshore drilling units etc., floating offshore facilities for crude oil/petroleum gas production, storage and offloading as well as work-ships are to be in accordance with the requirements of **Chapter 10, 11, 12, 14** and **15** respectively. In addition, in cases where any modification of ship registration details is needed, the ship is to comply with **2.3** in addition to the above requirements.

2 Class Maintenance Surveys consist of Periodical Surveys, Planned Machinery Surveys, Occasional Surveys and Unscheduled Surveys, which are as specified in the following (1) to (4). At each of these surveys, inspections, tests or examinations are to be carried out to verify that all necessary items are in good order.

##### (1) Periodical Surveys

###### (a) Annual Surveys

The surveys consist of general examinations of hull, machinery, equipment, fire-fighting equipment, etc. as specified in **Chapter 3** of this Part.

###### (b) Intermediate Surveys

The surveys consist of general examinations of hull, machinery, equipment, fire-fighting equipment, etc. and detailed examinations of certain parts as specified in **Chapter 4** of this Part.

###### (c) Special Surveys

The surveys consist of detailed examinations of hull, machinery, equipment, fire-fighting equipment, etc. as specified in **Chapter 5** of this Part

###### (d) Docking Surveys

The surveys consist of bottom inspections normally carried out in a drydock or on a slip-way as specified in **Chapter 6** of this Part.

###### (e) Boiler Surveys

The surveys consist of open-up examinations and performance tests of boilers as specified in **Chapter 7** of this Part.

(f) Propeller Shaft and Stern Tube Shaft Surveys

The surveys consist of open-up examinations of propeller shafts and the stern tube shafts as specified in **Chapter 8** of this Part.

(2) Planned Machinery Survey

(a) Continuous Machinery Survey (CMS): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out systematically, continuously and sequentially so that each survey interval for all CMS items does not exceed five *years*.

(b) Planned Machinery Maintenance Scheme (PMS): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out based upon an open-up inspection by the shipowner according to the machinery maintenance scheme approved by the Society.

(c) Condition Based Maintenance Scheme (CBM): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out based upon the results of condition monitoring and diagnosis according to a machinery condition based maintenance scheme approved by the Society.

(3) Occasional Surveys

The surveys consist of examinations of the status (including damaged areas, repair work, and modifications) of hull, machinery and equipment which are carried out separately from **(1)** and **(2)** above.

(4) Unscheduled Surveys

The surveys consist of examinations of the status, etc. of hull, machinery and equipment which are carried out separately from **(1)** to **(3)** above.

### 1.1.3 Intervals of Class Maintenance Surveys\*

**1** Periodical Surveys are to be carried out in accordance with the requirements specified in **(1)** through **(6)** below.

(1) Annual Surveys

Annual Surveys are to be carried out within three *months* before or after each anniversary date.

(2) Intermediate Surveys

Intermediate Surveys are to be carried out as specified in **(a)** or **(b)** below. Annual Surveys are not required to be carried out when an Intermediate Survey is carried out.

(a) Intermediate Surveys are to be carried out at the time of the second or third Annual Survey after the Classification Survey during Construction or a Special Survey; or

(b) In lieu of **(a)** above, Intermediate Surveys for cargo ships over 10 *years* of age may be commenced at any time between the second and third Annual Surveys and be completed at the time of the second or third Annual Survey.

(3) Special Surveys

Special Surveys are to be carried out as specified in **(a)** and **(b)** below.

(a) Special Surveys are to be carried out within 3 *months* before the date of expiry of the *Certificate of Classification*;

(b) Special Surveys may be commenced at or after the 4th Annual Survey and be completed within 3 *months* before the date of expiry of the *Certificate of Classification* ; or

(4) Docking Surveys

Docking Surveys are to be carried out as prescribed in **(a)** and **(b)** below.

(a) Concurrently with Special Surveys

(b) Within 36 *months* from the date of completion of the Classification Survey or the previous Docking Survey

(5) Boiler Surveys

Boiler Surveys are to be carried out as specified in **(a)** and **(b)** below. However, for ships where over eight *years* have elapsed since construction and that have only one main boiler, Boiler Surveys are to be carried out at Annual Surveys, Intermediate Surveys and Special Surveys.

(a) Concurrently with Special Surveys

(b) Within 36 *months* from the date of completion of the Classification Survey or the previous Boiler Survey

(6) Propeller Shaft and Stern Tube Shaft Surveys

Propeller shaft and stern tube shaft surveys are to be carried out as specified in **Chapter 8**.

**2** Planned Machinery Surveys are to be carried out as specified below in **(1)** to **(3)**. In the case of azimuth thrusters, however, the



surveys for gears, gear shafts, shaft couplings, bearings and clutches for propulsion as well as azimuth steering gears may be carried out concurrently with the survey specified in **-1(6)** above.

- (1) In the Continuous Machinery Survey, each survey item or part is to be examined at the interval not exceeding 5 years.
- (2) In the Planned Machinery Maintenance Scheme, each survey item or part is to be examined according to the survey schedule table specified in **9.1.3** and at the general examination (including review of maintenance records) which is to be carried out every year.
- (3) In the Condition Based Maintenance Scheme, each survey item or part is to be examined according to the survey schedule table specified in **9.1.4** and at the annual survey.

**3** The classed ships are to be subject to Occasional Surveys when they fall under one of the conditions of **(1)** through **(6)** below. Periodical Surveys may substitute for the Occasional Surveys where the survey items of the Occasional Surveys are inspected as a part of the Periodical Surveys.

- (1) When main parts of hull, machinery or important equipment or fittings which have been surveyed by the Society, have been damaged, or are to be repaired, altered, or modified.
- (2) When load lines are to be changed or to be newly marked.
- (3) When an alteration affecting the ship's stability is made.
- (4) When the Survey is requested by the owner.
- (5) When the Survey is carried out to verify that the ships already constructed are in compliance with the retroactive requirements of the Rules.
- (6) Whenever the survey is considered necessary by the Society.

**4** The classed ships may be subject to Unscheduled Surveys when the confirmation of the status of the ship by survey is deemed necessary in cases where the Society considers the ship to be subject to **1.4-3** of the **Conditions of Service for Classification of Ships and Registration of Installations**.

#### **1.1.4 Periodical Surveys Carried Out in Advance\***

**1** Annual Surveys may be carried out in advance of the times specified in **1.1.3-1(1)** when requested by the owner. In such cases, additional Periodical Surveys are to be carried out as specified otherwise by the Society.

**2** Intermediate Surveys may be carried out in advance of the times specified in **1.1.3-1(2)** when requested by the owner. In such cases, additional Periodical Surveys are to be carried out as specified otherwise by the Society. Furthermore, when an Intermediate Survey is carried out in advance at the time of an Annual Survey, the Annual Survey may be dispensed with.

**3** Special Surveys may be carried out based upon following **(1)** through **(3)** in advance of the times specified in **1.1.3-1(3)** when requested by the owner.

- (1) Where a Special Survey is carried out in advance at the time of an Annual Survey or Intermediate Survey, the Annual Survey or Intermediate Survey may be dispensed with.
- (2) Where a Special Survey is commenced prior to the time of the fourth Annual Survey, the Special Survey is to be completed within 15 months from the date of its commencement.
- (3) Notwithstanding **(2)**, where a Special Survey is commenced on or before the due date of the third Annual Survey and an Intermediate Survey is not carried out, the Special Survey is to be completed up to the following **(a)** or **(b)**, whichever is earlier.
  - (a) Due date of third Annual Survey; or
  - (b) 15 months from the date of its commencement.

#### **1.1.5 Postponement of Surveys\***

**1** Special Surveys, Docking Surveys carried out at the period specified in **1.1.3-1(4)(a)**, Boiler Surveys carried out at the period specified in **1.1.3-1(5)(a)** and Ordinary Surveys for Propeller shafts Kind 2 specified in **8.2.2-1(1)** may be postponed as specified in **(1)** or **(2)** below subject to the approval by the Society in advance. However, no postponement is to be permitted on the period of 36 months between any two Docking Surveys, Boiler Surveys and Ordinary Surveys for Propeller shafts Kind 2 respectively.

- (1) Maximum 3 months for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed.
- (2) Maximum 1 month for the ship engaged on short voyages.

**2** In addition to **-1** above, Docking Surveys carried out concurrently with Special Surveys may be postponed 3 months, subject to the approval by the Society in advance, in exceptional circumstances such as unavailability of dry-docking facilities, unavailability of repair facilities, unavailability of essential materials, equipment or spare parts, or delays incurred by action taken to avoid severe

weather conditions.

3 In addition to -1 above, Boiler Surveys specified in 1.1.3-1(5)(a) and (b) may be postponed up to 3 months, subject to the approval by the Society in advance, in the following exceptional circumstances: the unavailability of repair facilities; the unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions.

4 Notwithstanding the requirement specified in 1.1.3-2, Planned Machinery Surveys may be postponed as specified in -1(1) or (2), provided that such Surveys are carried out at the time of Special Surveys.

#### 1.1.6 Modification of the Requirements\*

1 With respect to Periodical Surveys and Planned Machinery Surveys in cases where considered appropriate by the Society, the Surveyor may modify the requirements specified in Chapters 3 through 9 of this Part based on the size, service engaged, construction, age, history, results of previous surveys and actual condition of the ship.

2 When the results of a Periodical Survey suggest the likelihood of heavy corrosion, defects etc., and the Surveyor considers it necessary, close-up surveys, pressure tests or thickness measurements are to be carried out. Thickness measurements procedures and submission of gauging results are to be in accordance with the requirements of 5.2.6-1.

3 For tanks and cargo holds where effective coatings are found to be in a good condition, the extent of internal examination, close-up surveys or gauging requirements specified in Chapters 3 through 9 of this Part may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating at the discretion of the Surveyor.

#### 4 Continuous Hull Surveys

(1) At the request of the owner, the Society may approve ships (other than oil tankers, bulk carriers, ships carrying dangerous chemicals in bulk with integral tanks and general dry cargo ships of not less than 500 *gross tonnage*) to be exempt from detailed examinations of the tanks and compartments at the next Special Survey if these examinations (thickness measurements and pressure tests of tanks and compartments) are carried out based on the criteria for the next Special Survey in order and completed before the next Special Survey. This form of examination is referred to as a "Continuous Hull Survey". If the examination during the Continuous Hull Survey reveals any defects, the Surveyor may require further detailed examinations of other similar tanks and compartments. The Society may, where considered necessary, require the Continuous Hull Survey to be carried out by a method other than that specified above.

(2) For ships which are undergoing the Continuous Hull Survey, the Docking Survey specified in 1.1.3-1(4)(a) may be carried out prior to the Special Survey, provided that the Docking Surveys are to be held twice or more by the date of expiry of the *Certificate of Classification* and that all the requirements of Chapter 6 are also complied with. The Docking Survey, however, is to be carried out within 36 months from the date of completion of the previous Docking Survey

(3) For ships which are undergoing the Continuous Hull Survey, internal examination of ballast tanks for ships more than 10 years of age is to be carried out as specified in (a) and (b) below.

(a) Concurrently with Special Surveys

(b) Concurrently with Intermediate Surveys

5 For Intermediate Surveys for cargo ships up to 10 years of age carried out at the time of the third Annual Survey in accordance with the requirements in 1.1.3-1(2)(a), examinations required for Intermediate Surveys carried out during the period between the 2nd and 3rd Annual Surveys as a part of another survey may be given special consideration or omitted at the discretion of the Surveyor. However, at a minimum the examinations required in Chapter 3 are to be carried out at the Intermediate Survey.

#### 1.1.7 Bulk Carriers\*

1 For ships which are applicable to Chapter 31B (Requirements related to Chapter 31B specified in this Chapter are those which are applied to ships which have been contracted for construction prior to 1 July 2023), continuing compliance with An3 and An.5, Annex 1.1, Part 2-2, Part C is to be verified at Special Surveys and Intermediate Surveys (for ships over 10 years of age). For this purpose, the thickness measurements as deemed appropriate by the Society are to be carried out for the vertical corrugated watertight bulkhead abaft the foremost hold, in addition to those according to Table B5.15.

2 For ships which are required to carry out the annual thickness measurement for the vertical corrugated watertight bulkhead abaft the foremost hold as a result of the survey specified in -1, the measurement is to be carried out at Annual Surveys in addition to those according to Table B3.6.

3 For ships which are applicable to 31B.2.1-2, Part C, the following surveys are to be carried out at periodical surveys in addition to the surveys required in this chapter.

- (1) At annual surveys, in addition to the requirements stipulated in **Chapter 3**, the following items are to be carried out for the foremost hold.
  - (a) For ships over 5 *years* and up to 15 *years* of age
    - i) An overall survey of the cargo hold
    - ii) A close-up survey of transverse bulkheads and a minimum of 25% of hold frames (including their upper and lower brackets and adjacent shell plating)  
Where considered necessary by the Surveyor as a result of the survey, the survey is to be extended to include a close-up survey of all of the hold frames (including their upper and lower brackets and adjacent shell plating).
    - iii) A survey of suspect areas identified at previous surveys
  - (b) For ships over 15 *years* of age
    - i) An overall survey of the cargo hold
    - ii) A close-up survey of transverse bulkheads and all hold frames (including their upper and lower brackets and adjacent shell plating)
    - iii) A survey of suspect areas identified at previous surveys
  - (c) The thickness measurement is to be carried out to the minimum extent specified in **(a)ii)** and **iii)** or **(b)ii)** and **iii)** above as applicable. This thickness measurement may be dispensed with provided the Surveyor is satisfied by the close-up survey, there is no structural diminution and the protective coating, where applied, remains effective. However, where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Tables B5.16** through **B5.20** for the structural members in which such corrosion is found.
- (2) Function tests of the bilge well high level alarms and hold water ingress alarms as stated in **(2)** and **(4)** of **C31B.2.1-2, Part C of the Guidance for the Survey and Construction of Steel Ships** are to be carried out in addition to those required at periodical surveys as stated in **3.2.3**, **4.2.3** and **5.2.3**.

#### **1.1.8 Laid-up Ships\***

**1** Laid-up ships are not subject to Class Maintenance Surveys specified in **1.1.2**. However, Occasional Surveys may be carried out at the request of owners.

**2** When laid-up ships are about to be re-entering service, the following surveys and surveys for specific matters which have been postponed due to being laid-up, if any, are to be carried out.

- (1) If the due dates for Periodical

Surveys or Planned Machinery Surveys have not transpired while the ship was laid-up, then surveys equivalent to the Annual Surveys specified in **Chapter 3**, corresponding to the age of the ship, are to be carried out.

- (2) If the due dates for Periodical Surveys or Planned Machinery Surveys have transpired while the ship was laid-up, then these Periodical Surveys or Planned Machinery Surveys are, in principal, to be carried out. However, where two or more kinds of Periodical Surveys are due, only the superlative survey may be carried out.

**3** If the survey to be carried out under the requirements of **-2(2)** above is a Special Survey, either the overdue Special Survey or the next due Special Survey is to be carried out. In such cases, the validity of the Classification Certificate is to be in accordance with the requirements of **2.6, Guidance for the Classification and Registry of Ships** corresponding to the Special Survey to be carried out.

#### **1.1.9 Machinery Verification Runs**

**1** At the time of a special survey, a dock trial in the presence of the attending surveyor is to be carried out to confirm the satisfactory operation of main and auxiliary machinery. If significant repairs have been carried out to main or auxiliary machinery or steering gear, the Surveyor may deem a sea trial necessary.

**2** At the time of extended drydocking, a dock trial may be required at the discretion of the attending surveyor to confirm the satisfactory operation of main and auxiliary machinery. If significant repairs have been carried out to main or auxiliary machinery or steering gear, the Surveyor may deem a sea trial necessary.

**3** For electric propulsion ships, at the time of the machinery verification runs specified in **-1** and **-2** above, the satisfactory operation of electric propulsion plants is to be confirmed.

#### **1.1.10 Self-unloading Ships\***

Surveys for self-unloading ships are to be carried out in accordance with the requirements for bulk carriers depending upon the structural configuration of the ship unless specified otherwise in this Part.

### 1.1.11 General Dry Cargo Ships

For general dry cargo ships with hybrid cargo hold arrangements, e.g. with some cargo holds of single-side skin and others of double-side skin, the requirements of general dry cargo ships are to be applied only to structure in way of the single-side skin cargo hold region.

## 1.2 Specialized Ships, Installations, and Apparatus

### 1.2.1 Incinerators of Waste Oil and Waste Substance

Where incinerators of waste oil and waste substance are installed on board, they are to be examined to the satisfaction of the Surveyor.

### 1.2.2 Surveys of Special Ships

When an application is received from the shipowner and the Society judges that it is impractical to apply the requirements in this Part to the ship due to the special nature of its design, services and operating mode, the Society may modify times, items, scope, or extent of surveys as applicable.

## 1.3 Definitions

### 1.3.1 Terms\*

The terms which appear in this part are defined as follows. Terms not defined here are as defined in other parts of the Rules.

- (1) "Ballast tank" is a tank which is being used primarily for salt water ballast. For a space which is used for both cargo and salt water ballast, the followings requirements of (a) and (b) below are applied.
  - (a) The space is treated as a Ballast Tank when substantial corrosion has been found in that space.
  - (b) For oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, the tanks used for the carriage of cargo or ballast water as a routine part of the vessel's operation are treated as Ballast Tanks. Cargo tanks in which water ballast might be carried only in exceptional cases per **MARPOL Annex I/18.3** are to be treated as cargo tanks.
- (2) "Close-up survey" is a survey where the details of structural components are within the close visual inspection range of the Surveyor, i.e. preferably within reach of hand.
- (3) "Longitudinal members in the transverse section" include all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and longitudinal bulkheads in the considered transverse section.
- (4) "Representative tanks/spaces" are those which are expected to reflect the condition of other tanks/spaces of similar types and service and with similar corrosion prevention systems. When selecting representative tanks/spaces, account is to be taken of the service and repair history on board and identifiable critical structural areas and/or suspect areas.
- (5) "Suspect areas" are locations showing substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.
- (6) "Substantial corrosion" is an extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75% of allowable margins, but within acceptable limits. Notwithstanding the above, for the following (a) to (c), "substantial corrosion" is an extent of corrosion such that the assessment of the corrosion pattern indicates a gauged (or measured) thickness which is within the range of 0.5mm to the renewal thickness stipulated in the relevant provisions. "Renewal thickness" refers to the minimum allowable thickness below which the renewal of structural members is to be carried out.
  - (a) For ships complying with the provisions of **Part CSR-B**, **Part CSR-T** or **Part CSR-B&T**.
  - (b) For hatch covers and hatch coamings for cargo holds of the ships stipulated otherwise by the Society.
  - (c) For transverse watertight bulkheads in cargo hold complying with the provision of **Annex 1.1**, **Part 2-2**, **Part C** or **Chapter 31B**, **Part C**.
- (7) "Corrosion Prevention System" is normally considered a full hard coating.
- (8) Coating condition is defined as follows:
 

"Good": condition with only minor spot rusting;

"Fair": condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for poor condition;

"Poor": condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under

consideration.

- (9) "Cargo length area" is that part of the ship which includes all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.
- (10) "Oil" is petroleum including crude oil, heavy fuel oil, lubricating oil, light oil, kerosene, gas oil, and others prescribed by the relevant laws and regulations.
- (11) "Oil tankers" are ships constructed or adapted for the carriage of oil in bulk in cargo tanks forming an integral part of the ship's hull, including chemical carriers intended to carry oil in bulk and combination carriers which are designed to carry either oil or solid cargoes in bulk, such as ore/oil carriers and ore/bulk/oil carriers but excluding ships carrying oil in independent tanks not part of the ship's hull such as asphalt carriers.
- (12) "Double hull oil tankers" are ships which belong to oil tankers specified in (11) above, which have the cargo tanks forming an integral part of the ship's hull and are protected by a double hull which extends for the entire length of the cargo area, consisting of double sides and double bottom spaces for the carriage of water ballast or void spaces, and includes existing double hull tankers not complying with **3.2.4, Part 3 of the Rules for Marine Pollution Prevention Systems** but having double hull structure.
- (13) "Bulk carriers" are ships defined as the following:
  - (a) Ships constructed or converted with a single deck, topside tanks and hopper side tanks in cargo spaces, and intended primarily to carry dry cargoes in bulk
  - (b) Ships constructed or converted with a single deck, two longitudinal bulkheads and a double bottom throughout the cargo spaces, and intended primarily to carry ore cargoes in the centre holds only
  - (c) Combination carriers which are designed to carry either oil or solid cargoes in bulk, such as ore/oil carriers and ore/bulk/oil carriers, and have the same construction as the ships defined in (a) or (b) above
- (14) "Double Skin Bulk carriers" are ships, which belong to bulk carriers specified in (13) above, in which all cargo holds are bounded by a double-side skin (regardless of the width of the wing space).
- (15) "General dry cargo ships" are ships constructed or converted to carry solid cargoes other than:
  - bulk carriers;
  - self-unloading ships;
  - container carriers;
  - ro-ro cargo ships;
  - car carriers;
  - refrigerated cargo ships;
  - dedicated wood chip carriers; and
  - dedicated cement carriers
  - ships of double side-skin construction, with double side-skin extending for the entire length of the cargo area, and for the entire height of the cargo hold to the upper deck
- (16) "Ships carrying timber cargoes" are cargo ships which belong to general dry cargo ships specified in (15) above and which have marked timber load lines in accordance with the requirements in **Part V** or primarily carry log cargoes.
- (17) "Ships carrying liquefied gases in bulk" refers to the definition in **2.1.42, Part A**.
- (18) "Ships carrying dangerous chemicals in bulk" refers to the definition in **2.1.43, Part A**.
- (19) "Self-unloading ships" are ships constructed generally with single deck, double bottom, hopper side tanks and topside tanks in the cargo length area and equipped with self-unloading facilities for dry cargoes in bulk.
- (20) "Ships using low-flashpoint fuels" refers to the ships defined in **2.1.44, Part A**.
- (21) "Anniversary Date" is the day corresponding to the expiry date of the Classification Certificate, excluding the expiry date of the Classification Certificate.
- (22) "Pitting corrosion" is defined as scattered corrosion spots/areas with local material reductions which are greater than the general corrosion in the surrounding area. Pitting intensity is defined in **Fig. B1.1**.
- (23) "Edge corrosion" is defined as local corrosion at the free edges of plates, stiffeners, primary support members as well as around openings. An example of edge corrosion is shown in **Fig. B1.2**.
- (24) "Grooving corrosion" is defined as local corrosion adjacent to weld joints along abutting stiffeners or at stiffener or plate butts

or seams. An example of grooving corrosion is shown in [Fig. B1.3](#).

- (25) The terminology used in the application of propeller shaft and stern tube shaft surveys is as specified in [Chapter 8](#).
- (26) “Remote inspection techniques” is a means of survey that enables examination of any part of the structure using such as unmanned aerial vehicles or drones without the need for direct physical access of the surveyor on site.
- (27) “Electric propulsion ships” are ships which rely solely on electric propulsion motors for their propulsion.
- (28) “Electric propulsion plants” are the following electrical installations of electric propulsion ships.
- (a) Generating plants for propulsion
  - (b) Electric motors for propulsion
  - (c) Electrical installations that are necessary for the satisfactory operation of (a) and (b) (e.g. control gears for electric motors, semiconductor converters, and transformers)
- (29) “Remote survey” is a process for verifying that ships and its equipment are in compliance with the Rules of the Society where the verification is undertaken, or partially undertaken, without attendance on site by a Surveyor.

Fig. B1.1 Pitting Intensity Diagram

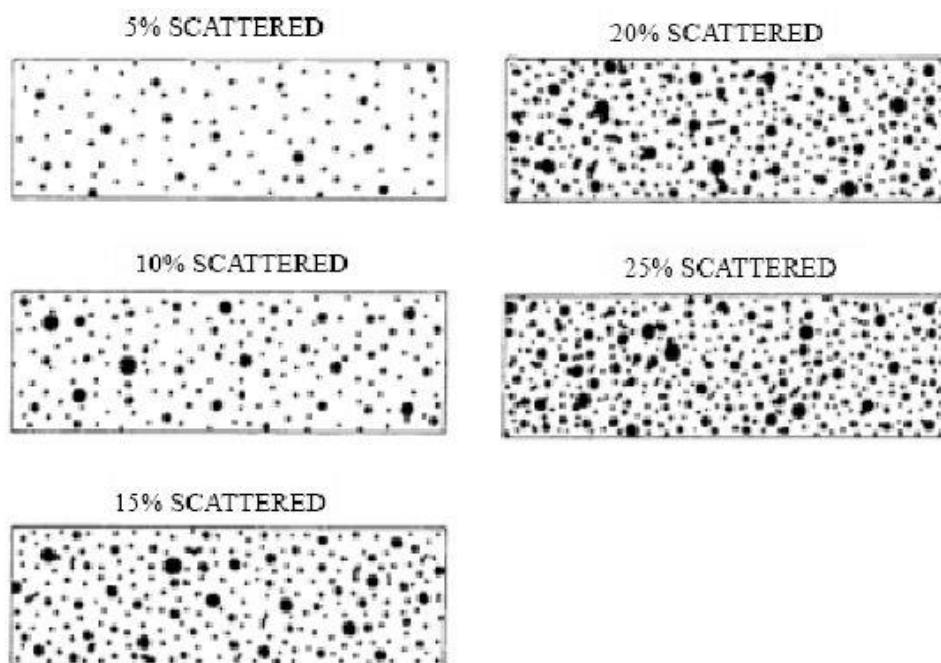


Fig. B1.2 Edge Corrosion

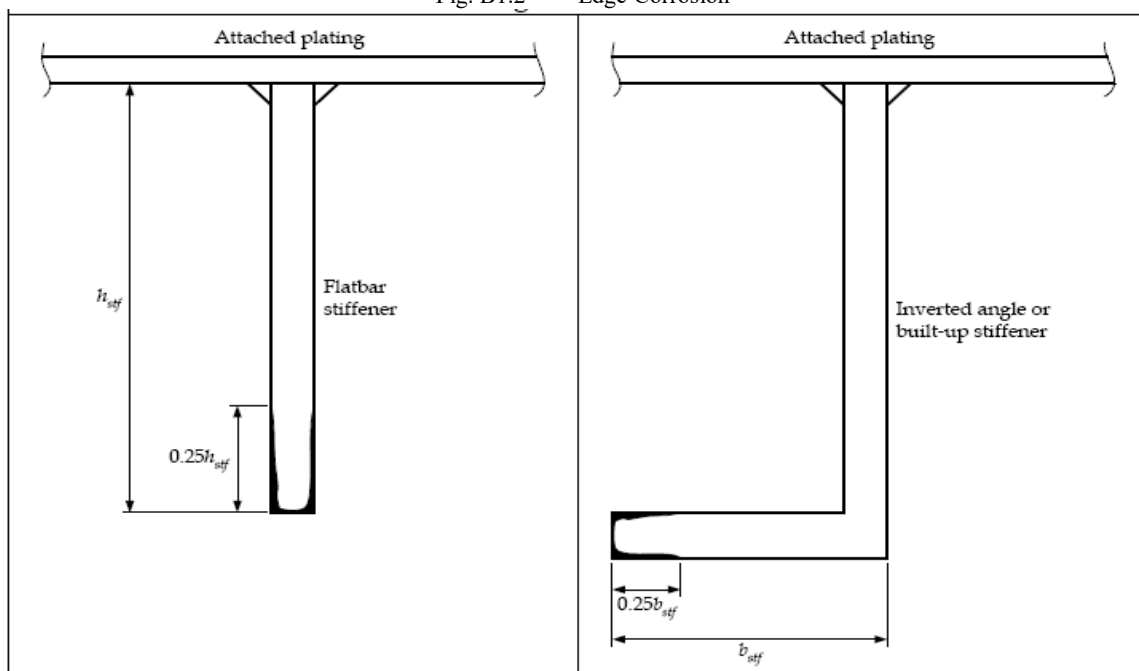
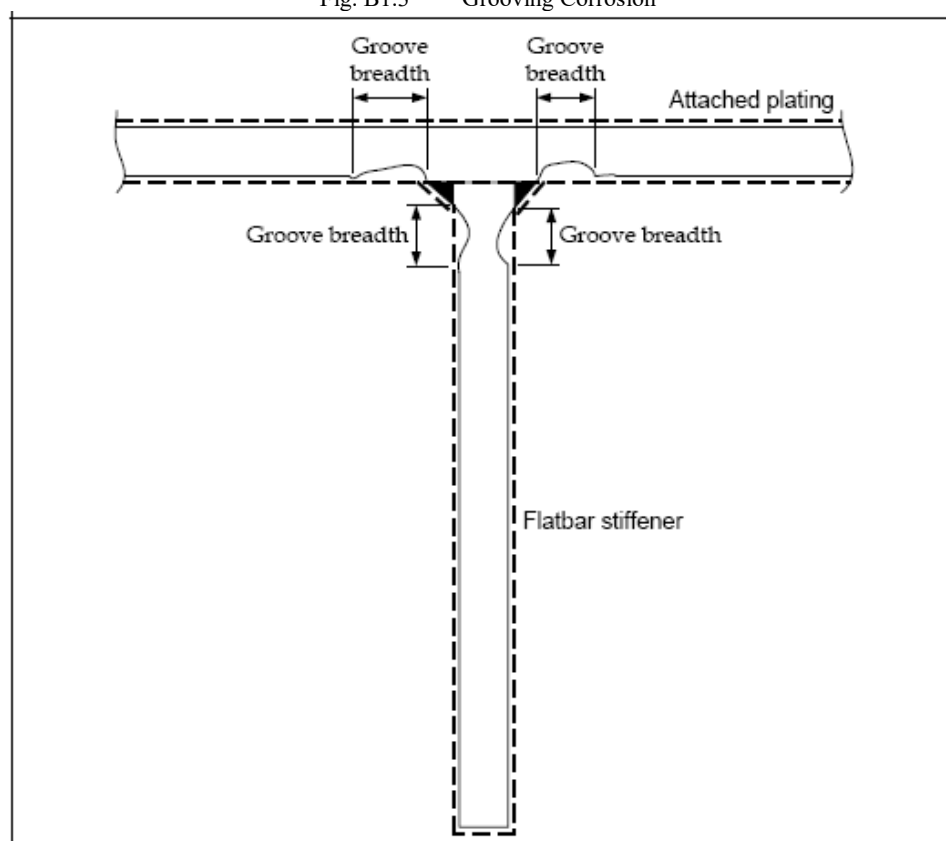


Fig. B1.3 Grooving Corrosion



## 1.4 Preparation for Survey and Other Items

### 1.4.1 Notification

When a ship is to be surveyed in accordance with the Rules, it is the responsibility of the owners to notify the Surveyor at the place where they wish to undergo the survey. The Surveyor is to be advised of the survey a reasonable time in advance so that the

survey can be carried out at the proper time.

#### **1.4.2 Preparation for Surveys\***

1 All such preparations as required for classification, periodical and other surveys and thickness measurements specified in this part as well as those which may be required as necessary by the Surveyor in accordance with the provisions in this Part are to be made by the Owners or their representatives at their responsibilities. The preparations are to include provisions of an easy and safe access, necessary facilities, certificates and records for the execution of the survey and thickness measurements, open-up examinations of equipment, removal of obstructions and cleaning. Inspection, measuring and test equipment, which Surveyors rely on to make decisions affecting classification are to be individually identified and calibrated to a standard deemed appropriate by the Society. However, the Surveyor may accept simple measuring equipment (e.g. rulers, measuring tapes, weld gauges, micrometers) without individual identification or confirmation of calibration, provided they are of standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces. The Surveyor may also accept equipment fitted on board a ship and used in examination of shipboard equipment (e.g. pressure, temperature or rpm gauges and meters) based either on calibration records or comparison of readings with multiple instruments.

2 An applicant is to submit a Survey Programme (e.g. **Survey Programme and Survey Planning Questionnaire for BC and OC** or **Survey Programme and Survey Planning Questionnaire for OT and CT**) that details survey items as part of the preparation for the Special Survey of oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks and for the Intermediate Surveys of bulk carriers, oil tankers and ships carrying dangerous chemicals in bulk with integral tanks over 10 years of age. To ships which do not engage in international voyage and classed for restricted service, such as having the class notation “Coasting Service”, “Smooth Water Service”, etc., this requirement need not apply.

3 An applicant for survey(s) is to arrange a supervisor (hereinafter referred to as “owner’s representative”) who is well conversant with the intended survey items for the preparation of the survey in order to provide the necessary assistance to the Surveyor according to his requests during the surveys.

4 Prior to the commencement of survey and measurement, a survey planning meeting is to be held by the surveyor(s), the owner’s representative, the thickness measurement company representative, where involved, and the master of the ship or an appropriately qualified officer of the ship appointed by the master, ship owner or Company so as to ensure the safe and efficient conduct of the survey and measurement work to be carried out.

#### **1.4.3 Suspension of Surveys**

Surveys may be suspended where necessary preparations as specified in **1.4.2-1** and **-2** have not been made, any appropriate attendant in accordance with **1.4.2-3** is not present, or the Surveyor considers that the safety for execution of the survey is not ensured.

#### **1.4.4 Disposition when Repairs are Considered Necessary as a Result of Surveys\***

1 When repairs are considered to be necessary as a result of surveys, the Surveyor notifies his findings to the survey applicant. The applicant, when he receives such notification, is to obtain the Surveyor’s verification after carrying out the necessary repairs.

2 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or will affect the ship’s structural, watertight or weathertight integrity, is to be promptly and thoroughly repaired. However, for locations where adequate repair facilities are not available, it may allow the ship to proceed directly to a repair facility subject to approval by the Administration. This may require discharging the cargo and/or temporary repairs for the intended voyage.

3 When a survey results in the identification of corrosion or structural defects, either of which will impair the ship’s fitness for continued service, remedial measures are to be implemented before the ship continues in service.

4 Where the damage found on the structure is isolated and of a localized nature which does not affect the ship’s structural integrity (as for example a minor hole in a cross-deck strip), consideration may be given by the surveyor to allow an appropriate temporary repair to restore watertight or weather tight integrity after evaluation of the surrounding structure and impose an associated Condition with a specific time limit in order to complete the permanent repair and retain classification.

#### **1.4.5 Procedure for Tests, Wear and Tear, etc.**

##### **1 Speed Trial**

A Speed trial is to be carried out at the Class Maintenance Survey, where alterations or repairs which might affect the ship’s speed have been made. A Speed trial or a trial of the ship’s propulsion machinery may be required where deemed necessary by the Surveyor at any survey.



## 2 Inclining Test

Where alterations or repairs which might greatly affect the ship's stability have been made and/or the Surveyor deems it necessary, **2.3.1-5** is to be followed to determine the need for re-inclining tests, and the need for amending stability information.

## 3 Repairs for Wear and Tear

Where the thicknesses of materials of hull structure, scantlings of equipment, etc. become less than the stipulated wear and tear limits, these are to be replaced by new ones having either the original scantlings at the time of construction or the scantlings deemed appropriate by the Society. Where, however, the original scantlings were larger than the required ones, or where deemed appropriate by the Surveyor, allowances may be made in regards to location, extent, kind, etc. of the wear and tear.

## 4 Replacement of fittings, equipments and parts, etc.

In cases where it is necessary to replace any fittings, equipment or parts, etc. used onboard, replacements are to comply with the regulations to be applied during ship construction. However, in cases where new requirements are specified or where deemed necessary by the Society, the Society may require that such replacements comply with any new requirements in effect at the time the relevant replacement work is carried out. In addition, replacements are not to use any materials which contain asbestos.

### 1.4.6 Firms Engaged in Inspections, Measurements and Maintenance\*

1 Unless otherwise specified, third parties engaged in thickness measurements, in-water surveys by divers or remote operated vehicles, close-up surveys using remote inspection techniques, or tightness testing of closing appliances such as hatches, doors, etc., with ultrasonic equipment are to be firms deemed appropriate by the Society.

2 Unless otherwise specified, third parties engaged in inspections and maintenance of fixed fire extinguishing systems, portable fire extinguishers, self contained breathing apparatuses, emergency escape breathing devices or fire detection and alarm systems are to be firms deemed appropriate by the Society.

3 Unless otherwise specified, third parties engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems are to be firms deemed appropriate by the Society.

## 1.5 Others

### 1.5.1 Portable Atmosphere Testing Instruments for Enclosed Spaces\*

Ships of not less than 500 *gross tonnage* engaged on international voyages (except steel barges, submersibles) are to carry an appropriate portable atmosphere testing instrument or instruments. As a minimum, these are to be capable of measuring concentrations of oxygen, flammable gases or vapours, hydrogen sulphide and carbon monoxide prior to entry into enclosed spaces. Instruments carried under other requirements may satisfy this regulation. Suitable means are to be provided for the calibration of all such instruments.

### 1.5.2 Remote Inspection Techniques (RIT)

1 For surveys using RIT, inspection plans are to be submitted to the Society for approval prior to the surveys being carried out.

2 For surveys using RIT, the information normally obtained from a survey is to be provided.

3 Surveys using RIT are to be in accordance with IACS Recommendation No.42 in addition to the requirements specified in **1.5.2**.

4 The equipment and procedures for observing and reporting the surveys using RIT are to be discussed and agreed with the parties involved prior to the survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.

5 The structure to be examined using RIT is to be sufficiently clean to permit meaningful examination and visibility is to be sufficient to allow for a meaningful examination. The method of orientation on the structure is to be at the discretion of the Society.

6 The method of data presentation including pictorial representation is to be at the discretion of the Society. Good two-way communication between the surveyor and RIT operator is to be provided.

7 If the RIT reveals damage or deterioration that requires attention, the surveyor may require a traditional survey to be undertaken without the use of RIT.

### 1.5.3 Class Survey Carried by Means of Remote Survey

Although the survey method for class maintenance survey is generally attendance on site by a Surveyor, the Society may approve survey methods different from the traditional ordinary survey with attendance by a Surveyor, provided that survey is carried out in accordance with the requirements specified in **Annex 1.5.3 "CLASS MAINTAINANCE SURVEY BY MEANS OF REMOTE SURVEY"**. However, in the case of matters stipulated in international conventions or instructions from Administrations, this may only be done with Administration acceptance.

## Chapter 2 CLASSIFICATION SURVEYS

### 2.1 Classification Survey during Construction

#### 2.1.1 General\*

1 When it is intended to build a ship for classification by the Society, the hull and equipment, machinery, fire protection and detection, means of escape, fire extinction, electrical installation, stability and load lines are to be ascertained that they meet the relevant requirements in the Rules.

2 When it is intended to build a ship for classification by the Society, a ship is to be constructed under quality control system in order to ascertain appropriate quality. For the purpose, the Society examine the situation for facility, technology and quality control related to construction of ships.

#### 2.1.2 Construction Monitoring

1 For ships subject to *SOLAS Chapter II-1 Regulation 3-10*, the critical structural areas during construction are to be based upon a construction monitoring plan in accordance with the “Guidelines for Hull Construction Monitoring” issued separately by the Society.

2 Notwithstanding -1 above, other ships may be based upon a construction monitoring plan in accordance with the “Guidelines for Hull Construction Monitoring” upon request.

#### 2.1.3 Submission of Plans and Documents

1 When it is intended to build a ship for classification by the Society, the applicable plans and documents specified in (1) to (6) below are to be submitted. The plans and documents to be approved by the Society are “Plans and Documents for Approval”, the plans and documents including all alternation during the work are “Finished Plans”, the plans and documents except “Plans and Documents for Approval” and “Finished Plans” are “Other Plans and Documents” (hereinafter same in this chapter). Plans and Documents for Approval and Other Plans and Documents are to be submitted to the Society before the work is commenced and Finished Plans are to be submitted to the Society at the completion of a classification survey.

- (1) Plans and Documents for Approval, Other Plans and Documents and Finished Plans (Submission) related to hull specified in **Table B2.1**.
- (2) Plans and Documents for Approval, Other Plans and Documents and Finished Plans (Submission) related to machinery specified in **Table B2.2**.
- (3) For ships subject to **Part N**, Plans and Documents for Approval, Other Plans and Documents and Finished Plans (Submission) related to ships carrying liquefied gases in bulk specified in **Table B2.3** in addition to (1) and (2) above.
- (4) For ships subject to **Part S**, Plans and Documents for Approval, Other Plans and Documents and Finished Plans (Submission) related to ships carrying dangerous chemicals in bulk specified in **Table B2.4** in addition to (1) and (2) above.
- (5) For ships subject to **Part GF**, Plans and Documents for Approval, Other Plans and Documents and Finished Plans (Submission) related to ships using low-flashpoint fuels specified in **Table B2.5** in addition to (1) and (2) above.
- (6) Plans and documents other than (1) to (5) above when deemed necessary by the Society.

2 Plans and documents specified in -1 above are to be in accordance with (1) to (5) below.

- (1) Hull structural plans are to include scantling details, material details, location of butts and seams, cross section details as necessary, details of welding such as sizes and proportions applicable to the ship, and other necessary information unless specified otherwise.
- (2) For hull structures subject to **An3.6, Annex 1.1, Part 2-2, Part C**, renewal thicknesses are to be indicated in the relevant plans.
- (3) For structural members of ships subject to *SOLAS Chapter II-1 Regulation 3-10*, net (renewal) scantlings, as built scantlings and voluntary addition thickness are to be indicated.
- (4) Related plans and documents are to indicate in detail the quality of materials used, scantlings and arrangements of structural members, their attachments, clearance between the bottom of boilers and the top of floors, and other particulars necessary for examination of proposed constructions.
- (5) For plans and documents specified in -1 above, where the information is included in plans and documents, the submission of the other plans and documents related to the information may be dispensed with.

3 The applicant specified in **2.3, Chapter 2, Regulations for the Classification and Registry of Ships** is to submit the plans and documents specified in **-1** above to the Society in accordance with **(1)** to **(3)** below.

- (1) Where the submission of plans and documents by paper, 2 sets for the Society and necessary sets for returning to the applicant are to be submitted.
- (2) Where the submission of plans and documents electrically, the plans and documents are to be submitted using the systems prepared by the Society.
- (3) Where the submission of plans and documents by means other than **(1)** and **(2)** above, the plans and documents are to be submitted by the means deemed appropriate by the Society.

4 Where the applicant specified in **2.3, Chapter 2 Regulations for the Classification and Registry of Ships** intends to obtain approval of plans and documents in advance due to the preparation of work, an application for prior approval of plans and documents is to be submitted to the Society. When an application for classification survey is submitted, an application for prior approval of plans and documents is automatically transferred to the application for classification survey.

#### **2.1.4 Plans and Documents to be Maintained On Board\***

At the completion of a classification survey, the plans and documents specified in **(1)** to **(7)** below are to be on board. Duplicate plans and documents are not required.

- (1) Finished Plans(On Board) specified in **Table B2.1** and **Table B2.2**.
- (2) For ships subject to **Part N**, Finished Plans(On Board) specified in **Table B2.3** in addition to **(1)** above.
- (3) For ships subject to **Part S**, Finished Plans(On Board) specified in **Table B2.4** in addition to **(1)** above.
- (4) For ships subject to **Part GF**, Finished Plans(On Board) specified in **Table B2.5** in addition to **(1)** above.
- (5) For ships engaged on international voyages, the Ship Construction File specified in **Table B2.1** in addition to **(1)** above.
- (6) Notwithstanding **(5)** above, for ships complying with *SOLAS Chapter II-1 Regulation 3-10*, the Ship Construction File specified in **Table B2.1** in addition to **(1)** above. The construction file is to be included the information specified in **Table B2.6**.
- (7) Plans and documents other than **(1)** to **(6)** above when deemed necessary by the Society.

#### **2.1.5 Storage of Ship Construction Files**

1 Plans and documents to be included in the Ship Construction Files for ships engaged on international voyages and subject to *SOLAS Chapter II-1 Regulation 3-10* do not need to be actually in the file nor stored at the same location, provided that the location, status and other necessary information of such documents are addressed in the file.

2 Ship Construction Files for ships subject to *SOLAS Chapter II-1 Regulation 3-10* are to be maintained in accordance with **(1)** to **(4)** below.

- (1) Some parts of Ship Construction Files may be subject to various degrees of or otherwise restricted access and such documentation may be appropriately kept in an onshore archive deemed appropriate by the Society. In such cases, procedures to access the information kept in said archive are to be specified in Ship Construction Files kept on board the ship. Finally, all intellectual property provisions within the Ship Construction File are to be duly complied with.
- (2) Ship Construction Files are to be available to the Society and flag states throughout the ship's life.
- (3) Plans and documents included in Ship Construction Files for which the normal storage location is specified as an onshore archive in **Table B2.6** are to be available on board.
- (4) Ship Construction Files are to be appropriately updated for major events, including but not limited to substantial repairs and corrosion, or modifications to the ship structure. Documented procedures for updating Ship Construction Files are to be included within safety management systems.

#### **2.1.6 Coating and Corrosion Resistant Steel Technical Files**

##### **1 Coating Technical Files**

For the coatings of internal spaces, the coating technical files are to include at least **(1)** to **(7)** below.

- (1) A copy of the statement of compliance or type approval certificate.
- (2) A copy of the technical data sheet that includes **(a)** to **(f)** below.
  - (a) Product name and identification mark and/or number
  - (b) Materials, components and composition of the coating system, colours
  - (c) Minimum and maximum dry film thickness
  - (d) Application methods, tools and/or machines

- (e) Condition of surface to be coated (de-rusting grade, cleanliness, profile, etc.)
- (f) Environmental limitations (temperature, humidity, etc.);
- (3) Shipyard work records of coating application that includes (a) to (e) below.
  - (a) Applied actual space and area (in *square metres*) of each compartment
  - (b) Applied coating system
  - (c) Time of coating, thickness, number of layers, etc.
  - (d) Ambient condition during coating
  - (e) Method of surface preparation
- (4) Procedures for inspection and repair of coating system during ship construction;
- (5) Coating log issued by the coating inspector, stating that the coating was applied in accordance with the specifications to the satisfaction of the coating supplier representative and specifying deviations from the specifications, see *IMO Resolution MSC.215(82) Annex 2* or *MSC.288(87) Annex 2* for an example of the daily log and non-conformity report;
- (6) Shipyard's verified inspection report that includes (a) to (d) below.
  - (a) Completion date of inspection
  - (b) Result of inspection
  - (c) Remarks (if given)
  - (d) Coating inspector's signature
- (7) Procedures for in-service maintenance and repair of coating system.

## 2 Corrosion Resistant Steel Technical Files

Corrosion resistant steel technical files are to include at least (1) to (3) below.

- (1) Copy of Type Approval Certificate.
- (2) Technical data that includes (a) and (b) below.
  - (a) Approved welding methods and welding consumables
  - (b) Repairing methods recommended by the manufacturer (if any)
- (3) Records of the application that includes (a) and (b) below ((a) and (b) may be substituted for by hull related approved drawings in cases where the required information is given in the plans):
  - (a) Applied actual space and area of each compartment.
  - (b) Applied product and its thickness.

### 2.1.7 Survey

#### 1 General

- (1) For Classification surveys during Construction, the survey items specified in 2.1.7 is to be implemented.
- (2) For the surveys, the applicant is to prepare test plans for review by the Society prior to survey. Test and measurement records are to be submitted to the Society, as required.
- (3) Surveys may be carried out at manufacturing sites in cases where said surveys may be difficult to carry out at shipyards.
- (4) For the ships subject to alternative design and arrangement in accordance with the Rules, the assessment and approval are to be implemented in accordance with the Rules.
- (5) The presence of surveyors may be increased or decreased based on the actual status of facilities, technical abilities and quality control at the place of manufacture, except in the case of sea trials.
- (6) In addition to the items specified in this 2.1.7, other surveys may be required in cases where deemed necessary by the Society.
- (7) To ascertain the common understanding of applicable Rules, survey items during construction and the details of means and so on, a kick-off meeting between the Society and the survey applicant is to take place prior to the commencement of the survey.
- (8) In order to have a common understanding of the applicable requirements and recognised fabrication standards (RFS), and the details of each survey item during construction and their survey methods, etc., the Society is to hold kick-off meetings with applicants of registration surveys during construction prior to the commencement of such surveys. The quality standards to be applied are to be in accordance with (a) and (b) below.
  - (a) Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. Structural fabrication is to be in accordance with *IACS Recommendation 47 "Shipbuilding and Repair Quality Standard"* (*IACS Rec.47*), or a RFS which has been accepted by the Society prior to the commencement of

fabrication or construction.

- (b) Where an RFS other than *IACS Rec.47* is applied, the shipyard is to create a summary document referencing the RFS to be used in construction, highlighting any limitations to usage of the selected RFS, a comparison of the tolerance and fabrication standards of the selected RFS with those of *IACS Rec.47*, etc. This summary document is to be included with the “record of kick-off meeting” for the ship. For ships subject to *SOLAS* Chapter II-1 Regulation 3-10, the summary document is also to be included in the Ship Construction File.

- (9) Materials which contain asbestos are not being used.

## 2 Hull and equipment

For hull and equipment, relevant items in **Table B2.7** are to be implemented.

## 3 Machinery and Electrical Equipment

For machinery and electrical equipment, relevant items in **Table B2.8** are to be implemented.

## 4 Fire Protection, Means of Escape and Fire Fighting Equipment

For fire protection, means of escape and fire fighting equipment, relevant items in **Table B2.9** are to be implemented.

## 5 Ship Construction File

The survey for Ship Construction Files specified in **2.1.4(6)** are to be implemented in accordance with **(1)** to **(4)** below.

- (1) Ship Construction Files stored on board and in onshore archives are to contain **(a)** and **(b)** below.

- (a) Plans and documents required by **Table B2.1** and **Table B2.6**.

- (b) Additional drawings or documents provided by shipyards in accordance with the Ship Construction File’s list of plans and documents.

- (2) Storage locations of plans and documents are to be specified as either “on board” or “onshore archive”. For the plans and documents for which the normal storage location is specified as onshore archive in **Table B2.6**, that storage location of such plans and documents are to be stored on board.

## 6 Verification of Coating Application

For the coatings of internal spaces subject to **3.3.5.3** and **3.3.5.4, Part 1, Part C of the Rules**, and **22.4.2** or **22.4.3, Part CS of the Rules**, the items specified in **Table B2.10** are to be implemented prior to reviewing the coating technical files for dedicated seawater ballast tanks, etc. and cargo oil tanks.

## 7 Sea Trials

In the classification survey of all ships, the tests specified in **Table B2.11** and **Table B2.12** are to be implemented in the full load condition, in the calmest possible sea and weather condition, and in the sufficiently deep unrestricted water. However, where sea trials cannot be implemented in the full load condition, sea trials may be implemented in another loaded condition deemed appropriate. The noise measurements specified in **Table B2.11** are to be carried out at either the full load condition or the ballast condition.

## 8 Stability Experiments

- (1) In the classification survey, stability experiments(inclining tests and oscillation tests) are to be implemented upon completion of the ship. The lightship displacement and the longitudinal, transverse and vertical position of its centre of gravity are to be determined. A stability information booklet, which is to be prepared on the basis of the particulars of stability determined by the results of stability experiments.
- (2) For inclining tests, **Annex 2.3.2 “Guidance for Inclining Test”** gives the standard method.
- (3) The stability experiments of an individual ship may be dispensed with, provided that reliable stability data is obtained from the stability experiments of a sister ship or other adequate means and a special approval is given by the Society.
- (4) Where a stability instrument is fitted on board the ship, an operation manual for the instrument is to be provided on board. A functional test for the stability instrument is to be implemented.

## 9 Loading Tests

For the registration of ships carrying liquefied gases in bulk intended to load the cargoes which are required the test under actual loading condition, loading tests are to be implemented. However, the test may be implemented at the first loading after completion of the classification survey in case that the ship cannot be loaded with its intended cargoes.

## 2.2 Classification Survey of Ships Not Built under Survey

### 2.2.1 General\*

1 In Classification Surveys of Ships Not Built under Survey, examinations of the hull and equipment, machinery, fire protection and detection, means of escape, fire fighting system, electrical installations, stability and load lines are required for the Special Survey corresponding to the ship's age in order to ascertain they meet relevant requirements in the Rules. In addition, the actual scantlings of the main parts of ships are to be measured.

2 For ships subject to -1 above intending to implement a Classification Survey of Ships Not Built under Survey, necessary plans and documents are to be submitted to the Society in accordance with 2.1.3.

3 For ships, subject to -1 above intending to implement a Classification Survey of Ships Not Built under Survey, the documents specified in (1) to (6) below are to be submitted to the Society in addition to the plans and documents specified in -2 above.

- (1) Ship inspection records or copies of survey reports
- (2) Record of official sea trial (where no records of official sea trials are available, a sea trial is to be carried out)
- (3) Stability information (where no stability information is available, inclining tests are to be carried out in accordance with 2.1.7-8)
- (4) For ships carrying liquefied gases in bulk, test reports for loading test (Where no test reports or enough service records, loading tests are to be carried out in accordance with 2.1.7-9)
- (5) Copies of classification certificate, statutory certificate and certificate of registry
- (6) Other documents showing the ship's history and particulars (as much as possible)

4 Where examination of the plans and documents specified in -1 and -2 above is made by the Society, the results will be notified to the applicant. Where sufficient examination cannot be done on the submitted plans and documents due to lack of information, the Society may require an on-board inspection.

5 For ships, subject to -1 above intending to implement a Classification Survey of Ships Not Built under Survey, the plans and documents required to be kept on board are to be in accordance with 2.1.4.

6 For ships which appear to have some drawback regarding classification with the Society, a preliminary investigation may be made by the Society.

#### 7 Modification of Survey Requirements

- (1) Where the owner wishes to postpone a part of the survey and the Society deems it appropriate, postponement may be approved based on examinations of the present condition and seaworthiness of the ship. The postponed examinations are to be completed within one year.
- (2) Depending on the situation, special consideration may be given to the requirements for Classification Surveys of Ships Built under Government Survey provided that a year has not passed since the ship was completed and the next Special Survey is made to coincide with the due date of the next government Special Survey.

8 Where the applicant specified in 2.3, Chapter 2 Regulations for the Classification and Registry of Ships intends to obtain approval of plans and documents in advance due to the preparation of work, an application for prior approval of plans and documents is to be submitted to the Society. When an application for classification survey is submitted, an application for prior approval of plans and documents is automatically transferred to the application for classification survey.

9 Notwithstanding -1 and -2 above and 2.2.2 below, Classification Surveys of Ships Not Built under Survey may be implemented by other equivalent survey methods in cases where deemed appropriate by the Society.

### 2.2.2 Hydrostatic Tests, Watertight Tests, and Relevant Tests

In the classification survey specified in 2.2.1, sea trials are to be carried out after the following items have been completed: hydrostatic tests and watertight tests in accordance with (1) and (2) below; maintenance of machinery and determination of the working pressure of the boilers; and adjustment of safety valves and accumulation tests of the boilers. Tests and trials may be dispensed with at the discretion of the Society with the exception of hydrostatic tests of boilers and pressure vessels of which important parts have been newly repaired, main steam pipes, and air tanks of which the interior cannot be inspected; and tests for gas leakage of refrigerating machinery on board.

- (1) Double bottoms, both peaks, tanks, cofferdams and chain lockers, watertight bulkheads and shaft tunnels are to be tested as specified in item 10(1), Table B2.7.

- (2) Hydrostatic, leakage or airtight tests are to be carried out on machinery and its parts at the pressures specified in the relevant chapters of **Part D**.

## 2.3 Alterations

### 2.3.1 Examinations of Altered Parts\*

**1** In cases where ships classified by the Society undergo repairs, alternations, modifications and related outfitting related to thereto(hereinafter referred to as “modifications, etc.”) for hull and equipment, machinery, fire protection and detection, means of escape, fire fighting system, electrical installations, stability and load lines, such ships are to continue to at least comply with any previously applicable requirements.

**2** If ships constructed before the date on which any relevant amendments enter into force, are, as a rule, to comply with any requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such modifications, etc.

**3** In cases where ships undergo modifications, etc. which affect main particulars (hereinafter referred to as “major conversion”), the concerned ship is to comply with requirements in force at the time of such modifications, etc. In cases where the Society agrees that it is difficult to apply new requirements, such requirements may be waived subject to Administration agreement. A major conversion, for example, refers to (but is not limited to) **(1)** to **(3)** below.

- (1) Alteration of the dimensions of a ship; for example, the lengthening of a ship by adding a new midbody. The hull structure, machinery and equipment are to comply with all requirements in force at time of alteration. For example, in the case of the lengthening of a ship, the new midbody is to comply with all relevant requirements (for example, longitudinal strength and equipment numbers.) which are affected by such alteration.
- (2) Change of ship type; for example, the conversion from tanker to bulk carrier.
- (3) Modification of construction which affects necessary requirements related to ship subdivisions. For ships not falling under any of **(a)** to **(c)** below, with respect to Required Subdivision Index (*R*) and Attained Subdivision Index (*A*) that are specified in **2.3.2, Part 1, Part C**, it is demonstrated that the *A/R* ratio calculated for the ship after such a modification is not less than the *A/R* ratio calculated for the ship before the modification. However, in cases where the ship's *A/R* ratio before modification is equal to or greater than 1, it is necessary that the ship's *A/R* ratio after modification be equal to or greater than 1.
  - (a) Ships for which the building contract is placed on or after 1 January 2020.
  - (b) In the absence of a building contract, the keel of ships is laid or which are at a similar stage of construction on or after 1 July 2020.
  - (c) The delivery of ships is on or after 1 January 2024.

**4** “Requirements in force at the time of alteration” are those requirements, unless otherwise specified, for a conversion constructed after either of the dates specified in **(1)** and **(2)** below.

- (1) The date on which the contract is placed for the conversion.
- (2) In the absence of a contract, the date on which the work identifiable with the specific conversion begins.

**5** The necessity for re-inclining tests and amending stability information for ships subject to major conversions is to be in accordance with **(1)** to **(3)** below. In this sub-paragraph, “Stability information” includes any document (whether on paper or electronic) or electronic means of calculation of stability which includes lightship properties. This may include, but is not limited to, approved stability books, computer software for onboard calculations of stability, approved strength books and loading instruments.

- (1) The determination of the necessity for re-inclining tests and amending stability information is to be in accordance with **Table B2.13**.
- (2) Where the stability information has been amended in accordance with **(1)** above to reflect the lightship properties derived from the lightweight calculation, it is to be approved by the Society and provided to the ship's master with instructions that it is now to be used for all stability calculations.
- (3) Where it is judged in accordance with **(1)** above that re-inclining tests and amending stability information are not necessary, ships are to be in accordance with **(a)** and **(b)** below. In this context, “lightship properties” means the weight and the centre of gravity of ships.
  - (a) A copy of the lightweight calculation report endorsed by the Society is to be provided on board for future reference with

no further amendments required to the stability information. “Lightweight calculation” means a detailed calculation of weights added to, removed from, and relocated on a ship, resulting from all alterations to the ship since the date of the last approved inclining test to determine the adjusted lightship properties. The documented weights and their centres of gravity are to be verified on board or on site by the attending Society surveyor.

- (b) Deviations of lightship properties are, however, still to be noted in the stability information on board for reference and applied to all future references and stability/loading calculations.

6 The tightness of such boundaries is to be verified by the tests specified in [Annex 2.1.5 “Testing Procedures of Watertight Compartments”](#) in cases where modifications or repairs that affect the tightness of such boundaries have been carried out.

7 The astern response characteristics of ships considered by the Society to have undergone significant repairs which impact the response characteristics of their propulsion systems are to be verified in accordance with [Table B2.11](#) after such repairs are carried out. Tests are to demonstrate the satisfactory operation of the equipment or system under realistic service conditions at least over the manoeuvring range of the propulsion plant in both the ahead and astern directions. Depending on the actual extent of the repairs, the Society may accept a reduction of the test plan.

8 For ships where selective catalytic reduction systems, exhaust gas cleaning systems or exhaust gas recirculation systems are newly installed, applicable surveys for the relevant systems are to be carried out in accordance with relevant requirements in this chapter.

9 Where the applicant specified in [2.3, Chapter 2 Regulations for the Classification and Registry of Ships](#) intends to obtain approval of plans and documents in advance due to the preparation of work, an application for prior approval of plans and documents is to be submitted to the Society. When an application for classification survey is submitted, an application for prior approval of plans and documents is automatically transferred to the application for classification survey.



Table B2.1 Plans and Documents – Hull (General)

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
1 General arrangement		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 Midship section	(1) Cross sections of the holds, machinery spaces, and areas containing wing tanks (if fitted). (2) Plans showing the following in <b>(a)</b> to <b>(e)</b> items. (a) Intended classification characters and notations (b) Designed maximum load draught (c) Draught in <i>metres</i> corresponding to the designed timber freeboard, where the timber load line is intended to be marked (d) The position of the freeboard deck in ships with multiple decks (e) For ships complying with the requirements in <b>3.2.2.3</b> or <b>3.2.2.4, Part 1, Part C of the Rules</b> , design temperatures.	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 Structural arrangement plans	(1) Plans showing the construction arrangements and scantlings of hull structural members (including fore and aft structures).	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4 Stem, sternframe, propeller post and rudder	(1) Plans showing materials and ship speed. (2) Plans for rudder construction (including push-up pressures and rudder stock lengths).	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5 Longitudinal section at centreline	(1) Plans showing arrangements of watertight bulkheads, load draughts, sizes of brackets and transverse sections of ships at 0.1 <i>L</i> and 0.2 <i>L</i> from both ends of the ship. (2) Plans showing the arrangements and sizes of hull constructions and cargoes on deck which are counted as part of projected areas with respect to wind, buoyancy or both.	<input type="radio"/>					
6 Deck plans	(1) Plans showing the following <b>(a)</b> to <b>(d)</b> items. (a) Freeboards, superstructure decks, hatchways and hatch beams, (b) The forward end of <i>L<sub>f</sub></i> specified in <b>Part A of the Rules</b> and the point 0.25 <i>L<sub>f</sub></i> aft of it. (c) For car decks of vehicle carriers, the routes vehicles frequently use during loading and unloading (i.e. the deck areas subject to dynamic loads in the vicinities of ramp ways and the routes taken by the vehicles when moving between decks). (d) For ships fitted with movable car decks, plans of their support structures.	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7 Single bottoms and double bottoms		<input type="radio"/>					
8 Watertight bulkheads and oiltight bulkheads	(1) For oiltight bulkheads, plans showing the highest positions of tanks and positions of tops of overflow pipes.	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9 Superstructure end bulk-	(1) Plans showing the details of closing appliances for bulkhead openings.	<input type="radio"/>					

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
heads							
10 Equipment numbers and equipment		○					
11 Plans showing arrangements for resisting panting in both peaks and their vicinity		○					
12 Pillars and deck girders		○					
13 Shell expansion	(1) Plans showing dimensions and arrangements of freeing ports and draught at the ballast condition (for ships complying with <b>3.2.2.2, Part 1, Part C of the Rules</b> ). (2) Comparative tables for the standard sheer specified in <b>Part V of the Rules</b> and the actual sheer on exposed decks, where exposed freeboards or superstructure decks have wells formed by the bulwarks and end bulkheads of superstructures.	○		○	○	○	○
14 Copies of certificates for forgings and castings welded into the hull structures						○	○
15 Shaft tunnels		○					
16 Plans for the seatings of boilers, engines, thrust and plunger blocks, dynamos and other important auxiliary machinery	(1) Plans showing horsepower, heights and weights of main engines, and arrangements of holding down bolts.	○					
17 Machinery casings		○					
18 Deckhouses	(1) Plans for ships equipped with long deckhouses.	○					
19 Winch platforms		○					
20 Plans showing equipment forming part of the watertight and weathertight integrity of the ship	(1) Plans showing equipment locations, sizes and details. (2) Plans showing hatch covers and piping.	○				○	○
21 Pumping system	(1) Plans showing capacity of each tank (water or oil).	○					

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
22 Height of timber cargo, and the location of loading and securing equipment	(1) Plans for ships equipped for loading timber cargoes.	<input type="radio"/>					
23 Arrangements of scupper pipes	(1) The Summer Load Line determined by the requirements of <b>Part V of the Rules</b> load lines 600 mm 0.01 $L_f$ and 0.02 $L_f$ above it, and load lines 450 mm below the freeboard deck. (2) Regardless of (1) above, the maximum designed load line above the Summer Load Line may be acceptable instead of the load line itself.	<input type="radio"/>					
24 Fire protection plans	(1) Plans showing materials used in the construction of superstructures, bulkheads, decks, deckhouses, trunks, stairways, deck coverings, etc. and the arrangements of the closing appliances for openings.	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>		
25 Plans showing arrangements for airborne sound insulation properties of bulkheads and decks in accommodation spaces	(1) “Airborne sound insulation properties of bulkheads and decks within accommodation spaces” refers to the weighted sound reduction index ( $R_w$ ) in <b>An5.1, Annex 2.3.1-2 “Procedures for On Board Noise Measurements”, Part B of the Rules</b> .	<input type="radio"/>					
26 Plans showing ventilation systems		<input type="radio"/>					
27 Plans showing the arrangements for gaseous fuel for domestic purposes	(1) Requirements for gaseous fuel for domestic purposes are specified in <b>4.3, Part R of the Rules</b> .	<input type="radio"/>					
28 Plans showing means of escape	(1) Plans showing details of escape routes, passage widths, etc.	<input type="radio"/>					
29 Plans showing fire extinguishing arrangements	(1) Plans showing the locations, numbers and types, etc. of fire-fighting systems, fire detection and alarm systems, inert gas systems, fire extinguishers, fire pumps (including emergency fire pumps), fire hydrants, fire hoses, fire fighter outfits, helicopter facilities and international shore connections, etc. in accordance with <b>Part R of the Rules</b> .	<input type="radio"/>		<input type="radio"/>			
30 Plans showing specifications and arrangements, etc. of fixed fire detection	(1) Systems are required to be provided in accordance with <b>Chapters 7 and 20, Part R of the Rules</b> .	<input type="radio"/>					

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
and fire alarm systems							
31 Plans showing specifications and arrangements etc. for fixed fire extinguisher systems (including fixed local application fire-fighting systems, fixed deck foam systems and fixed water spray systems)	(1) Systems are required to be provided in accordance with <b>Chapters 10, 18, 19 and 20, Part R of the Rules.</b>	○					
32 Plans showing specifications and arrangements, etc. of inert gas systems	(1) Systems are required to be provided in accordance with <b>4.5.5, Part R of the Rules.</b>	○					
33 Plans showing specifications and arrangements, etc. of fixed hydrocarbon gas detection systems	(1) The systems are required to be provided by <b>4.5.7 and 4.5.10, Part R of the Rules.</b>	○					
34 Plans showing arrangements for means of access	(1) As specified in <b>14.16.2.5, Part 1, Part C</b> or <b>26.1.5, Part CS of the Rules.</b>	○			○		
35 Ship structure access manuals	(1) As specified in <b>14.16.3.6, Part 1, Part C</b> or <b>26.2.6, Part CS of the Rules.</b>	○			○*2	○	○
36 Plans and data showing navigation bridge visibility	(1) For ships for which overall length ( $L_{oa}$ ) is 55 m or over. (2) As specified in <b>1.1.4, Part W of the Rules.</b>	○		○	○		
37 General arrangements for the bilge systems and ventilation systems of cargo oil pump rooms		○					
38 General arrangements for venting systems for cargo vapours, etc.		○					
39 Plans showing arrange-	(1) As specified in <b>14.2, Part 1, Part C of the Rules.</b>	○					

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
ments of ships identification numbers							
40 Plans showing towing and mooring fitting arrangements	(1) As specified in <b>14.4.1.4, Part 1, Part C</b> or <b>23.2.9 Part CS of the Rules</b> .	<input type="radio"/>			<input type="radio"/>		
41 Plans showing arrangements of means of embarkation and disembarkation	(1) For ships of 500 <i>gross tonnage</i> and above engaged in international voyages. (2) As specified in <b>14.14, Part 1, Part C</b> or <b>21.8, Part CS of the Rules</b> . (3) Plans showing the following (a) to (c) items. (a) Arrangements of equipment and related devices (including lighting and lifebuoys) (b) Overall arrangements of the means of embarkation and disembarkation (including situations related to the use of maximum and minimum angles of inclination) (c) Detailed plans of connections between the means of embarkation and disembarkation and the deck	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>
42 Plans and documents for in-water surveys	(1) For ships that are subject to <b>6.1.2, Part B of the Rules</b> . (2) As specified in <b>6.1.2-3, Part B of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>
43 Loading manuals	(1) For ships only required to have a loading manual in accordance with <b>3.8.1.1, Part 1, Part C of the Rules</b> or <b>25.1.1, Part CS of the Rules</b> . (2) As specified in <b>3.8.2, Part 1, Part C of the Rules</b> or <b>25.1.2, Part CS of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>
44 Damage control plans	(1) For ships of 500 <i>gross tonnage</i> and above. (2) As specified in <b>2.3.4.3, Part 1, Part C of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>
45 Operating and maintenance manuals for doors and inner doors	(1) As specified in <b>14.10.1.10-1</b> and <b>14.10.2.9-1, Part 1, Part C of the Rules</b> or <b>21.3.10-1</b> and <b>21.4.9-1, Part CS of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>
46 Stability information booklets	(1) As specified in Annex U1.2.1 "Guidance for Stability Information for Master". (2) Booklets are to be prepared in accordance with the following (a) to (c). (a) For ships complying with <b>Part U of the Rules</b> , booklets are to be prepared in accordance with (1) above. (b) For ships other than (a) above that comply with the International Convention on Load Lines, 1966 (hereinafter referred to as " <i>ILLC</i> "), booklets are to be prepared in a format approved by the Society.	<input type="radio"/>			<input type="radio"/> *2	<input type="radio"/>	<input type="radio"/>

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
	(c) For ships other than (1) and (2) above, booklets are to be prepared as deemed appropriate by the Society. (3) Booklets for ships subject to <b>Part U of the Rules</b> , are to be submitted to the Society in consideration of the timing of stability experiments and delivery. It is recommended that booklets based on assumed values be submitted to the Head Office of the Society for preliminary examination as early as possible before stability experiments.						
47 Lines (provided with offset table), light load hydrostatic curves, tank capacity plans (finished plan), and inclining test results	(1) For ships required to have loading computers in accordance with <b>3.8.1.1, Part 1, Part C of the Rules</b> , lines are to be submitted. (2) For ships other than (1) above which are required to provide stability information booklets or which are subject to <b>Part V of the Rules</b> , lines are to be submitted.		○				
48 Plans showing locations of emergency towing arrangements	(1) As specified in <b>14.5.2, Part 1, Part C of the Rules</b> .	○					
49 Plans showing the construction of the parts of hulls where emergency towing arrangements are installed	(1) As specified in <b>14.5.2, Part 1, Part C of the Rules</b> .	○					
50 Plans showing the access to the bows of tankers		○					
51 Coating technical files for dedicated seawater ballast tanks, etc.	(1) As specified in <b>3.3.5.3, Part 1, Part C of the Rules</b> and <b>22.4.2 Part CS of the Rules</b> . (2) The information to be included in coating technical files is specified in <b>2.1.6, Part B of the Rules</b> .	○			○*2	○	○
52 Coating technical files, corrosion resistant steel technical files or both for cargo oil tanks	(1) As specified in <b>3.3.5.4, Part 1, Part C of the Rules</b> and <b>22.4.3, Part CS of the Rules</b> . (2) The information to be included in coating technical files and corrosion resistant steel technical files is specified in <b>2.1.6, Part B of the Rules</b> .	○			○*2	○	○
53 Polar water operational manual	(1) As specified in <b>2.3.1, Part I of the Rules</b> .				○*2		

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
54 Asbestos-free declarations and supporting documents			○				
55 Drawings indicating critical structural areas	(1) For ships whose surveys for construction monitoring are carried out in accordance with the requirements in <b>2.1.2, Part B of the Rules</b> . (2) “Drawings indicating critical structural areas” means those drawings indicating locations which have been identified from calculations to require monitoring or from the service history of similar or sister ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship. The following <b>(1)</b> and <b>(2)</b> are to be considered depending on the subject ship: (a) For ships subject to <b>14.16.3, Part 1, Part C of the Rules</b> , drawings are to include the critical structural areas indicated in the ship structural access manuals specified in <b>14.16.3.6, Part 1, Part C of the Rules</b> . (b) For ships subject to <i>SOLAS Chapter II-1 Regulation 3-10</i> , drawings are to be consistent with information regarding those “areas requiring special attention throughout the ship’s life, including critical structural areas” included in the Ship Construction File specified in item <b>79</b> below.	○			○		○
56 Specifications			○				
57 Corrosion prevention scheme	(1) Items included in the Coating Technical Files specified in item <b>51</b> and <b>52</b> above may be omitted.		○			○	○
58 Plans showing the particulars of the cargo intended to be carried and its distribution	(1) For ships that are to be made exceptional conditions of loading.		○				
59 Plans showing the arrangement, size and projected lateral area of bilge keels, if fitted.	(1) For ships required to have stability information documents.		○				
60 Hydrostatic curves	(1) For ships complying with <b>Part V of the Rules</b> . (2) Documents showing the displacement and the change of displacement per <i>cm</i> of immersion at each draught up to the freeboard deck		○				
61 Capacity calculation	(1) For ships installed with such valves or devices.		○				

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
sheets for pressure and vacuum valves and overpressure protective devices of cargo oil tanks							
62 Instruction and operation manuals for inert gas systems	(1) As specified in <b>35.2.2-5, Part R of the Rules</b> . (2) For ships that are installed the systems. (3) Documents showing cautionary notes related to operator safety.		○		○		
63 Strength calculation sheets associated with various supporting hull structures of towing and mooring fittings	(1) As specified in <b>14.4, Part 1, Part C of the Rules</b> and <b>23.2, Part CS of the Rules</b> . (2) Documents showing design loads. (3) Documents including those for towing and mooring fittings which are not selected from standards approved by the Society.		○				
64 Operation manuals for emergency towing arrangements	(1) For ships required to have emergency towing arrangements in accordance with <b>14.5.2, Part 1, Part C of the Rules</b> .		○		○		
65 Booklets for damage control and damage stability information	(1) As specified in <b>2.3.4.4</b> and <b>2.3.4.5, Part 1, Part C of the Rules</b> .		○		○		
66 Operation manuals for loading computers	(1) As specified in <b>3.8, Part 1, Part C of the Rules</b> .				○		
67 Operation manuals for stability instruments or stability computers	(1) Reference is to be made to Chapter 4, Part B of <i>IMO resolution MSC.267(85) "International Code on Intact Stability, 2008 (2008 IS Code)"</i> .				○		
68 Instruction manuals for the cargo tank venting systems	(1) Documents showing the handling of venting systems as specified in <b>4.5.3, Part R of the Rules</b> .				○		
69 Fire control plans, fire safety operational booklets, training manuals and maintenance plans	(1) As specified in <b>Chapters 14, 15</b> and <b>Chapters 16, Part R of the Rules</b> .				○		
70 Operation manuals for the helicopter facilities	(1) As specified in <b>18.8, Part R of the Rules</b> .				○		



Name*1	Notes	Submission			Maintained On Board	
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File
						Ships engaged in international voyages Ships subject to SOLAS Chapter II-1 Regulation 3-10
71 Emergency Towing Procedures	(1) Specified in <a href="#">14.5.3, Part 1, Part C of the Rules</a> and <a href="#">23.3 Part CS of the Rules</a> .				○	
72 Noise survey report	(1) The reports referred to in <a href="#">An4.2, Annex 2.3.1-2 “Procedures for On Board Noise Measurements”, Part B of the Rules</a> . It is recommended that documents containing the noise exposure levels determined in accordance with <a href="#">An3.3.6, Annex 2.3.1-2 “Procedures for On Board Noise Measurements”, Part B of the Rules</a> be attached to noise survey reports.			○	○	
73 Documents related to watertight cable penetrations			○			
74 Watertight cable penetration registers	(1) All watertight cable penetrations are to be recorded and identified in the watertight cable penetration register. This is to include documentation referencing manufacturer manuals for each type of watertight cable penetration installed, type approval certificates for each type of watertight cable penetration, applicable installation drawings, records of each installed watertight cable penetration documenting the as-built condition after final inspections at shipyards, and sections to record any inspection, modification, repair or maintenance. (2) Watertight cable penetration registers are to be provided by shipbuilders and reviewed by attending surveyors. (3) Watertight cable penetration registers can be either hard copies or digitised media. (4) Watertight cable penetration manuals for unmanned vessels may be kept on shore.				○	○
75 Certificates showing that the devices related to fire fighting and fire protection maintained on board have passed all required examinations and tests	(1) Such certificates are the type approval certificates valid at the time of Classification Surveys issued for each piece of equipment, device, etc., or other applicable certificates. Unless the equipment or devices on board are renewed after the ship has entered service, such certificates need not be updated. Devices related to fire-fighting and fire protection means are those listed in (a) to (q) below. (a) Fire pumps (including emergency fire pumps) (hose test records after installation on board may be accepted.) (b) Fire hoses and nozzles (c) Fire extinguishers (including spare charges) (d) Fire-fighter outfits (e) Emergency escape breathing devices				○	

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
	(f) Fixed fire-extinguishing systems (g) Fire dampers and power-operated closing doors (h) Fixed fire detection and fire alarm systems, and automatic sprinkler systems (i) Fire protection materials (j) Additional equipment (e.g. electrical equipment of an explosion-proof type, detection systems, full protective clothing, portable fire extinguishers and water spraying systems) required for ships carrying dangerous goods (k) Deck foam systems (nozzles and foam concentrates) (l) Inert gas systems (portable oxygen content meters) (m) Equipment for protection of cargo pump rooms (temperature sensing devices and hydrocarbon gases concentration meters) (n) Watertight doors below freeboard decks (o) Side scuttles (p) Portable gas detectors (q) Fixed hydrocarbon gas detection systems						
76 Docking plan	(1) Documents (including locations and other necessary information) for all penetrations specified in item 3, <b>Table B6.1, Part B of the Rules</b> .					○	○
77 Plans and documents for anti-fouling systems	(1) As specified in <b>2.2.2, Rules for Anti-Fouling Systems on Ships</b> .		○			○	○
78 Test plans, test records, measurement records, etc.	(1) Documents including the following <b>(a)</b> and <b>(b)</b> items. The allowable deviations referred to in <b>(a)</b> below mean allowable values specified in appropriate standards such as <i>JSQS</i> or other equivalent values applied to the ship. (a) Measurement records of the ship's principal dimensions (including allowable deviations). (b) Details of markings for load lines and associated measurement records (including allowable deviations).					○	○
79 Areas requiring special attention throughout the ship's life (including critical structural areas specified in item 55)							○

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
80 All design parameters limiting the operation of the ship							<input type="radio"/>
81 “As built” drawings and information which are verified to incorporate all alterations approved by the Society during the construction process	(1) Documents showing scantling details, material details, location of butts and seams, cross section details and the locations of all partial and full penetration welds.						<input type="radio"/>
82 Net (renewal) scantlings for all structural constituent parts, as built scantlings and voluntary addition thickness		<input type="radio"/>					<input type="radio"/>
83 Any alternatives to the Rules	(1) Documents showing structural details and equivalency calculations.	<input type="radio"/>					<input type="radio"/>
84 A listing of materials used for the construction of the hull structure, and provisions for document-ing changes to any of the above during the ship’s service life							<input type="radio"/>
85 Minimum hull girder section modulus along the length of the ship which has to be maintained throughout the ship’s life, including cross section details such as the values of the areas of the deck zone and bottom zone, the renewal value for the	(1) Plans are to be submitted prior to the commencement of the survey.						<input type="radio"/>

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
neutral axis zone							
86 List of documents constituting the Ship Construction File							○
87 Survey records	(1) For ships whose surveys for construction monitoring are carried out in accordance with <b>2.1.2, Part B of the Rules</b> .				○		○
88 Construction monitoring plans	(1) For ships whose surveys for construction monitoring are carried out in accordance with <b>2.1.2, Part B of the Rules</b> . (2) Plans are to be submitted prior to the commencement of the survey.		○		○		○
89 Lists of blocks manufactured by subcontractors	(1) Documents are to be submitted prior to the commencement of the survey.		○				
90 Welding application plans	(1) Plans are to be submitted prior to the commencement of the survey.	○					
91 Non-destructive inspection plans	(1) Plans are to be submitted prior to the commencement of the survey.	○					
92 Non-destructive operator qualification records	(1) Documents are to be submitted prior to the commencement of the survey.		○				
93 Hydrostatic and water-tight test plans	(1) Plans are to be submitted prior to the commencement of the survey.	○					
94 Welding procedure specifications and welding details	(1) Documents are to be submitted prior to the commencement of the survey.	○					
95 Welder's qualification records	(1) Documents are to be submitted prior to the commencement of the survey.		○				
96 Guidance for maintenance and inspection of steel wires	(1) As specified in <b>23.1.4, Part CS of the Rules</b> .				○		
97 Technical specification documents for mooring lines	(1) As specified in <b>14.4.4.4, Part 1, Part C of the Rules</b> .		○		○		
98 Management plans for inspection and maintenance	(1) As specified in <b>14.4.5.1, Part 1, Part C of the Rules</b> or <b>23.2.10, Part CS of the Rules</b> .				○		

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
nance of mooring equipment (including mooring lines)	<p>(2) Plans are to be prepared in accordance with <i>MSC.1/Circ.1620</i> and are to include the following <b>(a)</b> to <b>(f)</b>.</p> <p>(a) Procedures for mooring equipment (including mooring lines) operations, inspection and maintenance.</p> <p>(b) Procedures to allow the identification and management of mooring lines, tails and associated attachments.</p> <p>(c) Manufacturer criteria for mooring line replacement.</p> <p>(d) Records of the original mooring design concepts, equipment, arrangements and specifications. For ships the keels of which were laid before 1 January 2007 and which are without appropriate documentation, <i>MBL<sub>sd</sub></i> is to be established in accordance with the following <b>i)</b> and <b>ii)</b>.</p> <p>i) <i>MBL<sub>sd</sub></i> is to be established based on the Safe Working Load (<i>SWL</i>) of the mooring equipment provided on board.</p> <p>ii) If no safe working load is specified, the strength of the mooring equipment and its supporting hull structure should be checked based on <b>14.4.3, Part 1, Part C of the Rules</b> and determine <i>MBL<sub>sd</sub></i> based on the actual capacity of the equipment on board and its supporting hull structure.</p> <p>(e) Manufacturers' test certificates for mooring lines, joining shackles and synthetic tails.</p> <p>(f) Records of mooring equipment inspections and maintenance, and mooring line inspections and replacement. The selection of replacement mooring lines is to be in accordance with the following <b>i)</b> to <b>vii)</b>.</p> <p>i) When replacing mooring lines, compatibility with the mooring equipment and fittings on board, as specified in the mooring arrangement plan, is to be taken into account, and a replacement mooring line which meets the designed specification is to be selected.</p> <p>ii) In cases where <b>i)</b> above cannot be satisfied, the following <b>1)</b> to <b>7)</b> properties are to be taken into consideration and the towing and mooring arrangement plan updated accordingly.</p> <p>1) breaking strength;</p> <p>2) environmental conditions to be used (e.g. temperature);</p> <p>3) linear density;</p>						

Name*1	Notes	Submission			Maintained On Board		
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)	Ship Construction File	
						Ships engaged in international voyages	Ships subject to SOLAS Chapter II-1 Regulation 3-10
	<p>4) tenacity;</p> <p>5) D/d ratios;</p> <p>6) compression fatigue; and</p> <p>7) stiffness.</p> <p>iii) Any increase in LDBF for the mooring lines above the limits specified, i.e. 100 % to 105 % of the MBLSD, may require a review of the operating parameters and design loads of mooring equipment and fittings, and their associated hull supporting structures.</p> <p>iv) It is to be considered that their strength will decay due to varying environmental conditions and thus the original service life expectations may not be achieved.</p> <p>v) For wire ropes, corrosion protection is to be considered.</p> <p>vi) The acceptable minimum bend radius (D/d ratio) recommended by the manufacturer is to be taken into consideration. The mooring line regularly exposed to below the acceptable minimum bend radius is to be subject to particular attention during inspections, taking into account the possibility that they may need to be replaced before the end of the service life recommended by the manufacturer.</p> <p>vii) When selecting replacement mooring lines with high stiffness, consideration is to be given to the use of synthetic tails. The effect of the use of synthetic tail on the stored energy and possible snap-back of the high stiffness mooring lines is to also be considered.</p>						
99 Documented agreement related to performance standard for protective coating and corrosion resistant	(1) Documents showing the agreement between shipowners, shipyards and coating manufacturers regarding inspections of surface preparations and coating processes.		○				

Notes

\*1 : For ships of not less than 500 *gross tonnage* engaged in international voyages, it is recommended submitted plans and documents be marked with *IMO* ship identification numbers.

\*2 : Plans and documents plans approved by the Society or copies thereto.

Table B2.2 Plans and Documents – Machinery

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
1 Arrangement of machinery in machinery space, diagram for internal communication systems	(1) Including diagram for engineers' alarm systems.	<input type="radio"/>			
2 Main and auxiliary engines (including attachments)	(1) Plans and data specified in <b>2.1.3-1(1), Part D of the Rules</b> in relation to the kind of engine as well as documents showing specifications of louvers for emergency generator rooms and closing appliances of ventilators fitted to the rooms (if they are of a power-operated type.) .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>2.1.3-1.(2)</b> and <b>(3), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>
3 Steam turbines (including attachments)	(1) Plans and data specified in <b>3.1.2(1), Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>3.1.2(2), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>
4 Gas turbines (including attachments)	(1) Plans and data specified in <b>4.1.2(1), Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>4.1.2(2), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>
5 Power transmission gears	(1) Plans and data specified in <b>5.1.2, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
6 Shafting	(1) Plans and data specified in <b>6.1.2(1), Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>6.1.2(2), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>
7 Propellers	(1) Plans and data specified in <b>7.1.2, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
8 Torsional vibration calculations	(1) Data specified in <b>8.1.2, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
9 Boilers and incinerators	(1) Plans and data specified in <b>9.1.3</b> and <b>9.13.2, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
10 Pressure vessels	(1) Plans and data specified in <b>10.1.4, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
11 Piping	(1) Plans and data specified in <b>13.1.2, Part D of the Rules</b> .	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>
	(2) Bilge and ballast piping diagrams are to be submitted as finished plans.				
12 Piping for tankers	(1) Plans and data specified in <b>14.1.2, Part D of the Rules</b> .	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>
	(2) Cargo piping diagrams are to be submitted as finished plans.				
13 Steering gear	(1) Plans and data specified in <b>15.1.3, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
14 Windlasses and mooring winches	(1) Plans and data specified in <b>16.2.2(1), Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>16.2.2(2), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>
15 Refrigerating machinery and controlled atmosphere systems	(1) Plans and data specified in <b>17.1.2, Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
16 Automatic and remote controls	(1) Plans and data specified in <b>18.1.3(1), Part D of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
	(2) Plans and data specified in <b>18.1.3(2), Part D of the Rules</b> .		<input type="radio"/>		<input type="radio"/>

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
17 Waterjet propulsion systems	(1) Plans and data specified in <b>19.1.3, Part D of the Rules</b> .	<input type="radio"/>			
18 Azimuth thrusters	(1) Plans and data specified in <b>20.1.3, Part D of the Rules</b> .	<input type="radio"/>			
19 Selective catalytic reduction systems and associated equipment	(1) Plans and data specified in <b>21.1.3(1), Part D of the Rules</b> .	<input type="radio"/>			
	(2) Plans and data specified in <b>21.1.3(2), Part D of the Rules</b> .		<input type="radio"/>		
20 Exhaust gas cleaning systems and associated equipment	(1) Plans and data specified in <b>22.1.3(1), Part D of the Rules</b> .	<input type="radio"/>			
	(2) Plans and data specified in <b>22.1.3(2), Part D of the Rules</b> .		<input type="radio"/>		
21 Exhaust gas recirculation systems and associated equipment	(1) Plans and data specified in <b>23.1.3(1), Part D of the Rules</b> .	<input type="radio"/>			
	(2) Plans and data specified in <b>23.1.3(2), Part D of the Rules</b> .		<input type="radio"/>		
22 Instructions and operation manuals for the following equipment when fitted on ships: selective catalytic reduction systems and associated equipment; exhaust gas cleaning systems and associated equipment; or exhaust gas recirculation systems and associated equipment	(1) Including cautionary notes related to operator safety.				<input type="radio"/>
23 Spare parts	(1) List of spare parts specified in <b>24.1.2, Part D of the Rules</b> .	<input type="radio"/>			
24 Electrical installations	(1) Plans and data specified in <b>1.1.6, Part H of the Rules</b> .	<input type="radio"/>			
	(2) Plans and data specified in <b>1.1.6(2), Part H of the Rules</b> . Total Harmonic Distortion (THD) calculation reports and harmonic filter operation guides are to be provided as finished plans and maintained on board.	<input type="radio"/>			<input type="radio"/>
	(3) Maintenance records of batteries specified in <b>1.1.8, Part H of the Rules</b> .				<input type="radio"/>
25 Test plans for sea trials	(1) Test plans related to astern tests are to be provided by yards. If specific operational characteristics have been defined by manufacturers, these are to be included in the test plans.	<input type="radio"/>			
26 Sea trial records	(1) Including the results of the tests specified in <b>2.1.7-7, Part B</b> and the test plans for the sea trials specified in item 25 above.		<input type="radio"/>		<input type="radio"/>
27 Operating and maintenance instructions for ship machinery and equipment	(1) Documents specified in <b>1.3.9, Part D of the Rules</b> .				<input type="radio"/>
28 Manuals for the water level detection and alarm systems	(1) Documents specified in <b>13.8.5-4</b> or <b>13.8.6-3, Part D of the Rules</b> .				<input type="radio"/>
29 Computer systems	(1) Plans and data specified in <b>2.1.1(1), Part X of the Rules</b> .	<input type="radio"/>			



Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
	(2) Plans and data specified in <b>2.1.1(2), Part X of the Rules</b> .		○		

Notes

\*1 : For ships of not less than 500 *gross tonnage* engaged in international voyages, it is recommended submitted plans and documents be marked with *IMO* ship identification numbers.

Table B2.3 Plans and Documents – Ships Carrying Liquefied Gases in Bulk

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
1 Manufacturing specifications for cargo tanks, insulations and secondary barriers	(1) Includes the following: welding procedures; inspection and testing procedures for welds and cargo tanks; properties and installation procedures of insulation materials and secondary barriers; and working standards. (2) For cargo tanks treated with mechanical stress relieving by pressurising, the test plans specified in <b>6.6.2-3, Part N of the Rules</b> are to be included. (3) For cargo tanks using pressure accumulation systems as pressure and temperature control systems, the design conditions specified in <b>7.5, Part N of the Rules</b> are to be included.	○			
2 Details of cargo tank construction		○			
3 Arrangement of cargo tank accessories	(1) Including details of fittings inside tanks.	○			
4 Details of cargo tank supports, deck portions through which cargo tanks penetrate, and their sealing devices		○			
5 Details of secondary barriers		○			
6 Specifications or standards for materials (including insulation) used for cargo piping system in connection with design pressure and temperature		○			
7 Specifications and standards of materials of cargo tanks, insulation, secondary barriers and cargo tank supports		○			
8 Layout and details of attachment for insulations		○			
9 Constructions of cargo pumps, cargo compressors and their prime movers		○			
10 Piping diagrams of cargo hold, cargo gauging system, and cargo tank venting system	(1) Cargo piping diagrams are to be submitted as finished plans.	○		○	
11 Constructions of main parts of refrigeration systems		○			
12 Piping diagrams for refrigeration system refrigerant		○			

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
13 Bilge arrangements and ventilation systems in hold spaces or interbarrier spaces, cargo pump rooms, cargo compressor rooms, and cargo control rooms		<input type="radio"/>			
14 Arrangement of sensors for gas detectors, temperature indicators, pressure gauges		<input type="radio"/>			
15 Diagrams of inert gas lines and details of pressure adjusting devices	(1) Where hold spaces or interbarrier spaces are filled by inert gases.	<input type="radio"/>			
16 Details of pressure relief device and drainage systems for leakage of liquefied cargo in hold spaces or interbarrier spaces	(1) As specified in <b>21.1.2, Part D of the Rules</b> .	<input type="radio"/>			
17 Sectional assembly, details of nozzles, fitting arrangement and details of fittings for various pressure vessels		<input type="radio"/>			
18 Details of valves for special purposes, cargo hoses, expansion joints, filters, etc. for cargo piping system		<input type="radio"/>			
19 Arrangement of earth connections for cargo tank, pipe lines, machinery, equipment, etc.		<input type="radio"/>			
20 Plans showing arrangements for personnel protection	(1) Personnel protection arrangements are specified in <b>Chapter 14, Part N of the Rules</b> .	<input type="radio"/>			
21 Programs of the non-destructive testing for periodical surveys	(1) For independent tanks of Type <i>B</i> . (2) Refer to Item 1, (1)(d), <b>Table B5.27, Part B of the Rules</b> .	<input type="radio"/>			○*2
22 Programs of examination and testing of cargo containment systems for periodical surveys	(1) For membrane and semi-membrane tanks <i>B</i> . (2) Refer to Note 1, <b>Table B5.27, Part B of the Rules</b> .	<input type="radio"/>			○*2
23 Inspection/survey plans for cargo containment systems	(1) As specified in <b>4.3.6, Part N of the Rules</b> .	<input type="radio"/>			○*2
24 Cargo operations manuals	(1) As specified in <b>18.2.1, Part N of the Rules</b> .	<input type="radio"/>			○*2
25 Basic design principal and technical reports of cargo containment systems			<input type="radio"/>		
26 Data on test method and result of model test carried out in compliance with the requirements of <b>Chapter 4, Part N</b>			<input type="radio"/>		

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
27 Data on notch toughness, corrosiveness, physical and mechanical properties of materials and welded parts at the minimum design temperature and room temperature, where new materials or welding methods are adopted for constructing the cargo tanks, secondary barriers, thermal insulation, etc.			○		
28 Data on design loads of cargo tanks	(1) As specified in <b>4.13 to 4.18, Part N of the Rules</b> .		○		
29 Calculation sheets of cargo tanks and supports specified in <b>4.8 and 4.21 to 4.25, Part N</b>	(1) As specified in <b>4.8 and 4.21 to 4.25, Part N of the Rules</b> .		○		
30 Data on test analysis and results of model tests carried out to demonstrate strength and performance of cargo tanks, thermal insulation, secondary barriers, and cargo tank supports			○		
31 Calculation sheets on heat transfer between primary members of cargo tanks under various loading conditions	(1) Where considered necessary by the Society.		○		
32 Calculation sheets for thermal stress on primary members of cargo tanks at temperature distributions specified in item 33	(1) Where considered necessary by the Society.		○		
33 Hull structure temperature distribution calculation sheets	(1) Where considered necessary by the Society.		○		
34 Cargo system specifications			○		
35 Cargo composition and physical properties	(1) Including a saturated vapour pressure diagram within the necessary temperature range.		○		
36 Cargo tank pressure relief valve relieving capacity calculation sheets	(1) Including calculation of the back pressure in cargo vent system.		○		
37 Refrigeration system capacity calculation sheets			○		
38 Cargo piping arrangements	(1) Including the details of cargo sampling arrangements.		○		
39 Cargo tank filling limit calculation sheets			○		
40 Cargo tank area access manhole arrangements and associated guides	(1) As specified in <b>3.5, Part N of the Rules</b> .		○		
41 Ship survival capability calculations	(1) As specified in <b>Chapter 2, Part N of the Rules</b> .	○			○

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
42 Documents related to failure mode and effects analysis	(1) As specified in <b>10.2.6, Part N of the Rules</b> .		○		
43 Cargo handling plans	(1) As specified in <b>17.18.13-2</b> and <b>17.23.12-10, Part N of the Rules</b> .	○			○*2
44 Lists of loading/filling limits	(1) As specified in <b>15.6.1, Part N of the Rules</b> .	○			○*2
45 A copy of the <i>IGC</i> Code or national regulations incorporating the provisions of the <i>IGC</i> Code	(1) As specified in <b>18.1.1, Part N of the Rules</b> .				○
46 Plans for additional fire-fighting equipment and other fire-fighting means	(1) The specification and arrangements of fire-fighting equipment and other means specified in <b>Chapter 11, Part N of the Rules</b> .	○			
47 Documents specifying maximum allowable loading limits	(1) As specified in <b>15.6.1-1, Part N of the Rules</b> .	○			
48 Stress analysis	(1) As specified in <b>5.11.5, Part N of the Rules</b> .		○		
49 Calculation results of the evaluation of the adequacy of vent systems	(1) For cargo tanks that are loaded the cargoes in accordance with <b>15.5.2, Part N of the Rules</b> . (2) Specified in <b>1.3, Annex 5, Part N of the Guidance</b> .	○			
50 Specifications, piping and operation manuals of cargo emergency shutdown (ESD) systems	(1) Cargo emergency shutdown(ESD) systems means the systems specified in <b>18.3, Part N of the Rules</b> .	○			
51 Piping diagram, constructions and particulars of utilisation units	(1) Where cargo is used as fuel.	○			
52 Plans and documents for equipment and fittings of ships carrying liquefied gases in bulk	(1) As specified in <b>1.2(1), 21.2.1</b> and <b>21.2.2, Annex 1, Part N of the Guidance</b> .	○			
	(1) As specified in <b>1.2(2), 2.2.1, 3.2.1, 17.2.1, 18.2.1</b> and <b>20.2.1, Annex 1, Part N of the Guidance</b> .		○		
53 Plans and documents for dual fuel boilers	(1) As specified in <b>1.3(1), Annex 2, Part N of the Guidance</b> .	○			
	(2) As specified in <b>1.3(2), Annex 2, Part N of the Guidance</b> .		○		
54 Plans and documents for gas combustion units	(1) As specified in <b>1.3(1), Annex 2A, Part N of the Guidance</b> .	○			
	(2) As specified in <b>1.3(2), Annex 2A, Part N of the Guidance</b> .		○		
55 Plans and documents for high pressure gas-fuelled engines	(1) As specified in <b>1.3 (1) and (3), Annex 16.1.1-2, Part N of the Rules</b> .	○			
	(2) As specified in <b>1.3 (2), Annex 16.1.1-2, Part N of the Rules</b> .		○		
56 Plans and documents for low pressure gas-fuelled engines	(1) As specified in <b>1.3 (1) and (3), Annex 16.1.1-3, Part N of the Rules</b> .	○			
	(2) As specified in <b>1.3 (2), Annex 16.1.1-3, Part N of the Rules</b> .		○		
57 Plans of access to bows of tankers		○			

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)

Notes

\*1 : For ships of not less than 500 *gross tonnage* engaged in international voyages, it is recommended submitted plans and documents be marked with *IMO* ship identification numbers.

\*2 : Plans and documents and plans approved by the Society or copies thereto.

Table B2.4 Plans and Documents – Ships Carrying Dangerous Chemicals in Bulk

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
1 Cargo tank construction details		<input type="radio"/>			
2 Cargo tank accessory arrangements	(1) Including details of fittings inside tanks.	<input type="radio"/>			
3 Manufacturing specifications, details of cargo tank supports, deck portions through which cargo tanks penetrate and their sealing devices for independent cargo tanks	(1) For independent cargo tanks. (2) Manufacturing specifications including materials to be used, welding procedures and inspection and testing procedures for weld and cargo tanks.	<input type="radio"/>			
4 Coating or lining procedures of insides of cargo tanks, and corrosion test results of such coating or lining, if required		<input type="radio"/>			
5 Plans showing arrangement and the methods of attachment of the insulation together with the working procedure concerned		<input type="radio"/>			
6 Cargo pump construction plans	(1) Including list of materials to be used and their specifications.	<input type="radio"/>			
7 Cargo tank area piping arrangements		<input type="radio"/>		<input type="radio"/>	
8 Cargo tank ventilation arrangement		<input type="radio"/>			
9 Ventilation plan	(1) Including cargo pump rooms, pump rooms, cofferdams, double bottoms, etc.	<input type="radio"/>			
10 Cargo level monitoring and measurement system diagrams	(1) Including the detailed construction of the equipment.	<input type="radio"/>			
11 Cargo temperature control systems		<input type="radio"/>			
12 Plans for cargo tank environmental control systems	(1) Where environmental control is implemented by inerting, padding, drying and ventilation systems. (2) Including piping diagrams and construction of systems.	<input type="radio"/>			
13 Cargo vapour detection instruments	(1) Listed by applicable cargo.	<input type="radio"/>			
14 Cargo tank, pipe line, machinery and equipment earthing connection arrangements	(1) Where flammable cargoes are intended to be loaded.	<input type="radio"/>			
15 Personnel protection arrangement plans	(1) Personnel protection arrangements are specified in <b>Chapter 14, Part S of the Rules</b> .	<input type="radio"/>			
16 Cargo operations manuals	(1) As specified in <b>16.1.1, Part S of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2
17 Lists showing chemical and physical properties and other special properties of all cargoes intended to be loaded			<input type="radio"/>		

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
18 Loading plans of dangerous chemicals coming within the scope of <b>Part S of the Rules</b> and other chemicals loaded simultaneously with these dangerous chemicals			<input type="radio"/>		
19 Data on reactivity hazard of cargo in relation to other chemicals or water; self-reactionary traits such as polymerisation; and where deemed necessary, hazardous reactivity with heating or cooling media	(1) For chemicals not intended to be loaded simultaneously with the dangerous chemicals coming within the scope of <b>Part S of the Rules</b> may be excluded.		<input type="radio"/>		
20 Data on reactivity hazard between intended cargoes and coating or lining in cargo tanks and of piping and equipment that may come into contact with cargo liquid or vapour			<input type="radio"/>		
21 Data on compatibility of corrosion-resistant materials and cargoes having corrosive properties			<input type="radio"/>		
22 Strength calculation of each cargo tank and, where deemed necessary, thermal stress calculations			<input type="radio"/>		
23 Capacity calculations for heating systems	(1) For loading cargoes that require heating.		<input type="radio"/>		
24 Arrangements of access manholes in cargo tank area and the guide for access through these manholes	(1) Specified in <b>3.4, Part S of the Rules</b> .	<input type="radio"/>			
25 Ship survival capability calculations	(1) As specified in <b>Chapter 2, Part S of the Rules</b> .	<input type="radio"/>			<input type="radio"/>
26 Lists of loading/filling limits	(1) As specified in <b>15.3.2-12, 15.8.33-3 and 15.14.7-3, Part S of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2
27 Cargo handling plans	(1) As specified in <b>15.3.2-15 and 15.8.32, Part S of the Rules</b> .	<input type="radio"/>			<input type="radio"/> *2
28 A copy of the <i>IBC</i> Code or national regulations incorporating the <i>IBC</i> Code	(1) As specified in <b>16.2.3-1, Part S of the Rules</b> .				<input type="radio"/>



Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
29 Manufacturing specifications for cargo tanks and insulation	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction. (2) Including the following: welding procedures; inspection and testing procedures for welds and cargo tanks; properties and installation procedures of insulation materials; and working standards.	○			
30 Specifications and standards of materials (including insulations) used for cargo piping system in connection with design pressure and/or temperature	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.	○			
31 Specifications and standards of materials of cargo tanks, insulations and cargo tank supports	(1) Where cargoes are required to be cooled, and the Society judges there is a need to the document based on cargo storage plans and cargo tank construction.	○			
32 Constructions of main parts of refrigeration systems	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.	○			
33 Piping diagrams for refrigeration system refrigerant	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.	○			
34 Data on notch toughness, corrosiveness, physical and mechanical properties of materials and welded parts at the minimum design temperature and room temperature, where new materials or welding methods are adopted for constructing the cargo tanks, thermal insulation, etc.	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.		○		
35 Data on test analysis and results of model tests carried out to demonstrate strength and performance of cargo tanks, thermal insulation, secondary barriers, and cargo tank supports	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.		○		
36 Calculation sheets on heat transfer between the primary members of the cargo tank under various loading conditions	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.		○		
37 Calculation sheets for thermal stress on primary members of cargo tanks at the temperature distributions specified in Item 36	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.		○		
38 Hull structure temperature distribution calculation sheets	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based one cargo storage plans and cargo tank construction.		○		

Name*1	Notes	Submission			Maintained On Board
		Approval	Other	Finished Plans (Submission)	Finished Plans (On Board)
39 Cargo composition and physical properties	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction. (2) Including a saturated vapour pressure diagram within the necessary temperature range.		○		
40 Refrigeration system capacity calculation sheets	(1) Where cargoes are required to be cooled, and the Society judges there is a need to document based on cargo storage plans and cargo tank construction.		○		
41 Plans for additional fire-fighting equipment and other fire-fighting means	(1) The specification and arrangements of fire-fighting equipment and other means specified in <b>Chapter 11, Part S of the Rules</b> .	○			
42 Tanker bow access plans		○			

Notes

\*1 : For ships of not less than 500 *gross tonnage* engaged in international voyages, it is recommended submitted plans and documents be marked with *IMO* ship identification numbers.

\*2 : Plans and documents approved by the Society or copies thereto.

Table B2.5 Plans and Documents – Ships Using Low-flashpoint Fuels

Name*1	Notes	Submission		Maintained On Board
		Approval	Other	Finished Plans (On Board)
1 Manufacturing specifications for fuel tanks, thermal insulation and secondary barriers	(1) Including the following: welding procedures, inspection and testing procedures for welds and fuel tanks, installation procedures of thermal insulation materials and secondary barriers, and working standards.	<input type="radio"/>		
2 Arrangements and construction of fuel tanks		<input type="radio"/>		
3 System drawings and arrangements of fuel tank accessories	(1) Including details of the internal fittings.	<input type="radio"/>		
4 Arrangements and construction of fuel tank supports		<input type="radio"/>		
5 Construction of fuel tank deck portions through which fuel tanks penetrate, and their sealing arrangements		<input type="radio"/>		
6 Arrangements and construction of secondary barriers		<input type="radio"/>		
7 Specifications or standards for materials used for fuel tanks, thermal insulations, secondary barriers and fuel tank supports		<input type="radio"/>		
8 Layout and detailed installation of thermal insulation		<input type="radio"/>		
9 Manufacturing specifications for fuel piping systems	(1) Including the following: welding procedures, testing and inspection procedures for fuel piping, installation procedures of double wall piping, ducts and thermal insulation materials and secondary barriers, and working standards.	<input type="radio"/>		
10 Piping diagrams for fuel piping, fuel gauging systems and fuel vent piping		<input type="radio"/>		
11 Bilge systems in fuel storage hold spaces or interbarrier spaces, fuel preparation rooms, tank connection spaces and bunkering stations		<input type="radio"/>		
12 Specifications, piping diagrams and arrangements of gas detection systems		<input type="radio"/>		
13 Piping diagrams of inert gas lines and details of pressure adjusting devices	(1) Where fuel storage hold spaces or interbarrier spaces may be inerted.	<input type="radio"/>		

Name*1	Notes	Submission		Maintained On Board
		Approval	Other	Finished Plans (On Board)
14 Details of pressure relief systems for fuel storage hold spaces, interbarrier spaces and tank connection spaces as well as details of drainage arrangements for leaked fuel		<input type="radio"/>		
15 Assembly cross section of various pressure vessels, details of nozzles, system plans of fittings and details of fittings		<input type="radio"/>		
16 Arrangements of electrical bonding for fuel tanks, piping systems, machinery, equipment, etc.		<input type="radio"/>		
17 Arrangements of equipment installed in fuel preparation rooms, tank connection spaces, bunkering stations and bunkering control stations		<input type="radio"/>		
18 Programs of non-destructive testing for periodical surveys	(1) For independent fuel storage tanks of Type B. (2) Refer to <b>Item 1, (1) (d), Table B5.29, Part B of the Rules.</b>	<input type="radio"/>		<input type="radio"/> *2
19 Programs of examination and testing of liquefied gas fuel containment systems for periodical surveys	(1) For membrane tanks. (2) Refer to <b>Note *1, Table B5.29, Part B of the Rules.</b>	<input type="radio"/>		<input type="radio"/> *2
20 Inspection/survey plans for liquefied gas fuel containment systems for ships using low-flashpoint fuels	(1) As specified in <b>6.4.1-8, Part GF of the Rules.</b>	<input type="radio"/>		<input type="radio"/> *2
21 Arrangements of access to hazardous areas, fuel preparation rooms, tank connection spaces, ESD-protected machinery spaces and inerted spaces and guides for said access thereto (including air locks)		<input type="radio"/>		
22 Diagrams for control systems (including monitoring, safety and alarm systems) of bunkering systems, fuel tanks, fuel supply systems and fuel consumers and lists of the setting values		<input type="radio"/>		

Name*1	Notes	Submission		Maintained On Board
		Approval	Other	Finished Plans (On Board)
23 Plans and documents for high pressure gas-fuelled engines	(1) As specified in <b>1.3(1)</b> and <b>(3), Annex 1.1.3-2, Part GF of the Rules.</b>	<input type="radio"/>		
	(2) As specified in <b>1.3(2)</b> and <b>(3), Annex 1.1.3-2, Part GF of the Rules.</b>		<input type="radio"/>	
24 Plans and documents for low pressure gas-fuelled engines	(1) As specified in <b>1.3(1)</b> and <b>(3), Annex 1.1.3-3, Part GF of the Rules.</b>	<input type="radio"/>		
	(2) As specified in <b>1.3(2)</b> and <b>(3), Annex 1.1.3-3, Part GF of the Rules.</b>		<input type="radio"/>	
25 Plans and documents for equipment and fittings of ships using low-flashpoint fuels	(1) As specified in <b>1.2(1), Annex 1, Part GF of the Guidance.</b>	<input type="radio"/>		
	(2) As specified in <b>1.2(2), Annex 1, Part GF of the Guidance.</b>		<input type="radio"/>	
26 Plans and documents for gas-fuelled boilers	(1) As specified in <b>1.3(1), Annex 2, Part GF of the Guidance.</b>	<input type="radio"/>		
	(2) As specified in <b>1.3(2), Annex 2, Part GF of the Guidance.</b>		<input type="radio"/>	
27 Plans and documents for gas combustion units	(1) As specified in <b>1.3(1), Annex 2A, Part GF of the Guidance.</b>	<input type="radio"/>		
	(2) As specified in <b>1.3(2), Annex 2A, Part GF of the Guidance.</b>		<input type="radio"/>	
28 Arrangements and construction of ventilation systems	(1) Including materials, ventilation capacity, etc.	<input type="radio"/>		
29 Arrangements of ventilation inlets and exhaust outlets		<input type="radio"/>		
30 Ventilation duct diagrams	(1) Including design pressures, materials, and arrangements and construction of fittings.	<input type="radio"/>		
31 Details of bunkering manifold connections		<input type="radio"/>		
32 Plans showing distance between fuel tanks and shell plating at each section		<input type="radio"/>		
33 Arrangements, capacity calculation sheets and drip tray details	(1) Including materials, thermal protection for the hull structure and drainage arrangements.	<input type="radio"/>		
34 Access routes and means of access to protected spaces within hold spaces		<input type="radio"/>		
35 Arrangements of air lock doors, air lock ventilation capacity calculation sheets and air lock alarm system details		<input type="radio"/>		
36 Operational procedures	(1) As specified in <b>17.2.2-3, Part GF of the Rules.</b>	<input type="radio"/>		○*2
37 Emergency procedures	(1) As specified in <b>17.2.2-4, Part GF of the Rules.</b>	<input type="radio"/>		○*2
38 Basic design principal and technical reports for fuel containment systems			<input type="radio"/>	
39 Data on test methods and results of model and other tests, etc.	(1) As specified in <b>Chapter 16, Part GF of the Rules.</b>		<input type="radio"/>	

Name*1	Notes	Submission		Maintained On Board
		Approval	Other	Finished Plans (On Board)
40 Data on physical and mechanical properties of materials and welded parts at low and normal temperatures as well as their toughness at low temperatures and corrosion resistance where new materials and welding methods are adopted for construction of the fuel tanks, secondary barriers, thermal insulation, etc.			○	
41 Data on design loads	(1) As specified in <b>6.4.9, Part GF of the Rules</b> .		○	
42 Strength calculation sheets for fuel tanks and associated supports	(1) As specified in <b>6.4.6</b> and <b>6.4.15, Part GF of the Rules</b> .		○	
43 Heat transfer calculation sheets for primary members of fuel tanks under various loading conditions	(1) Where deemed necessary by the Society.		○	
44 Thermal stress calculation sheets for the primary members at the temperature distributions	(1) Where deemed necessary by the Society.		○	
45 Temperature distribution calculation sheets for hull structures	(1) Where deemed necessary by the Society.		○	
46 Specifications of fuel systems			○	
47 Composition and physical properties of fuels	(1) Including a saturated vapour pressure diagram within the necessary temperature range.		○	
48 Calculation sheets of relieving capacities of pressure relief systems for fuel tanks	(1) Including calculation sheets of back pressure in discharge lines.		○	
49 Technical data relating to design concepts for fuel preparation rooms and tank connection spaces			○	
50 Calculation sheets for refrigeration system capacities			○	
51 Strength calculation sheets for pipes	(1) As specified in <b>7.3.4-2, Part GF of the Rules</b> .		○	
52 Investigation reports of the stress analysis for high pressure fuel piping systems	(1) As specified in <b>7.3.4-4, Part GF of the Rules</b> .		○	
53 Stress analysis reports for piping systems with design temperatures of $-110^{\circ}\text{C}$ or lower	(1) As specified in <b>7.3.4-5, Part GF of the Rules</b> .		○	
54 Investigation reports of the design pressures for outer pipes or ducts of high pressure fuel piping	(1) As specified in <b>9.8.2, Part GF of the Rules</b> .		○	

Name*1	Notes	Submission		Maintained On Board
		Approval	Other	Finished Plans (On Board)
55 Details of pump shaft penetrations	(1) Including information on design specifications, construction, materials, etc.		<input type="radio"/>	
56 Investigation documents for fuel tank filling limits			<input type="radio"/>	
57 Probability calculation sheets in cases	(1) Where a probabilistic approach is used to decide fuel tank arrangements.		<input type="radio"/>	
58 List of data on risk assessment			<input type="radio"/>	
59 Documents related to failure modes and effects analysis	(1) As specified in <b>14.3.4, Part GF of the Rules</b> .		<input type="radio"/>	
60 A copy of the <i>IGF</i> Code or national regulations incorporating the <i>IGF</i> Code	(1) As specified in <b>17.2.2-1, Part GF of the Rules</b> .			<input type="radio"/>
61 Plans for additional fire-fighting equipment and other fire-fighting means	(1) The specification and arrangements of fire-fighting equipment and other means specified in <b>Chapter 11, Part GF of the Rules</b> .	<input type="radio"/>		
62 Construction of main parts of refrigeration systems		<input type="radio"/>		
63 Piping diagrams for refrigeration system refrigerant		<input type="radio"/>		

#### Notes

\*1 : For ships of not less than 500 *gross tonnage* engaged in international voyages, it is recommended submitted plans and documents be marked with *IMO* ship identification numbers.

\*2 : Plans and documents approved by the Society or copies thereto.

Table B2.6 List of Information to be Included in the Ship Construction File (SCF)  
(Ships subject to *SOLAS Chapter II-1 Regulation 3-10*)

Items	Information to be included	Further explanation of the content	Example documents	Normal storage location
<b>DESIGN</b>				
1	Design life	• assumed design life in years	• statement or note on midship section	• SCF-specific on board ship
			• midship section plan	on board ship
2	Environmental conditions	• assumed environmental conditions	• statement referencing data source or Rule (specific rule and data); or • in accordance with Rule (date and revision)	• SCF-specific on board ship
3	Structural strength			
3.1	General design	• applied Rule (date and revision) • applied alternative to Rule	• applied design method alternative to Rule and subject structure(s)	• SCF-specific on board ship
3.2	Deformation and failure modes	• calculating conditions and results • assumed loading conditions	• allowable loading pattern • maximum allowable hull girder bending moment and shear force	• capacity plan on board ship • loading manual on board ship • trim and stability booklet on board ship
3.3	Ultimate strength	• operational restrictions due to structural strength	• maximum allowable cargo density or storage factor	• loading instrument instruction manual on board ship • operation and maintenance manuals on board ship
3.4	Safety margins	• strength calculation results	• bulky output of strength calculation  • plan showing highly stressed areas (e.g. critical structural areas) prone to yielding and/or buckling	• strength calculation on shore archive • areas prone to yielding and/or buckling on board ship
3.4	Safety margins	• gross hull girder section modulus  • minimum hull girder section modulus along the length of the ship to be maintained throughout the ship's life, including cross section details such as the value of the area of the deck zone and bottom zone, the renewal value for the neutral axis zone  • gross scantlings of structural constituent parts	• structural drawings	• general arrangement plan on board ship  • key construction plans on board ship



Items		Information to be included	Further explanation of the content	Example documents	Normal storage location
		<ul style="list-style-type: none"> <li>• net scantlings of structural constituent parts, as built scantlings and voluntary addition thicknesses</li> <li>• hull form</li> </ul>	<ul style="list-style-type: none"> <li>• rudder and stern frame</li> <li>• structural details of typical members</li> <li>• hull form information indicated in key construction plans</li> <li>• hull form data stored within an onboard computer necessary for trim and stability and longitudinal strength calculations</li> </ul>	<ul style="list-style-type: none"> <li>• rudder and rudder stock plans</li> <li>• structural details</li> <li>• yard plans</li> <li>• dangerous area plan</li> <li>• lines plan</li> </ul> <p>or equivalent</p>	<ul style="list-style-type: none"> <li>on board ship</li> <li>on board ship</li> <li>on shore archive</li> <li>on board ship</li> <li>on shore archive</li> <li>on board ship</li> </ul>
4	Fatigue life	<ul style="list-style-type: none"> <li>• applied Rule (date and revision)</li> <li>• applied alternative to Rule</li> <li>• calculating conditions and results</li> <li>• assumed loading conditions</li> <li>• fatigue life calculation results</li> </ul>	<ul style="list-style-type: none"> <li>• applied design method alternative to Rule and subject structures</li> <li>• assumed loading conditions and rates</li> <li>• bulky output of fatigue life calculation</li> <li>• plan showing areas (e.g. critical structural areas) prone to fatigue</li> </ul>	<ul style="list-style-type: none"> <li>• SCF-specific</li> <li>• structural details</li> <li>• fatigue life calculation</li> <li>• areas prone to fatigue</li> </ul>	<ul style="list-style-type: none"> <li>on board ship</li> <li>on board ship</li> <li>on shore archive</li> <li>on board ship</li> </ul>
5	Residual strength	<ul style="list-style-type: none"> <li>• applied Rule (date and revision)</li> </ul>		<ul style="list-style-type: none"> <li>• SCF-specific</li> </ul>	on board ship
6	Protection against corrosion				
6.1	Coating life	<ul style="list-style-type: none"> <li>• coated areas and target coating life and other measures for corrosion protection in holds, cargo and ballast tanks, other structure-integrated deep tanks and void spaces</li> </ul>	<ul style="list-style-type: none"> <li>• plans showing areas (e.g. critical structural areas) prone to excessive corrosion</li> </ul>	<ul style="list-style-type: none"> <li>• SCF-specific</li> </ul>	on board ship

Items		Information to be included	Further explanation of the content	Example documents	Normal storage location
6.2	Corrosion addition			<ul style="list-style-type: none"> <li>Coating Technical File required by PSPC (<i>Performance standard for Protective Coatings for Dedicated Seawater Ballast Tanks in All Types of Ships and Double-side Skin Spaces of Bulk Carriers</i>, adopted as <i>IMO</i> Resolution MSC.215(82), as amended and <i>Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers</i>, adopted as <i>IMO</i> Resolution MSC.288(87), as amended)</li> </ul>	on board ship
		<ul style="list-style-type: none"> <li>specification for coating and other measures for corrosion protection in holds, cargo and ballast tanks, other structure-integrated deep tanks and void spaces</li> </ul>		<ul style="list-style-type: none"> <li>areas prone to excessive corrosion</li> </ul>	on board ship
		<ul style="list-style-type: none"> <li>gross scantlings of structural constituent parts</li> <li>net scantlings of structural constituent parts, as built scantlings and voluntary addition thicknesses</li> </ul>		<ul style="list-style-type: none"> <li>key construction plans</li> </ul>	on board ship
7	Structural redundancy	<ul style="list-style-type: none"> <li>applied Rule (date and revision)</li> </ul>		<ul style="list-style-type: none"> <li>SCF-specific</li> </ul>	on board ship
8	Watertight and weathertight integrity	<ul style="list-style-type: none"> <li>applied Rule (date and revision)</li> </ul>		<ul style="list-style-type: none"> <li>SCF-specific</li> </ul>	on board ship
		<ul style="list-style-type: none"> <li>key factors for watertight and weathertight integrity</li> </ul>	<ul style="list-style-type: none"> <li>details of equipment forming part of the watertight and weathertight integrity</li> </ul>	<ul style="list-style-type: none"> <li>structural details of hatch covers, doors and other closings integral with the shell and bulkheads</li> </ul>	on board ship
9	Human element considerations	<ul style="list-style-type: none"> <li>list of ergonomic design principles applied to ship structure design to enhance safety during operations, inspections and maintenance of ship</li> </ul>		<ul style="list-style-type: none"> <li>SCF-specific</li> </ul>	on board ship
10	Design transparency	<ul style="list-style-type: none"> <li>applied Rule (date and revision)</li> <li>applicable industry standards for design transparency and IP protection</li> </ul>		<ul style="list-style-type: none"> <li>intellectual property provisions</li> </ul>	on board ship
		<ul style="list-style-type: none"> <li>reference to part of SCF information kept ashore</li> </ul>		<ul style="list-style-type: none"> <li>summary, location and access procedure for part of SCF information on shore</li> </ul>	on board ship

Items	Information to be included	Further explanation of the content	Example documents	Normal storage location
<b>CONSTRUCTION</b>				
11	Construction quality procedures	<ul style="list-style-type: none"> <li>• applied construction quality standard</li> </ul>	<ul style="list-style-type: none"> <li>• recognized national or international construction quality standard</li> <li>• SCF-specific</li> </ul>	on board ship
12	Survey during construction	<ul style="list-style-type: none"> <li>• survey regime applied during construction (to include all owner and class scheduled inspections during construction)</li> <li>• information on non-destructive examination</li> </ul>	<ul style="list-style-type: none"> <li>• applied Rules (date and revision)</li> <li>• copies of certificates of forgings and castings welded into the hull</li> <li>• SCF-specific</li> <li>• tank testing plan</li> <li>• non-destructive testing plan</li> <li>• Coating Technical File required by PSPC</li> </ul>	on board ship  on board ship on board ship on board ship
<b>IN-SERVICE CONSIDERATIONS</b>				
13	Survey and maintenance	<ul style="list-style-type: none"> <li>• maintenance plans specific to the structure of the ship where higher attention is called for</li> <li>• preparations for survey</li> <li>• gross hull girder section modulus</li> <li>• minimum hull girder section modulus along the length of the ship to be maintained throughout the ship's life, including cross section details such as the value of the area of the deck zone and bottom zone, the renewal value for the neutral axis zone</li> <li>• gross scantlings of structural constituent parts</li> <li>• net scantlings of structural constituent parts, as built scantlings and voluntary addition thicknesses</li> </ul>	<ul style="list-style-type: none"> <li>• plan showing highly stressed areas (e.g. critical structural areas) prone to yielding, buckling, fatigue and/or excessive corrosion</li> <li>• arrangement and details of all penetrations normally examined at dry-docking</li> <li>• details for dry-docking</li> <li>• details for in-water survey</li> <li>• SCF-specific</li> <li>• operation and maintenance manuals (e.g. hatch covers and doors)</li> <li>• docking plan</li> <li>• dangerous area plan</li> <li>• Ship Structure Access Manual</li> <li>• Means of access to other structure-integrated deep tanks</li> <li>• Coating Technical File required by PSPC</li> <li>• key construction plans</li> <li>• rudder and rudder stock</li> </ul>	on board ship on board ship  on board ship  on board ship on board ship  on board ship on board ship on board ship on board ship on board ship on board ship

Items		Information to be included	Further explanation of the content	Example documents	Normal storage location
		• hull form	• hull form information indicated in key construction plans	• structural details • yard plans • lines plan or equivalent	on board ship on shore archive on shore archive  on board ship
14	Structural accessibility	• means of access to holds, cargo and ballast tanks and other structure-integrated deep tanks	• plans showing arrangement and details of means of access	• Ship Structure Access Manual  • means of access to other structure-integrated deep tanks	on board ship  on board ship
<b>RECYCLING CONSIDERATIONS</b>					
15	Recycling	• identification of all materials that were used in construction and may need special handling due to environmental and safety concerns	• list of materials used for the construction of the hull structure	• SCF-specific	on board ship

Notes:

- 1 “SCF-specific” means documents to be developed especially to meet the requirements of this Table.
- 2 “Key construction plans” means plans such as midship section, main O.T. and W.T. transverse bulkheads, construction profiles/plans, shell expansions, forward and aft sections in cargo tank (or hold) region, engine-room construction, forward construction and stern construction drawings.
- 3 “Yard plans” means a full set of structural drawings, which include scantling information of all structural members.
- 4 “Hull form” means a graphical or numerical representation of the geometry of the hull. Examples would include the graphical description provided by a lines plan and the numerical description provided by the hull form data stored within an onboard computer.
- 5 “Lines plan” means a special drawing which is dedicated to show the entire hull form of a ship.
- 6 “Equivalent (to Lines plan)” means a set of information of hull form to be indicated in key construction plans for SCF purposes. Sufficient information is to be included in the drawings to provide the geometric definition to facilitate the repair of any part of the hull structure.
- 7 “Normal storage location” means a standard location where each SCF information item is to be stored. However, those items listed as being on board in the table above are to be on board as a minimum.
- 8 “Shore archive” is to be operated in accordance with applicable international standards.

Table B2.7 Survey - Hull and Equipment

Survey Item	Details
1 Materials, equipments and weldings	<p>(1) Tests are carried out in accordance with <b>Part K, Part L</b> and <b>Part M of the Rules</b>.</p> <p>(2) Materials, equipment and welded parts not manufactured at the shipyard are to be confirmed to be suitable for use on board the ship.</p> <p>(3) Survey methods considered to sufficient for obtaining information equivalent to that obtained through traditional ordinary surveys where a surveyor is in attendance.</p>
2 Ships carrying liquefied gases in bulk, ships carrying dangerous chemicals in bulk and ships using low-flashpoint fuels	<p>(1) For ships carrying liquefied gases in bulk, ships carrying dangerous chemicals in bulk and ships using low-flashpoint fuels, the tests specified in <b>Part N, Part S</b> and <b>Part G of the Rules</b> respectively are carried out in addition to the survey items specified in this table.</p>
3 Welding	<p>(1) Welding consumables are approved.</p> <p>(2) Welders are appropriately qualified.</p> <p>(3) Welding application plans are approved in accordance with <b>2.2.1, Part D of the Rules</b>.</p> <p>(4) New welding procedure qualification tests are carried out.</p> <p>(5) Welding equipment is appropriately calibrated and maintained.</p> <p>(6) The environment (cleanliness, dryness, lighting, etc.) and preparation (pre- or post-heat treatment, drying of surfaces, etc.) are appropriate.</p> <p>(7) Welding are appropriately monitored by supervisors.</p> <p>(8) Welding is appropriately implemented without serious surface defects.</p> <p>(9) Non-destructive inspections for the welded joints of hull constructions are carried out in accordance with <b>Chapter 8, Part D of the Rules</b>.</p>
4 Steel preparation and fit up	<p>(1) Steels are traceable and appropriately identified.</p> <p>(2) Surface preparation and cutting are appropriately carried out.</p> <p>(3) Straightening is appropriately carried out.</p> <p>(4) Forming is appropriately carried out.</p> <p>(5) Alignment, fit up and gaps are in accordance with appropriate standards.</p>
5 Steelwork process (sub-assembly, block, grand and mega block assembly, pre-erection and erection, closing plates)	<p>(1) Welded parts and materials are appropriately fitted.</p> <p>(2) Alignment and deformations are in accordance with appropriate standards.</p>
6 Rework, remedial works, alternation	<p>(1) Welding is appropriately carried out, and alignment and deformations are in accordance with appropriate standards.</p>
7 Rudders and rudder installations	<p>(1) Rudders and rudder installations are appropriately installed.</p> <p>(2) Leak tests are carried out.</p> <p>(3) Rudder carriers are appropriately installed..</p> <p>(4) Inspections of the centring of carriers and bearings are carried out.</p> <p>(5) Bushes are appropriately fitted.</p> <p>(6) Rudder stocks are appropriately installed.</p> <p>(7) Rudder stocks and rudders are appropriately connected.</p> <p>(8) Swing tests of rudder are carried out.</p> <p>(9) Clearances are measured.</p> <p>(10) Carrier bearings are appropriately lubricated.</p>
8 Keel line profiling, principle dimension measurement, hull deflection measurement	<p>(1) Measure plan accuracy.</p>
9 Load lines, freeboard marks and ship identification numbers	<p>(1) Load lines are located at appropriate positions.</p> <p>(2) Freeboard mark is located at an appropriate position.</p> <p>(3) Ship's identification number is located at an appropriate position.</p>

Survey Item	Details
10 Airtight tests (including leakage and hose tests), hydrostatic tests, watertight tests	<p>(1) The watertightness and structural adequacy of tanks and watertight boundaries as well as the weathertightness of other structures and shipboard outfitings are verified in accordance with the following (a) to (d).</p> <p>(a) The tests specified in SOLAS Chapter II-1 Regulation 11 are carried out for ships subject to SOLAS Convention, except where specially approved by the Administration.</p> <p>(b) The tests specified in <b>Chapter 1, Annex 2.1.5 “Testing Procedures of Watertight Compartments”, Part B of the Rules</b> are carried out for ships subject to SOLAS Convention, except in the case of the following (c).</p> <p>(c) The tests specified in <b>Chapter 2, Annex 2.1.5 “Testing Procedures of Watertight Compartments”, Part B of the Rules</b> are carried out for ships subject to SOLAS Convention satisfying the following i) and ii).</p> <p>i) The shipyard provides documentary evidence of the shipowner’s agreement to request a Flag Administration exemption from the application of SOLAS Chapter II-1, Regulation 11, or for an equivalency agreeing that the content of <b>Chapter 2, Annex 2.1.5 “Testing Procedures of Watertight Compartments”, Part B of the Rules</b> is equivalent to SOLAS Chapter II-1, Regulation 11.</p> <p>ii) The exemption/equivalency specified in i) above has been granted by the responsible Flag Administration.</p> <p>(d) The tests specified in <b>Chapter 3, Annex 2.1.5 “Testing Procedures of Watertight Compartments”, Part B of the Rules</b> are carried out for ships not subject to SOLAS Convention.</p> <p>(2) Relevant tests specified in <b>Part D of the Rules</b> are carried out for pipes.</p>
11 Bottom parts before launching	<p>(1) The condition of the underwater parts of bottom parts is appropriate.</p> <p>(2) Construction and arrangements for in-water surveys are appropriately provided for ships subject to <b>6.1.2, Part B of the Rules</b>.</p>
12 Dewatering arrangements	(1) Performance tests are carried out for the dewatering arrangements specified in <b>13.5.10 Part D of the Rules</b> .
13 Closing appliances of openings (including watertight and ramp doors)	<p>(1) Closing appliances for maintaining shell and weatherdeck watertightness or weathertightness are appropriately installed.</p> <p>(2) Watertightness or weathertightness performance tests are carried out.</p>
14 Bulwark	(1) Bulwark (including freeing ports) is appropriately provided.
15 Guardrails, walkways, etc.	<p>(1) Appropriate means (including guardrails, walkways and other means) for protection of seafarers are provided.</p> <p>(2) Safe access to operating positions for windlasses located in the bow are is provided for tankers.</p>
16 Navigation bridge visibility	<p>(1) Navigation bridge arrangement is appropriate.</p> <p>(2) Watch location visibility from the navigation bridge complies with <b>Chapter 2, Part W of the Rules</b>.</p>
17 Loading computers	(1) Operating tests, using several of the loading conditions examined in accordance with <b>3.8.3.2-2, Part 1, Part C of the Rules</b> , are carried out for loading computers after installation to confirm proper operation.
18 Stability computers	(1) Functional tests are carried out to verify proper operation.
19 Emergency towing arrangements	<p>(1) Emergency towing arrangements are located in accordance with approved plans.</p> <p>(2) Functional tests are carried out.</p>
20 Means of embarkation and disembarkation	<p>(1) Means of embarkation and disembarkation comply with <b>14.14, Part 1, Part C of the Rules</b>.</p> <p>(2) Accommodation ladders are subjected to static load tests at their specified maximum operational loads.</p> <p>(3) Winch hoisting and lowering of accommodation ladders are tested a minimum of two times in accordance with ISO 7364:1983 or another standard deemed appropriate by the Society.</p> <p>(4) Winches and accommodation ladders are verified to be in good conditions after testing.</p>
21 Corrosion prevention systems	(1) Corrosion prevention systems are fitted in dedicated seawater ballast tanks arranged in ships, double-side skin spaces arranged in bulk carriers of 150m in length and upwards and cargo oil tanks of crude oil tankers, of 5,000 tonnes dead weight and above.

Survey Item	Details
22 Water level detection and alarm systems	(1) Performance tests (including audible and visible alarms tests) are carried out for the water level detection and alarm systems specified in <b>13.8.5</b> and <b>13.8.6, Part D of the Rules</b> .
23 Collision bulkheads	(1) Collision bulkheads are watertight up to the freeboard deck. (2) Valves fitted onto pipes penetrating collision bulkheads are capable of being operated from above the freeboard deck. (3) There are no doors, manholes, ventilation ducts or other openings.
24 Towing and mooring equipment	(1) Towing and mooring equipment is properly marked to indicate restriction associated with safe operation. (2) The operation tests specified in <b>16.3.2, Part D of the Rules</b> are carried out.
25 Control of gases	(1) Portable instruments for measuring gases specified in <b>4.5.7, Part R of the Rules</b> are provided. (2) Suitable means for calibrating portable instruments for measuring gases is provided. (3) Arrangements for the gas measurements specified in <b>4.5.7(2), Part R of the Rules</b> are provided.
26 Cargo tank venting	(1) Cargo tank venting is appropriately arranged.
27 Ventilators and air pipes	(1) Ventilators and air pipes (including associated coamings and closing appliances) located on the freeboard deck and superstructure decks are appropriately provided.
28 Scuppers, inlets and discharges	(1) Scuppers, inlets and discharges are appropriately provided.
29 Means to prevent blockage of drainage arrangements	(1) Means to prevent blockage of drainage arrangements are provided for closed vehicle and ro-ro spaces, and special category spaces where fixed pressure water-spraying systems are provided.
30 Side scuttles and deadlights	(1) Side scuttles and deadlights are appropriately provided.
31 Spurling pipes and cable lockers	(1) Spurling pipes and cable lockers are appropriately provided.
32 Garbage chutes	(1) Garbage chutes are appropriately provided.
33 Type “A” or type “B-minus” freeboards	(1) Ships satisfy special requirements for type “A” and type “B-minus” freeboards (only when applicable).
34 Fittings and appliances for timber deck cargoes	(1) Fittings and appliances for timber deck cargoes are appropriately provided.
35 Provision of means of access	(1) Means of access are appropriately provided in accordance with approved manuals for oil tankers and bulk carriers.
36 Watertight cable penetrations	(1) Watertight cable penetrations are installed in accordance with <b>H2.9.15-5, Part H of the Guidance</b> .

Table B2.8 Survey - Machinery and Electrical Installations\*1

Survey Items	Details
1 General	<p>(1) Machinery, electrical installations, cables and piping etc. are appropriately arranged.</p> <p>(2) Machinery and electrical installations etc manufactured away from the site are to be confirmed when they are used for ships.</p> <p>(3) Machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected so as to reduce to a minimum any danger to persons on board with due regard being given to moving parts, hot surfaces and other hazards.</p> <p>(4) Normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative.</p> <p>(5) Means are provided so that the machinery can be brought into operation from the dead ship condition without external aid.</p> <p>(6) Means are provided to protect against overpressure in the parts of main, auxiliary and other machinery.</p> <p>(7) Means are provided to prevent the contacting of fuel oils, lubrication oils and other combustible oils to high temperature surfaces.</p> <p>(8) Arrangements to operate main and other machinery from machinery control room are satisfactory.</p> <p>(9) Means are provided for the cancellation of the remote control functions specified in <b>18.2.4-6, Part D of the Rules</b>.</p> <p>(10) The override arrangements specified in <b>18.2.6-3, Part D of the Rules</b> are provided.</p> <p>(11) Ventilation systems for machinery spaces operate as intended.</p> <p>(12) Precautions are provided against shock, fire and other hazards of electrical origin.</p> <p>(13) Means are provided for ascertaining the amount of oil contained in any oil fuel tanks specified in <b>4.2.2(1)(e), Part R of the Rules</b>.</p>
2 Hydrostatic tests, watertight tests and relevant tests	<p>(1) Hydrostatic, leakage or airtight tests are to be carried out as specified in <b>Part D of the Rules</b> in accordance with the kind of machinery</p> <p>(2) For pipes, relevant tests specified in <b>Part D of the Rules</b> are to be carried out.</p>
3 Ships using low-flashpoint fuels	<p>(1) For ships using low-flashpoint fuels, tests specified in <b>Part G of the Rules</b> are to be carried out in addition to the survey items specified in this table.</p>
4 Welds for machinery	<p>(1) Production weld tests and non-destructive tests specified in <b>Chapter 11, Part D of the Rules</b> are to be carried out.</p>
5 Main parts of machinery and materials	<p>(1) The tests of materials of main parts of machinery specified in <b>Part K of the Rules</b> are to be carried out.</p> <p>(2) The tests specified in either <b>Part D</b> or <b>Part H of the Rules</b> (according to the kind of machinery) are to be carried out.</p> <p>(3) For the tests specified (1) and (2) in above, the survey methods which are considered to be able to obtain information equivalent to that obtained through traditional ordinary surveys where a surveyor is in attendance.</p> <p>(4) The machining condition of main parts is to be appropriate. Confirmation at appropriate stages during machining may be required.</p> <p>(5) For welded construction, the welding is appropriate and there are no serious defects. The welding is to be confirmed before commenced and when completed.</p>
6 Installation	<p>(1) Main parts of machinery are properly installed on board.</p>



Survey Items	Details
7 Shafting	<p>(1) Confirmation tests for the optical or laser sighting of shaft centres specified in <b>D6.3.2(1), Part D of the Guidance</b> are to be carried out.</p> <p>(2) Clearance between stern tube bearings and propeller shafts or stern tube shafts, and propeller shafts wear down are to be measured.</p> <p>(3) Shaft alignment is to be satisfied in accordance with the following (a) to (c) items.</p> <p>(a) Shaft bearings are appropriately arranged.</p> <p>(b) The confirmation tests for measuring sag and the gaps between shaft coupling flanges specified in <b>D6.3.2(2), Part D of the Guidance</b> are to be carried out.</p> <p>(c) Confirmation tests for jacking up shafts near bearings are to be carried out in accordance with <b>Annex 6.2.13</b> and <b>1.4.2, Part D of the Rules</b>.</p> <p>(4) Connecting bolts of shafts are properly installed.</p> <p>(5) Performance tests for propeller shafts kind 1 C are to be carried out in accordance with <b>6.1.2(1)(ii), Part D of the Rules</b> for the systems and equipment, etc. specified in <b>6.2.11, Part D of the Rules</b>.</p>
8 Stern tubes	<p>(1) Inner conditions of stern tube bosses are appropriate.</p> <p>(2) Stern tubes are properly installed.</p> <p>(3) Leakage tests for the sealing devices specified in <b>6.2.10-2, Part D of the Rules</b> are to be carried out at the supply pressures of lubrication oils or fresh water after installation on board.</p>
9 Propellers	<p>(1) Propellers are properly fitted.</p> <p>(2) The force-fitting tests specified in <b>7.4.2, Part D of the Rules</b> are to be carried out for propellers force-fitted onto propeller shafts.</p>
10 Sea chest valves and overboard discharge valves, etc.	<p>(1) Sea chest valves and overboard discharge valves, etc. are properly fitted.</p>
11 Reciprocating internal combustion engines (including reciprocating internal combustion engines for emergency installations)	<p>(1) Performance tests for the safety devices and alarm systems specified in <b>2.4, Part D of the Rules</b> are to be carried out.</p> <p>(2) Performance tests for the automatic or remote control systems specified in <b>18.7.3, Part D of the Rules</b> are to be carried out.</p> <p>(3) Performance tests for the operation, watching, reporting, alarm and safety systems from the bridge are to be carried out for main propulsion machinery.</p> <p>(4) Crankshaft deflection is to be measured for main propulsion machinery.</p>
12 Steam turbines	<p>(1) Performance tests for the safety devices and alarm systems specified in <b>3.3, Part D of the Rules</b> are to be carried out.</p> <p>(2) One cross-compound type main steam turbines are to satisfy <b>3.2.2-1, Part D of the Rules</b> when provided.</p> <p>(3) Performance tests for the automatic or remote control systems specified in <b>18.7.3, Part D of the Rules</b> are to be carried out.</p> <p>(4) Performance tests for the operation, watching, reporting, alarm and safety systems from the bridge are to be carried out for main propulsion machinery.</p>
13 Gas turbines	<p>(1) Performance tests for the safety devices and alarm systems specified in <b>4.3, Part D of the Rules</b> are to be carried out.</p> <p>(2) Performance tests for the automatic or remote control systems specified in <b>18.7.3, Part D of the Rules</b> are to be carried out.</p> <p>(3) Performance tests for the operation, watching, reporting, alarm and safety systems from the bridge are to be carried out.</p>
14 Boilers	<p>(1) Popping tests of safety valves are to be carried out.</p> <p>(2) Performance tests for the safety devices and alarm systems specified in <b>9.9.10</b> and <b>9.11.2-3, Part D of the Rules</b> are to be carried out.</p>
15 Thermal oil heaters	<p>(1) Performance tests for the safety devices and alarm systems specified in <b>9.12.2</b> and <b>9.12.3, Part D of the Rules</b> are to be carried out.</p>
16 Incinerators	<p>(1) Operation tests of the safety devices and the alarm devices specified as well as the burning tests in <b>9.13.5, Part D of the Rules</b> are to be carried out.</p>

Survey Items	Details
17 Pipes and piping systems	<p>(1) Means are to be provided to prevent overpressure in oil tanks or in any part of oil fuel systems, including the filling pipes served by pumps on board.</p> <p>(2) Oil piping systems (including fuel oil and lubrication oil) are not to lead to forepeak tanks.</p> <p>(3) Bilge suction tests are to be carried out.</p> <p>(4) The sounding pipes specified in <b>13.8</b> and <b>14.2.8, Part D of the Rules</b> are to be provided.</p> <p>(5) The tests specified in <b>Chapter 13</b> and <b>Chapter 14, Part D of the Rules</b> are to be carried out.</p>
18 Air compressors	<p>(1) Performance tests are to be carried out for the relief valves specified in <b>13.13.1-2</b> and <b>13.13.2, Part D of the Rules</b>.</p> <p>(2) Charging tests are to be carried out.</p>
19 Pressure vessels	<p>(1) Performance tests are to be carried out for the pressure relief devices specified in <b>10.8.3, Part D of the Rules</b>.</p>
20 Steering gear	<p>(1) Steering gear compartments are to be readily accessible under safe conditions.</p> <p>(2) The bearings specified in <b>2.4, Part D of the Rules</b> are permanently lubricated or provided with lubrication fittings.</p> <p>(3) The relief valves specified in <b>15.2.4-4, Part D of the Rules</b> are provided.</p> <p>(4) Cables used in the power circuits specified in <b>15.2.7-1, Part D of the Rules</b> are separated as far apart as practicable throughout their entire length.</p> <p>(5) The rudder angle indicators specified in <b>15.2.10, Part D of the Rules</b> are provided.</p> <p>(6) Performance tests are to be carried out for the low level alarms specified in <b>15.2.4-5, Part D of the Rules</b> provided for hydraulic fluid reservoirs to give the earliest practical indication of hydraulic fluid leakage.</p> <p>(7) Fixed storage tanks to recharge the power actuating systems specified in <b>15.2.4-6, Part D of the Rules</b> are to be provided.</p> <p>(8) For the steering gear of in oil tankers, ships carrying liquefied gases in bulk or ships carrying dangerous chemicals in bulk of 10,000 <i>gross tonnage</i> or more, <b>15.6.1-2, Part D of the Rules</b> is to be satisfied.</p>
21 Windlasses	<p>(1) The tests specified in <b>16.2.5, Part D of the Rules</b> are to be carried out.</p>
22 Refrigerating machinery and controlled atmosphere systems	<p>(1) For refrigerating machinery, the pressure relief devices specified in <b>17.2.4, Part D of the Rules</b> are properly installed.</p> <p>(2) The hydrostatic or tightness tests specified in <b>17.2.1, Part D of the Rules</b> are to be carried out for pressure vessels exposed to the pressure of primary refrigerants, cylinders and crank cases of the compressors of refrigerators.</p> <p>(3) The leak tests specified in <b>17.4.2-1, Part D of the Rules</b> are to be carried out at a pressure of 90 % of the design pressure for piping systems which are exposed to the pressure of primary refrigerants after installation on board.</p> <p>(4) The operation tests and other tests specified in <b>17.4.2-2, Part D of the Rules</b> are to be carried out for installations and equipment connected with controlled atmosphere systems to confirm normal operation.</p>
23 Waterjet propulsion systems	<p>(1) The tests specified in <b>Chapter 19, Part D of the Rules</b> are to be carried out.</p>
24 Azimuth Thrusters	<p>(1) The tests specified in <b>Chapter 20, Part D of the Rules</b> are to be carried out.</p>
25 Selective catalytic reduction systems and associated equipment, exhaust gas cleaning systems and associated equipment or exhaust gas recirculation systems and associated equipment	<p>(1) The tests specified in <b>Chapter 21, 22 and 23, Part D of the Rules</b> are to be carried out.</p>
26 Prevention of electrical hazards	<p>(1) Distribution systems for tankers, ships carrying liquefied gases in bulk and ships carrying chemicals in bulk are to satisfy <b>4.2.2, Part H of the Rules</b>.</p>
27 Circuits of electric propulsion, auxiliary power and lighting	<p>(1) The insulation resistance tests specified in <b>2.18.1, Part H of the Rules</b> are to be carried out.</p>

Survey Items	Details
28 Internal communication systems	(1) The tests specified in <b>2.18.1-2</b> and <b>2.18.2-6, Part H of the Rules</b> *2 are to be carried out.
29 Generators	(1) The performance tests specified in <b>2.18.2, Part H of the Rules</b> are to be carried out. (2) Performance tests for starting arrangement are to be carried out.
30 Emergency sources of electrical power	(1) Emergency sources of electrical power are appropriately arranged. (2) The performance tests specified in <b>2.18.2, Part H of the Rules</b> are to be carried out. (3) Performance tests for starting arrangements are to be carried out.
31 Switchboards, section boxes and distribution boxes	(1) All switches, circuit-breakers and associated equipment on switchboards are to be operated on loads to demonstrate*2 suitability, and section boxes and distribution boxes are to be tested in the same way.
32 Motors	(1) The performance tests specified in <b>2.18.2-3, Part H of the Rules</b> *2 are to be carried out.
33 Electric heaters, electric cooking ranges and the like	(1) Electric heaters, electric cooking ranges and the like are to be tested to demonstrate that their heating elements function satisfactorily.
34 Lighting systems(including emergency lighting circuits)	(1) All circuits are to be tested*2 to demonstrate that lighting fittings, branch boxes, switches, socket-outlets and other accessories are effectively connected and function satisfactorily. Performance tests are to be carried out for all circuits.
35 Protective enclosures and degrees, types of protection	(1) Protective enclosures and the type of protection for electrical installations are to satisfy relevant requirements.
36 High voltage cables	(1) The high voltage tests specified in <b>2.17.6-6, Part H of the Rules</b> are to be carried out.
37 Computer-based systems	(1) The tests specified in <b>2.2 Part X of the Rules</b> are to be carried out.

## Notes

\*1 : This item may be carried out during sea trials.

\*2 : During the tests, it is to be ascertained that voltage drops of feeder circuits do not exceed the values specified in **2.9.6, Part H of the Rules**.

Table B2.9 Survey – Fire Protection, Means of Escape and Fire Fighting Equipment

Survey Items	Details
1 Fire-extinguishing system arrangements	<p>(1) Fire-extinguishing systems are installed in accordance with plans approved by the Society.</p> <p>(2) The control systems for fixed fire-extinguishing systems are to be clearly identified.</p>
2 Fire control plans	<p>(1) Fire control plans are correctly posted..</p> <p>(2) Fire control plans are permanently stored in prominently marked weathertight enclosures outside of deckhouses.</p>
3 Fire main pumps, fire main lines and fire hydrants	<p>(1) For fire main pumps, confirmation that two jets of water are simultaneously produced from the highest positioned hydrants and hydrants which impose the strictest condition, taking into account their distances from fire pumps, and that the pressures at each hydrant are not less than the minimum pressure required by <b>10.2.1-6(1), Part R of the Rules</b>.</p> <p>(2) Notwithstanding (1) above, confirmation that four jets of water are simultaneously produced from four fire hydrants for ships subject to <b>19.3.1, Part R of the Rules</b>.</p> <p>(3) For periodically unattended machinery spaces or spaces in which only one person is required on watch, the following (a) to (c) items are to be satisfied.</p> <p>(a) Operation tests of remote control systems or automatic operation systems for one pump are to be carried out.</p> <p>(b) Sea suction and outlet valves of such pumps in machinery spaces are to be capable of being opened from the same location where the pumps are started. Otherwise such valves are to be of a locked-open type with adequate notification such as “Keep open” attached thereto.</p> <p>(c) In cases where sea suction and outlet valves of such pumps are capable of being opened remotely, operation tests for remote control systems are to be carried out.</p> <p>(4) Tests for remote control systems of fire main pumps are to be carried out for ships subject to <b>19.3.1, Part R of the Rules</b>.</p> <p>(5) Pressure tests for ordinarily pressurised parts of systems with a pressure 1.5 times the working pressure are to be carried out for ships employing permanent pressurisation of fire main systems.</p> <p>(6) The tests specified in <b>11.2.5, Part N of the Rules</b> are to be carried out for ships carrying liquefied gases in bulk.</p>
4 Emergency fire pumps	<p>(1) For emergency fire pumps, confirmation that two jets of water are simultaneously produced from the highest positioned hydrants and hydrants which impose the strictest condition, taking into account their distances from fire pumps, and that the pressures at each hydrant are not less than the minimum pressure required by <b>32.2.2-2, Part R of the Rules</b>. The tests are to be carried out at the shallowest draught possible but need not be shallower than the one corresponding to the lightest seagoing condition.</p> <p>(2) Where suction or discharge piping penetrates machinery spaces, <b>10.2.1-4(1), Part R</b> and <b>R10.2.1-5, Part R of the Guidance</b> are to be satisfied.</p> <p>(3) Where sea-chests are fitted in machinery spaces, <b>10.2.1-4(1), Part R</b> and <b>R10.2.1-4, Part R of the Guidance</b> are to be satisfied.</p>
5 Mobile water monitors	<p>(1) Performance tests are to be carried out, and <b>10.7.3-2(5), Part R of the Rules</b> is to be satisfied during the tests.</p>
6 Water mist lances	<p>(1) Performance tests are to be carried out.</p>
7 Fixed carbon dioxide fire extinguishing system (High pressure)	<p>(1) Airtight tests of piping are to be carried out. The test pressure is to be 3.5 MPa for starting lines and lines between manifolds and selection valves and 1.0 MPa for lines between selection valves and open ends.</p> <p>(2) Piping is to be confirmed to be in good condition by delivering air through the pipes.</p> <p>(3) Performance tests of alarm systems are to be carried out.</p> <p>(4) Selection valves are to be marked in a way that clearly indicates the space for which they are intended.</p>

Survey Items	Details
8 Fixed carbon dioxide fire-extinguishing systems (low pressure)	<p>(1) Low pressure fixed carbon dioxide fire-extinguishing systems and their associated equipment are to satisfy relevant requirements in <b>Part D of the Rules</b>.</p> <p>(2) Carbon dioxide vessels are to be subjected to magnetic particle inspections for welded joints after completion of hydraulic tests, and then subjected to tightness tests at a pressure equal to the designed pressure together with their fittings.</p> <p>(3) Pipes from release valves on distribution manifolds to nozzles are to be tested for tightness and the free flow of carbon dioxide gas (or air) after being assembled on board. The test pressure is to be 1.0 MPa.</p> <p>(4) Carbon dioxide storage systems are to be subjected to operational tests under the charged condition of liquefied carbon dioxide gas after installation on board to ensure no leakage of carbon dioxide gas and verify the operations of alarms, pressure gauges and liquid level indicators.</p> <p>(5) The refrigerating plants are to be subjected to operational tests under the charged condition of liquefied carbon dioxide gas (including pressure control function tests) after being installed on board.</p> <p>(6) Selection valves are to be marked in a way that clearly indicates the space for which they are intended.</p>
9 Fixed foam fire-extinguishing systems, fixed deck foam fire extinguishing systems and foam fire fighting appliances for helidecks and helicopter landing areas (except for portable foam applicators provided at helicopter landing areas)	<p>(1) Piping tests which consist of delivering water are to be carried out.</p> <p>(2) Performance tests which consist of delivering foam are to be carried out. Such tests may be replaced with other equivalent tests at the discretion of surveyors. (Fixed foam fire-extinguishing systems and fixed deck foam fire-extinguishing systems)</p> <p>(3) Performance tests which consist of delivering foam are to be carried out. Such tests may be dispensed with when the following (a) and (b) items are confirmed. (Foam fire fighting appliances for helidecks and helicopter landing areas)</p> <p>(a) Confirmation that water and foam concentrates are mixed in appropriate proportions.</p> <p>(b) Confirmation that fluid can be released from outlets by performing the test specified (1) above.</p>
10 Fixed high-expansion foam fire extinguishing systems	<p>(1) The tests specified in <b>26.3.5 Part R of the Rules</b>.</p>
11 Fixed pressure water-spraying fire-extinguishing systems	<p>(1) Pressure tests for the ordinarily pressurised parts of systems with pressures 1.5 times working pressure are to be carried out.</p> <p>(2) Performance tests which consist of spraying water are to be carried out.</p> <p>(3) Operation tests of relevant pumps are to be carried out.</p>
12 Automatic sprinkler, fire detection and fire alarm systems	<p>(1) Pressure test for the ordinarily pressurised parts of systems with pressures 1.5 times working pressure are to be carried out.</p> <p>(2) Operation tests of relevant pumps and water delivery alarms are to be carried out by activating one fire detector.</p>
13 Fixed dry chemical powder fire extinguishing systems	<p>(1) Airtight tests of powder transfer lines, powder pressurising lines and starting gas lines with pressures not less than maximum working pressure are to be carried out.</p> <p>(2) Piping tests which consist of delivering air are to be carried out.</p> <p>(3) Operation tests of monitors and hand hoses are to be carried out.</p> <p>(4) Operation tests of remote control systems and associated automatic valves are to be carried out.</p> <p>(5) The tests specified in <b>11.4.8, Part N of the Rules</b> are to be carried out.</p>
14 Fixed water spray systems	<p>(1) The water delivered by the remotest spray nozzle is to be confirmed during performance tests.</p> <p>(2) The tests specified in <b>11.3.8, Part N of the Rules</b> are to be carried out.</p>

Survey Items	Details
15 Fixed local application fire-fighting systems	<p>(1) Airtight tests of piping with pressures not less than maximum working pressure are to be carried out.</p> <p>(2) Piping tests which consist of delivering air are to be carried out.</p> <p>(3) Performance tests of alarm systems are to be carried out.</p> <p>(4) For ships with periodically unattended machinery spaces, performance tests of feed water pumps and starting valves by automatic and manual operation are to be carried out. For other ships, performance tests of feed water pumps and starting valves by manual operation are to be carried out.</p>
16 Fire detecting systems	<p>(1) Performance tests for one detector in each group are to be carried out.</p> <p>(2) Performance tests of alarm systems under loss of power or fault conditions are to be carried out.</p>
17 Sample extraction smoke detection systems	(1) The performance tests specified in <b>30.2.4-2(2), Part R of the Rules</b> are to be carried out.
18 Manually operated call points	(1) Performance tests are to be carried out.
19 Fixed means for extinguishing a fire within exhaust ducts from galley ranges	(1) Relevant requirements in <b>R9.7.4, Part R of the Guidance</b> are to be satisfied.
20 Extinguishing systems for deep-fat cooking equipment	<p>(1) Performance tests for the automatic shutting off of electrical power specified in <b>10.6.3(3), Part R of the Rules</b> are to be carried out.</p> <p>(2) Performance tests for alarms indicating the operations specified in <b>10.6.3(4), Part R of the Rules</b> are to be carried out.</p>

Survey Items	Details
21 Inert gas systems	<p>(1) Operation tests for systems and performance tests for control and safety devices are to be carried out. During the tests, the following (a) to (k) items are to be satisfied.</p> <ul style="list-style-type: none"> <li>(a) There is no sign of gas or effluent leakage.</li> <li>(b) Inert gas blowers properly operate.</li> <li>(c) Scrubber-room ventilation systems properly operate.</li> <li>(d) Where deck water seals are provided as non return devices, automatic filling and draining properly operate, In addition, means for protecting systems against freezing are provided.</li> <li>(e) Where double block and bleed valves are provided as non return devices, automatic operation upon loss of power is confirmed.</li> <li>(f) Where two shut-off valves in a series with a venting valve in between are provided as non-return devices, automatic operation of the venting valve is confirmed. In addition, activation of alarms for faulty valve operations is confirmed.</li> <li>(g) All remotely operated or automatically controlled valves and, in particular, flue gas isolating valves properly operate.</li> <li>(h) Interlocking features of soot blowers properly operate.</li> <li>(i) Gas pressure regulating valves operate automatically.</li> <li>(j) Means for separating cargo tanks not being inerted from inert gas mains are provided.</li> <li>(k) Alarms of two oxygen sensors positioned in spaces containing inert gas systems properly operate.</li> </ul> <p>(2) Performance tests of alarms under the following (a) to (i) conditions are to be carried out, as far as practicable.</p> <ul style="list-style-type: none"> <li>(a) High oxygen content of gas in inert gas mains</li> <li>(b) Low gas pressures in inert gas mains</li> <li>(c) Low water levels in water seals</li> <li>(d) High temperatures of gas in inert gas mains</li> <li>(e) Low water pressures or low water flow rates to cooling and scrubbing arrangements</li> <li>(f) High water levels in scrubbers</li> <li>(g) Failures of inert gas blowers</li> <li>(h) Failures of power supplies to generators</li> <li>(i) High pressures of gas in inert gas mains</li> </ul> <p>(3) Accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas is to be confirmed.</p> <p>(4) For inert gas supply piping systems, airtight tests at least 1.25 times maximum system working pressure are to be carried out after installation on board. Where pressure/vacuum valves are provided for such systems, the pressures of airtight tests are to be not less than the setting pressures of pressure/vacuum valves but at least 0.024 MP.</p> <p>(5) It is to be confirmed through the use of inert gas or fresh air that the capacities of inert gas blowers are equal to or greater than 1.25 times the maximum design discharge capacity of the ship. Where fresh air is used in the tests, it is to be taken in from areas in proximity to flue gas isolating valves. However, such tests may be omitted for ships of the same design (including inert gas system design) as ships which have already been tested.</p>
22 Fixed hydrocarbon gas detection systems	(1) Performance tests are to be carried out.
23 Fire protection	(1) Fire protection (including ventilation systems) are properly installed.
24 Means of closing	<p>(1) Performance tests for the shut-off valves provided for fuel oil tanks, fuel supply lines and lubrication tanks are to be carried out.</p> <p>(2) Performance tests for the fire dampers and means of closing for main inlets and outlets of ventilation systems installed in accommodation and service spaces, control stations, machinery spaces and cargo spaces are to be carried out.</p> <p>(3) Performance tests for emergency stop systems to pumps of combustible oil and ventilation systems are to be carried out.</p>
25 Arrangements for gases and gas welding equipment for domestic purpose	(1) Relevant requirements in <b>4.3, Part R of the Rules</b> and <b>R4.3, Part R of the Guidance</b> are to be satisfied.

Survey Items	Details
26 Lighting enclosures used in cargo pump rooms	(1) <b>4.5.2-5, Part R of the Rules</b> is to be satisfied.
27 Means of escape	(1) <b>Chapter 13, Part R of the Rules</b> is to be satisfied.



Table B2.10 Survey – Coating Application

Survey Items	Details
1 Technical data sheet*1 and statement of compliance or type approval certificate	<p>(1) The technical data sheet and statement of compliance or type approval certificate comply with the “<i>PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR DEDICATED SEAWATER BALLAST TANKS IN ALL TYPE OF SHIPS AND DOUBLE-SIDE SKIN SPACES OF BULK CARRIERS</i>” (IMO Performance Standard for Protective Coatings for Seawater Ballast Tanks, etc. / IMO resolution MEPC.215(82) as amended). The statement of compliance or type approval certificate is to be one of the following (a) to (c) items.</p> <p>(a) The Society’s approval certificate specified in <b>Chapter 4, Part 4 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use</b></p> <p>(b) Statement of compliance issued by the Research Institute of Marine Engineering, Japan (RIME), the Japan Paint Inspection and Testing Association or MARINTEK</p> <p>(c) Other documents approved by the Society</p> <p>(2) The technical data sheet and statement of compliance or type approval certificate comply with the “<i>PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS</i>” (IMO Performance Standard for Protective Coatings for Cargo Oil Tanks / IMO resolution MEPC.288(87) as amended). The statement of compliance or type approval certificate is to be either of the following (a) or (b) items.</p> <p>(a) The Society’s approval certificate specified in <b>Chapter 4, Part 4 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use</b></p> <p>(b) Other documents approved by the Society</p>
2 Coating identification	(1) The coating identification on representative containers is consistent with the coating identified in the technical data sheet and statement of compliance or type approval certificate specified in item 1 above.
3 Inspector qualifications	<p>(1) The inspector is qualified in accordance with one of the following (a) to (c) qualification standards.</p> <p>(a) NACE Coating Inspector Level 2</p> <p>(b) FROSIO Inspector Level III</p> <p>(c) Equivalent qualifications approved by the Society</p>
4 Inspector reports	(1) Inspector reports on surface preparation and coating application indicate compliance with manufacturer technical data sheets and the statements of compliance or type approval certificates specified in item 1 above.
5 Monitoring	(1) Monitor coating inspections are implemented in accordance with <b>6</b> , IMO Resolution MSC.215(82) or <b>6</b> , IMO Resolution MSC.288(87).

Note

\*1 : “Technical data sheet” refers to the paint manufacturer product data sheets which contain detailed technical instructions and other information relevant to coatings and their application.

Table B2.11 Survey – Sea Trials \*1

Test Items	Details
1 Speed tests	<p>(1) Speed tests are to be carried out. For ships that are to perform speed tests under the full load condition, the ship speed defined in <b>2.1.8, Part A of the Rules</b> is to be confirmed. For ships that are unable to perform speed tests under the full load condition, the ship speed at maximum continuous revolutions of main engines is to be confirmed. This speed is hereinafter referred to as the “maximum speed of the ship”.</p> <p>(2) Speed tests at the main engine outputs specified in <b>Table B2.12</b> “Survey – Sea Trials of Reciprocating Internal Combustion Engines”, <b>Part B of the Rules</b> (not including 110 % and minimum revolutions) are to also be carried out.</p>
2 Astern tests	<p>(1) Astern tests are to be carried out in accordance with the following (a) and (b), and the items related to stopping ability specified in <b>An 1.4.3, Annex 2.3.1-1 “Guidance for the Test of Ship Maneuverability”, Part B of the Rules</b> are to be measured. When applying this requirement, tests are to be carried out from all control positions where there are multiple control positions for reversing operations to astern runs.</p> <p>(a) While the ship is running ahead at maximum speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.</p> <p>(b) Ships unable to perform the test at maximum speed are to run ahead at not less than the speed specified in <b>An 1.1.1-9, Annex 2.3.1-1 “Guidance for the Test of Ship Maneuverability”, Part B of the Rules</b>. While the ship is at this speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.</p> <p>(2) Engines are to be functioning normally while the ship is running astern. Main engines are to maintain rates of more than 70 % of maximum continuous revolutions, and ships are to keep running astern for the periods specified in the following (a) and (b) corresponding to engine type. In addition, performance is to satisfy <b>1.3.2, Part D of the Rules</b>.</p> <p>(a) For ships with main engines other than steam turbines: Until the astern speed (rotational speed in rpm) stabilises.</p> <p>(b) For ships with steam turbines: A period of at least 15 <i>minutes</i>; the astern trial, however, is to be limited to 30 <i>minutes</i> or in accordance with manufacturer recommendations to avoid overheating the turbine due to the effects of “windage” and friction.</p> <p>(3) For gas-fueled dual fuel engines, the confirmation specified in (2)(a) above is to be carried out for all operating modes (i.e. the applicable gas mode, diesel mode, etc.).</p>
3 Turning tests	<p>(1) Turning tests are to be carried out in accordance with the following (a) and (b). The turning ability specified in <b>An 1.4.2, Annex 2.3.1-1 “Guidance for the Test of Ship Maneuverability”, Part B of the Rules</b> is to be measured and ship stability during turning is to be confirmed.</p> <p>(a) Ships are to be steered to the left or right at maximum rudder angle (normally 35 <i>degrees</i>; however, where a special rudder is provided, a different rudder angle considered appropriate by the Society made be maintained instead) while running ahead at maximum speed, and this rudder angle is to be maintained until the ship makes a 360-<i>degree</i> turn.</p> <p>(b) Notwithstanding (1) above, ships unable to perform the test at maximum speed are to run ahead at not less than the speed specified in <b>An 1.1.1-9, Annex 2.3.1-1 “Guidance for the Test of Ship Maneuverability”, Part B of the Rules</b>. While at this speed, ship are to be steered to the left or right at maximum rudder angle (normally 35 <i>degrees</i>; however, where a special rudder is provided, a different rudder angle considered appropriate by the Society may be maintained instead), and this rudder angle is to be maintained until the ship makes a 360-<i>degree</i> turn.</p> <p>(2) The turning tests of an individual ship may be dispensed with, provided that sufficient data is available from the turning test of a sister ship and subject to special approval by the Society.</p>
4 Steering tests	

-1. For ships with propeller propulsion	<p>(1) During steering tests, the steering capabilities required by <b>15.2.2</b> and <b>15.2.3, Part R of the Rules</b> are to be confirmed. Where it is impractical to perform tests with ships at their deepest seagoing draughts and running ahead at speeds corresponding to the number of maximum continuous revolutions of main engines and maximum design pitches, ships may demonstrate their steering capabilities in accordance with the one of the following (a) to (c) items.</p> <p>(a) During sea trials, the ship is to be at even keel with its rudder fully submerged while running ahead at a speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch (in the case of the auxiliary steering gear, one half of this speed or <i>7 knots</i>, whichever is greater). Where the rudder cannot be fully submerged at even keel, the draught that the rudder is fully submerged (at zero speed waterline) in which the ship is in an acceptable trim condition may be accepted.</p> <p>(b) Where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed is to be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed is to result in a force and torque applied to the main steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch (in case of the auxiliary steering gear, one half of this speed or <i>7 knots</i>, whichever is greater).</p> <p>(c) The rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition<sup>*2</sup>. The speed of the ship is to correspond to the number of maximum continuous revolutions of the main engine and maximum design pitch of the propeller (in the case of the auxiliary steering gear, one half of this speed or <i>7 knots</i>, whichever is greater).</p> <p>(2) Running tests of power units, including transfer between power units, are to be carried out.</p> <p>(3) Isolation tests of one hydraulic actuating system, including checking the time for regaining steering capability, are to be carried out.</p> <p>(4) Tests of hydraulic fluid recharging systems are to be carried out.</p> <p>(5) Tests of the emergency power supplies specified by <b>15.2.6, Part D of the Rules</b> are to be carried out.</p> <p>(6) Operation tests of controls, including change-overs between two control systems, change-overs between the control systems and controllers provided in steering gear compartments, and change-overs between automatic steering and manual steering are to be carried out.</p> <p>(7) Function tests of alarm indicators, rudder angle indicators and power units required by <b>Chapter 15, Part D of the Rules</b> are to be carried out.</p> <p>(8) Function tests of power failure indicators and overcurrent alarms, operating conditions of electric motors, and relief valves for preventing overpressure are to be carried out.</p> <p>(9) Function tests of the rudder stoppers specified in <b>15.2.6, Part D of the Rules</b> are to be carried out.</p> <p>(10) Where steering gear is designed to avoid hydraulic locking, demonstrations of this feature are to be carried out.</p>
-2. For waterjet propulsion systems	<p>(1) Tests of the steering capabilities specified in <b>19.5.1, Part D of the Rules</b> are to be carried out.</p> <p>(2) Operation tests of steering system controls, including tests on change-overs of control systems between navigation bridges and auxiliary steering stations, and change-overs between manual steering and automatic steering are to be carried out, if provided.</p> <p>(3) Tests on measures for maintaining power supplies and on the alternative source of power required by <b>19.6.2 Part D of the Rules</b> are to be carried out.</p> <p>(4) Tests on the functioning of relief valves for preventing over-pressure are to be carried out.</p> <p>(5) Tests on the functioning of alarm and safety devices, and indication devices for deflector positions, reverser positions and impeller speed, and running indicators of electric motors for steering actuating systems are to be carried out.</p> <p>(6) Tests on the functioning of stoppers for reversers are to be carried out.</p>

<p>-3. For azimuth thrusters</p>	<p>(1) Tests on the steering capability specified in <b>20.5.1, Part D of the Rules</b> are to be carried out.</p> <p>(2) Operation tests of steering system controls, including tests on change-overs of control systems between navigation bridges and azimuth thruster compartments, and change-overs between manual steering and automatic steering are to be carried out, if provided.</p> <p>(3) Tests on measures for maintaining power supplies and on the alternative sources of power required by <b>20.6.2, Part D of the Rules</b> are to be carried out.</p> <p>(4) Tests on the functioning of relief valves for preventing overpressure are to be carried out.</p> <p>(5) Tests on the functioning of alarm and safety devices as well as indication devices for azimuth angles, propeller speeds and directions of rotation and pitch positions, and running indicators of electric motors for azimuth steering gear are to be carried out.</p>
<p>5 Performance tests of machinery installations</p>	<p>(1) The performance tests of machinery installations are to include the following (a) to (j) in order to verify that the machinery installations have sufficient normal functions and reliability and are free from detrimental vibration within the numbers of revolutions used. The details of these tests may be found in <i>JIS F 0801</i> "Test Code of Propelling Machinery at Sea Trials" or other documents considered equivalent thereto*3.</p> <p>(a) For reciprocating internal combustion engines, the output tests specified in <b>Table B2.12</b>, "Survey – Sea Trials of Reciprocating Internal Combustion Engines", <b>Part B of the Rules</b>, are to be used as the standard. For reciprocating internal combustion engines driving generators or auxiliary machinery (excluding auxiliary machinery for specific uses), operation tests may be carried out at an appropriate time after installation on board.</p> <p>(b) For steam turbines and gas turbines used as main propulsion machinery, output tests are to be carried out at 3 or 4 levels of power output selected from normal continuous cruise power run and 4/4, 3/4, 2/4 and 1/4 of the maximum continuous output of the engine.</p> <p>(c) Operating tests for starting devices are to be carried out. It is to be confirmed that the engines start continuously for the number of times required by <b>2.5.3-2</b> or <b>4.4.3-2, Part D of the Rules</b> during tests. For gas-fueled dual fuel engines, this test is to be carried out for all operating modes (i.e. the applicable gas mode, diesel mode, etc.).</p> <p>(d) Function tests of the alarms and safety devices required by <b>2.4, 3.3</b> and <b>4.3, Part D of the Rules</b> are to be carried out.</p> <p>(e) The suitability of residual and other special fuels for use in engines is to be confirmed. However, such tests may be dispensed with where the suitability has already been demonstrated at shop trials.</p> <p>(f) For reciprocating internal combustion engines driving main sources of electrical power (including reciprocating internal combustion engines driving generators for both propulsion and main power supply), the characteristics for governors specified in <b>2.4.1-5(1), Part D of the Rules</b> are to be confirmed.</p> <p>(g) Function tests of the safety devices and alarms of boilers are to be carried out.</p> <p>(h) Function tests of the safety devices and alarms of exhaust gas economisers are to be carried out.</p> <p>(i) Gas-fuelled engines are to comply with (a) and (f), and further comply with the following i) to iii), in the case of gas-fuelled dual fuel engines.</p> <p>i) The output tests and governor tests are to be carried out for all operating modes (i.e. the applicable gas mode, diesel mode, etc.). The 110 % load test is not required for the gas mode provided that changeover to oil fuel mode is automatically performed in case of overload.</p> <p>ii) During the output tests specified in i), if a test load is performed in all applicable operation modes without interruption (direct changeover at same power and speed), the duration of 100 % power run required by <b>Table B2.2</b> may be considered as the total duration demonstrated in all fuel modes. However, demonstration at each mode is not to be less than 1 hour.</p> <p>iii) Automatic switching over to oil fuel mode is to be tested. Further, manual changeover from diesel to gas mode and vice versa is to be tested.</p> <p>(j) Confirmation tests that crankshaft hot deflection values are within engine manufacturer recommended ranges (confirmation of measuring records is acceptable instead).</p>

6 Windlass performance tests	<p>(1) The following <b>(a)</b> to <b>(h)</b> operations tests are to be carried out under working conditions for each windlass to demonstrate satisfactory operation and confirm windlass construction and associated equipment are in good condition.</p> <ul style="list-style-type: none"> <li>(a) Braking</li> <li>(b) Clutch functioning</li> <li>(c) Lowering and hoisting of the chain cable and the anchor</li> <li>(d) Proper riding of the chain cable over the cable lifter</li> <li>(e) Proper transit of the chain cable through the hawse pipe and the chain pipe</li> <li>(f) Effecting proper stowage of the chain cable and the anchor</li> <li>(g) Proper seating of the anchors in the stored position</li> <li>(h) Proper function of the chain cable stoppers if fitted</li> </ul> <p>(2) Initially with 3 <i>shots</i> of chain cable (82.5 m or 45 <i>fathoms</i> in length) and the anchor submerged and hanging free, load tests are to be carried out in accordance with the manner specified in the following <b>(a)</b> to <b>(c)</b>. For <b>(a)</b> and <b>(b)</b>, it is to be measured and confirmed that the mean hoisting speed is not less than 0.15 m/s. Where it is difficult to have 3 <i>shots</i> of chain cable kept submerged due to ship location, an alternative test approved by the Society may carried out instead.</p> <ul style="list-style-type: none"> <li>(a) Hoisting up 2 <i>shots</i> of chain cable on one side</li> <li>(b) Hoisting up 2 <i>shots</i> of chain cable on the other side of <b>(a)</b> above</li> <li>(c) Hoisting up 1 <i>shot</i> of chain cable together on both sides</li> </ul> <p>(3) Cable lifter brake capacity tests are to be carried out. Braking capacity is to be tested by intermittently paying out and holding the chain cable by means of the application of the brake at every 1/2 <i>shot</i> of chain cable.</p>
7 Boiler accumulation tests	<p>(1) Accumulation tests are to be carried out in accordance with the following <b>(a)</b> and <b>(b)</b> while the boilers are under maximum firing conditions. However, where data on boiler evaporation submitted to the Society has been approved, the accumulation test specified in <b>(a)</b> may be dispensed with.</p> <ul style="list-style-type: none"> <li>(a) When safety valves of boilers blow with all stop valves closed, except for valves for steam supplies to machinery necessary to operate boilers, the accumulation of pressure in boiler drums is not to exceed 110 % of approved working pressure. However, feed water necessary to maintain safe water levels may be supplied.</li> <li>(b) For boilers with superheaters, where accumulation tests might overheat the superheaters, the operation tests specified in <b>9.9.3-8, Part D of the Rules</b> may be carried out as an alternative after shutting off main steam supplies. In such cases, the lift of each safety valve is to be checked beforehand.</li> </ul> <p>(2) For boilers which are capable of refiring while using exhaust gas economisers, accumulation tests are, in principle, to be carried out in accordance with the methods specified in <b>(1)</b> above, under maximum firing conditions and at main engine maximum continuous outputs.</p> <p>(3) For exhaust gas economisers, accumulation tests are, in principle, to be carried out in accordance with the methods specified in <b>(1)</b> above under maximum firing conditions and at main engine maximum continuous outputs.</p>
8 Measurements of torsional vibration for the shafting systems	<p>(1) Measurements are to be carried out in accordance with <b>8.1.3, Part D of the Rules</b>. In cases where the confirmation of engine running conditions specified in <b>8.1.3-2, Part D of the Rules</b> is performed at the estimated upper and lower borders by calculation, it is recommended that the fuel index around the estimated borders also be confirmed with consideration given to differences between estimated borders and actual borders confirmed through measurements.</p> <p>(2) Measurements in either diesel mode or in the gas mode (but not both modes) may be omitted where considered appropriate by the Society based upon relevant torsional vibration calculation sheets of diesel and gas mode.</p>
9 Measurements of the sound pressure levels of fixed fire detection and fire alarm systems	<p>(1) The sound levels specified in <b>29.2.5-1(9), Part R of the Rules</b> are to be measured using suitable instruments.</p>
10 Noise measurements	<p>(1) Noise measurements are to be in accordance with <b>Annex 2.3.1-2 "Procedures for on board Noise Measurements", Part B of the Rules</b>.</p>

11 Verification of Total Harmonic Distortion (THD) calculation reports and harmonic filter operation guides	(1) Total Harmonic Distortion (THD) values of main busbars are to be measured to confirm that said values do not exceed the acceptable limits given in reports.
12 Performance tests for automatic and remote control systems for main propulsion machinery, controllable pitch propellers, boilers and electric generating sets *4	<p>(1) For the control systems of main propulsion machinery and controllable pitch propellers, the tests specified in the following (a) to (d) are to be carried out.</p> <p>(a) Main propulsion machinery or controllable pitch propellers are to be subjected to starting tests, ahead-astern tests and running tests in the whole range of output, by means of remote control devices in main control stations or the main control stations on the bridge.</p> <p>(b) In addition to output increase and decrease tests, operation tests of main propulsion machinery or the controllable pitch propellers using the bridge control devices are to be carried out. Where operation tests were carried out for the entire output range by the bridge control devices, consideration may be given to reduction of the test items with the exception of the starting tests specified in (a) above.</p> <p>(c) Where there are two or more control stations for main propulsion machinery or controllable pitch propellers, tests on transfer of control are to be carried out while the ship is running ahead and while it is running astern. Where the remote devices for main propulsion machinery or controllable pitch propellers are in accordance with <b>18.3.2-2(3)(b), Part D of the Rules</b>, the above tests may be carried out while the main propulsion machinery is stopped.</p> <p>(d) After completion of the tests specified in (c) above, demonstrations that main propulsion machinery or controllable pitch propellers can be smoothly operated from the respective control stations are to be carried out.</p> <p>(2) Notwithstanding (1) above, the control systems for controllable pitch propellers intended for main propulsion are to be in accordance with <b>Annex 2.1.4 “Testing Procedures for Control Systems for Controllable Pitch Propellers Intended for Main Propulsion”, Part B of the Rules</b>.</p> <p>(3) Function tests of boiler control systems are to be carried out in accordance with the following (a) to (c).</p> <p>(a) Devices for feed water control, combustion, etc. are to operate stably in response to the load variations of main boilers, and the main boilers can supply steam stably to main propulsion machinery, electric generating sets and auxiliary machinery essential for main propulsion of the ship without local manual operation.</p> <p>(b) Essential auxiliary boilers are to supply steam stably to auxiliary machinery essential for main propulsion of the ship without manual operation.</p> <p>(c) Where exhaust gas economisers are used as sources of steam for driving generators and boilers supply extra steam automatically during power loss, operation tests of the automatic control devices for such systems are to be carried out.</p> <p>(4) Where generators supply electrical power to the loads necessary for ship propulsion and their motive power relies upon propulsion systems, tests of the functioning of the automatic or remote control systems for electric generating sets are to be carried out.</p>

<p>12 Performance tests for automatic and remote control systems for main propulsion machinery, controllable pitch propellers, boilers and electric generating sets *4</p>	<p>(5) For the electric generating sets specified in <b>3.2.1-3, Part H of the Rules</b>, the following (a) to (c) items are to be satisfied while main propulsion machinery is operating at normal continuous cruise output. However, in cases where main propulsion machinery is operating at outputs other than normal continuous cruising output, such tests may be carried out while main propulsion machinery is operating at said output on the condition that all active peripheral equipment is operating at outputs that are the same as the normal continuous cruising output of the main propulsion machinery.</p> <p>(a) Where only one electric generating set is normally used, standby generators, air circuit breakers, and important auxiliary machinery start up automatically when the main source of electrical power is stopped by tripping a circuit breaker.</p> <p>(b) Where two electric generating sets are normally used, preference tripping of unnecessary loads is performed and propulsion and steering of the ship are maintained, when the circuit breaker of one of the sets is tripped.</p> <p>(c) Emergency sources of electrical power are automatically started and connected upon the failure of any main sources of electrical power.</p> <p>(6) The “electric generating sets specified in <b>3.2.1-3, Part H of the Rules</b>” specified in (5) above refers to the application of <b>6.2.11-1 to -3, Part H of the Rules</b> for the ships specified in <b>6.1.1, Part H of the Rules</b>.</p>
<p>13 Other tests where deemed necessary by the Society</p>	<p>(1) For ships having multiple propellers or multiple main engines, sea trials are to be carried out under the assumption that one propeller or engine is inoperable due to failure to confirm that the ship can be maneuvered properly in that condition.</p> <p>(2) For propulsion gears for which the total face width (in case of double helical gears, the central gap is included) exceeds 300 mm or for which the ratio of the total face width to pitch circle diameter of the pinion exceeds 2, contact markings of the teeth are to be confirmed by thinly and uniformly coating tooth flanks with suitable paint.</p> <p>(3) Performance tests of supplementary means for manoeuvring or stopping are to be carried out when provided.</p> <p>(4) Open-up inspections of cylinders may be required after sea trials when considered necessary by the Society.</p> <p>(5) Sea trials for ships with electrical propulsion plants are to be carried out in accordance with test procedures deemed appropriate by the Society. For tests of ship manoeuvrability, refer to the test procedures specified in <b>Annex 2.3.1-1, Part B of the Rules</b>.</p> <p>(6) In addition to the tests specified in item 5, <b>Table B2.12, Part B of the Rules</b> the Society may require other tests found in <i>JIS F 0801</i> “Test Code of Propelling Machinery at Sea Trials” or other documents considered equivalent thereto.</p> <p>(7) For ships carrying liquefied gases in bulk, ships carrying dangerous chemicals in bulk and other ships whose length is not less than 100 m, sea trials to ascertain initial turning ability, yaw, and course keeping abilities are to be carried out. However, such tests need not be carried out for ships whose manoeuvring characteristics are confirmed by sufficient data on the ship and test type as well as information from sources such as the sea trials of sister ships and model tests. For other ships, such tests are recommended.</p> <p>(8) For ships having exhaust gas recirculation systems, running tests of engines are to be carried out with exhaust gas recirculation systems in operation, and the satisfactory operation of the engine and exhaust gas recirculation system is to be confirmed.</p>

## Notes

\*1: These tests may be dispensed with where such tests have been conducted while the ships are anchored or at dockside.

\*2: In applying the requirements, the items specified in (1) or (2) are to be applied. Alternatively, designers or builders may use computational fluid dynamic (CFD) studies or experimental investigations to predict the rudder stock moment (torque in the rudder stock) under the full load condition and at the service speed.



- (1) The rudder torque in the full load condition and at the speed of ship defined in **2.1.8, Part A of the Rules** is to be predicted using the following extrapolation formula. There is, however, no need for extrapolation where  $A_T$  is greater than  $0.95A_F$ .
- $Q_F$ : the rudder stock moment (torque in the rudder stock) for the full load condition and the speed of ship defined in **2.1.8, Part A of the Rules**

$Q_T$ : the rudder stock moment (torque in the rudder stock) for the trial condition

$\alpha$ : the extrapolation factor in accordance with the following formula:

$$\alpha = 1.25 \left( \frac{A_F}{A_T} \right) \left( \frac{V_F}{V_T} \right)^2$$

$A_F$ : the total immersed projected area of the movable part of the rudder in the full load condition

$A_T$ : the total immersed projected area of the movable part of the rudder in the trial condition

$V_F$ : the contractual design speed of the vessel corresponding to the maximum continuous revolutions of the main engine in the full load condition

$V_T$ : the measured speed of the vessel (considering current) in the trial condition

- (2) Where rudder actuator system pressure is shown to have a linear relationship to rudder stock torque, (1) above can be taken in accordance with the following formula. Where constant volume fixed displacement pumps are utilised, **15.2.2(1)** or **15.2.3(1), Part D of the Rules** can be deemed satisfied if the estimated steering actuator hydraulic pressure in the full load condition is less than the specified maximum working pressure of the rudder actuator. Where a variable delivery pump is utilised, pump data are to be supplied and interpreted to estimate the delivered flow rate corresponds to the full load condition in order to calculate the steering time and allow it to be compared to the required time.

$$P_F = P_T \alpha$$

$P_F$ : the estimated steering actuator hydraulic pressure in the full load condition

$P_T$ : the maximum measured actuator hydraulic pressure in the trial condition

\*3: The following preparations are to be made before carrying out tests.

- (1) All relevant equipment for the safety of attending personnel such as oil mist detection arrangements, overspeed protective devices and any other shut down functions are to be made available and are to be operational.
- (2) The overspeed protective device is to be set to a value which is not higher than the allowable overspeed value. This set point is to be confirmed by surveyors.
- (3) The engines are to be run as prescribed by the engine manufacturer.
- (4) All fluids used for testing purposes (fuel oils, lubrication oils, cooling water, etc., including all fluids used temporarily or repeatedly for testing purposes only) are to be suitable for their intended purposes (i.e., they are to be clean, preheated if necessary and cause no harm to engine parts).

\*4: Where these tests have been carried out when the ship was anchored or at dockside, some of these tests may be dispensed with at sea trials.



Table B2.12 Survey – Sea Trials of Reciprocating Internal Combustion Engines

Test items		Use of engines		
		Main engines of ships in which reciprocating internal combustion engines are used as main propulsion machinery (excluding electric propulsion ships) <sup>(1)</sup>	Reciprocating internal combustion engines driving generators (including main engines of electric propulsion ships) <sup>(2)</sup>	Reciprocating internal combustion engines driving auxiliaries (excluding auxiliary machinery for specific use etc.)
Load test	110% power run	—	10 minutes at $n_0$ ( $n_0$ is the rated engine speed.) <sup>(3)</sup>	—
	100% power (rated power) run	4 hours at engine speed in accordance with propeller curve <sup>(4) (5) (6)</sup>	1 hour at $n_0$ <sup>(3)</sup>	30 minutes at $n_0$
Overspeed run		30 minutes at $1.032n_0$ or more <sup>(7) (8)</sup>	—	—
Minimum revolution test of main engine <sup>(9)</sup>		○ <sup>(7)</sup>	—	—
Intermittent overload <sup>(10)</sup>		○		○

## Notes

- (1) After testing has been completed, the fuel delivery system is to be blocked so as to limit the engines to run at not more than 100% power, excluding propulsion engines for which intermittent overload is approved as well as propulsion engines also driving generators.
- (2) The tests are to be performed based on the rated electrical powers of the driven generators.
- (3) This may, if possible, be done during the electrical propulsion plant test, which is tested at 100% propulsion power (i.e., total electric motor capacity for propulsion) by distributing the power on as few generators as possible. The duration of this test is to be sufficient to reach the stable operating temperatures of all rotating machines or for at least 4 hours. When some of the generator set(s) cannot be tested due to insufficient time during the propulsion system test mentioned above, those required tests are to be carried out separately.
- (4) In the case of controllable pitch propellers, the test is to be performed at rated engine speed  $n_0$  at a propeller pitch leading to 100% power, or to the maximum achievable power if 100% power cannot be reached.
- (5) In the case of propulsion engines also driving generators, tests are to be also carried out for 2 hours at 100% propeller branch power (unless already covered in the test at 100% power) and 1 hour with 100% power take off branch power at rated engine speed  $n_0$  in addition to the test for 4 hours at 100% power.
- (6) For ships in which the tests specified in [2.2.5-2\(1\), Rules for Automatic and Remote Control Systems](#) are performed for not less than 4 hours at 100 % power without interruption, the 100 % power test specified in this table may be omitted. For gas-fuelled engines, see also [2.3.1-1\(5\)\(g\)ii](#).
- (7) Only for engines driving fixed pitch propellers.
- (8) The test may be omitted if a 100% power test is performed at  $1.032n_0$  or more. In cases where engine speed cannot reach the specified speed due to the planned propeller curve, etc., an overspeed test may be performed at maximum achievable continuous revolution (i.e., maximum engine speed within the range of torque limit, etc.).
- (9) The test is to be carried out to identify the minimum working revolution of the main engine when the ship is steered to the maximum rudder angle.
- (10) Only for engines for which intermittent overload is approved. The test is to be performed for the duration agreed upon with the manufacturer.

Table B2.13 Necessity for Re-inclining Tests and Amending Stability Information

Result of lightweight calculation	Need for inclining test	Need for an amendment to stability information
Lightweight change > 2 %	Yes	Yes, using new inclining test result
<i>LCG</i> change > 1 % of ship length for freeboard ( $L_f$ ), either forward or aft (For ships other than those of 500 gross tonnage and above engaged on international voyages, 1 % of length of ship ( $L$ ) can be applied.)	Yes	Yes, using new inclining test result
<i>VCG</i> change > 1 %	Yes	Yes, using new inclining test result
1 % < Lightweight change ≤ 2 %	No	Yes, using the calculated lightweight
0.5 % of ship length for freeboard ( $L_f$ ) < <i>LCG</i> change ≤ 1 % of ship length for freeboard ( $L_f$ ), either forward or aft (For ships other than those of 500 gross tonnage and above engaged on international voyages, 0.5 % of length of ship ( $L$ ) can be applied.)	No	Yes, using the calculated lightweight
0.5 % < <i>VCG</i> change ≤ 1 %	No	Yes, using the calculated lightweight
Lightweight change ≤ 1 %	No	No
<i>LCG</i> change ≤ 0.5 % of ship length for freeboard ( $L_f$ ), either forward or aft (For ships other than those of 500 gross tonnage and above engaged on international voyages, 0.5 % of length of ship ( $L$ ) can be applied.)	No	No
<i>VCG</i> change ≤ 0.5 %	No	No

## Notes

- (1) Longitudinal centre of gravity is abbreviated as “*LCG*” and vertical centre of gravity is abbreviated as “*VCG*”.
- (2) When multiple alterations are made to a ship in service over a period of time and each alteration is within the deviation limits specified in the table above, the cumulative total changes to the principal data from the most recent inclining test or lightweight calculation are to be used.
- (3) Both upward and downward changes to the vertical centre of gravity are to be considered.
- (4) When the differences in the original values for draught, still water bending moment and shear force and the values calculated after conversion exceed 2 %, the stability information are to be amended using the altered principal data of the ship and then be approved by the Society.
- (5) Lightship properties are to be consistent in all documents which use them (e.g. loading manual, stability manual, computer data).
- (6) A change in lightweight will result in a change in deadweight unless there is an associated change in freeboard. The consequences of the change could have an impact on compliance with other regulations (e.g. MARPOL Annex VI).
- (7) “Stability information” in this table means any document (whether on paper or electronic) or electronic means of calculation of stability which includes lightship properties. This may include, but is not limited to, approved stability books, computer software for onboard calculations of stability, approved strength books and loading instruments.

## Chapter 3 ANNUAL SURVEYS

### 3.1 General

#### 3.1.1 Surveys Equivalent to Special Surveys\*

Surveys equivalent to Special Surveys may be required when considered necessary by the Society, based on the service and repair history of the ship or damage history of similar ship types or ships with similar tanks and spaces.

#### 3.1.2 Survey for Combination Carriers

At Annual Surveys for combination carriers such as ore/oil carriers and ore/bulk/oil carriers, the surveys are to be carried out in accordance with the relevant requirements in this Chapter, considering the ship's equipment, structural configuration and past operational experience.

### 3.2 Annual Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings

#### 3.2.1 Examination of Plans and Documents\*

1 At Annual Surveys, the management conditions of plans and documents listed in [Table B3.1](#) are to be examined.  
 2 For ships subject to *SOLAS Chapter II-1 Regulation 3-10*, the Ship Construction File in [2.1.5-2](#) are to be examined in accordance with (1) to (5) below:

- (1) For a Ship Construction File stored on board a ship, the Surveyor is to examine the information included in it on board the ship.
- (2) For a Ship Construction File stored in an onshore archive, the Surveyor is to examine the list of information included in it stored in the onshore archive.
- (3) The Surveyor is to confirm upon completion of the survey that the Ship Construction File has been updated whenever any modification of the documentation included in it has taken place.
- (4) The Surveyor is to confirm upon completion of the survey that any addition and/or renewal of materials used for the construction of the hull structure are documented within the list of materials specified in item 85, [Table B2.1](#).
- (5) The Surveyor is to confirm that the Ship Construction File is available to the Society and the flag state throughout the ship's life.

#### 3.2.2 General Examination\*

At Annual Surveys, examinations of hull, equipment, fire-extinction and fittings listed in [Table B3.2](#) are to be carried out.

#### 3.2.3 Performance Tests\*

At Annual Surveys, performance tests listed in [Table B3.3](#) are to be carried out.

#### 3.2.4 Internal Examinations of Spaces and Tanks\*

At Annual Surveys, the internal examinations (1) and (2) below are to be carried out.

- (1) Spaces and Tanks listed in [Table B3.4](#)
- (2) Suspect areas identified at previous survey (excluding cargo tanks of oil tankers, ships carrying dangerous chemicals in bulk with integral tanks and ships carrying liquefied gases in bulk)

#### 3.2.5 Close-up Surveys

- 1 At Annual Surveys, close-up surveys listed in [Table B3.5](#) are to be carried out.
- 2 Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor.
- 3 When thickness measurements of structures subject to close-up surveys using RIT are required, temporary means of access for the corresponding thickness measurements is to be provided unless such remote inspection techniques are also able to carry out the required thickness measurements.

#### 3.2.6 Thickness Measurements

1 At Annual Surveys, the thickness measurements (1) to (3) below are to be carried out. As to the gauging equipment and thickness measurement report, the provisions of [5.2.6-1](#) are to be applied correspondingly as well.

- (1) Spaces and Tanks listed in [Table B3.6](#)
  - (2) Areas where deemed necessary by the Surveyor as a consequence of internal examination of spaces and tanks specified in [3.2.4\(2\)](#)
  - (3) Substantial corrosion areas identified at the previous survey (excluding cargo tanks of oil tankers other than ships built under [Part CSR-T](#) or [Part CSR-B&T](#), ships carrying dangerous chemicals in bulk with integral tanks and ships carrying liquefied gases in bulk). For bulk carriers built under [Part CSR-B](#) or [Part CSR-B&T](#) as well as for the hatch covers and hatch coamings specified in [1.3.1\(6\)\(b\)](#), thickness measurements may be dispensed with at Surveyor's discretion in cases where a protective coating has been applied in accordance with coating manufacturer's requirements and is maintained in good condition.
- 2 For structures built with materials other than steel, alternative thickness measurement requirements may be developed and applied as deemed necessary by the Society.

### 3.2.7 Pressure Test

At Annual Surveys for oil tankers and ships carrying dangerous chemicals in bulk, a pressure test is to be carried out on the piping system when deemed necessary by the Surveyor as a consequence of the general examination of item No.27 specified in [Table B3.2](#).

### 3.2.8 Alternative Design and Arrangements

For ships subject to *SOLAS Chapter II-2 Regulation 17*, alternative design and arrangements for fire safety are to be examined in accordance with the test, inspection and maintenance requirements, if any, specified in the relevant approval documents.

## 3.3 Annual Surveys for Machinery

### 3.3.1 General Examinations\*

1 At Annual Surveys for Machinery, a general examination of all the machinery in the engine room as well as the following (1) to (4) inspections are to be carried out:

- (1) It is to be ascertained that the main propulsion machinery, power transmission machinery, shafting systems, prime movers other than main propulsion machinery, boilers, thermal oil heaters, incinerators, pressure vessels, auxiliaries, piping systems, control systems, electrical installations and switchboards are placed in good order.
- (2) It is to be ascertained that the engine room, boiler spaces and means of escape are placed in good order with respect to dangers of fire and explosion.
- (3) For ships affixed with the notation "PSCM" or "PSCM-1A", the records of the parameters monitored are to be reviewed, in addition to a general examination, so as to ascertain that the relevant installations are well maintained.
- (4) For ships other than those referred to in (3) above with oil lubricated or freshwater lubricated bearings, it is to be checked as to whether lubricating oil analysis or fresh water sample tests are regularly carried out except for the cases specified in [3.3.4-2\(3\)](#). In cases where lubricating oil analysis or water sample tests are carried out, it is to be checked as to whether the reference standards deemed appropriate by the Society are complied with based upon the lubricating oil analysis or fresh water sample test reports, in addition to a general examination.

2 At Annual Surveys for tankers, ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk, the following inspections (1) and (2) are to be carried out in addition to the items in -1 above.

- (1) It is to be checked that each pump foundations are intact.
- (2) It is to be ascertained that ventilation systems in cargo pump rooms and electrical installations in hazardous areas are placed in good order.

3 At Annual Surveys for electric propulsion ships, it is to be ascertained as far as practical for electric propulsion systems that forced cooling apparatuses (including filters), supports and coverings of cables, capacitor elements of propulsion semiconductor converters for propulsion, windings of generating plants and electric motors for propulsion, slip rings, commutators and brushes, etc. are in good condition.

### 3.3.2 Performance Tests\*

1 At Annual Surveys for Machinery, performance tests for the systems and devices listed in [Table B3.7](#) are to be carried out in order to ascertain that they are in good working order.

2 At Annual Surveys for tankers, ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk, in addition

to the requirements specified in [Table B3.7](#), the installations and devices specified in [Table B3.8](#) are to be subjected to the performance tests.

### 3.3.3 Alternative Design and Arrangements

For ships subject to *SOLAS Chapter II-1 Regulation 55*, alternative design and arrangements for machinery, electrical installations, or low-flashpoint fuel storage and distribution systems are to be examined in accordance with the test, inspection and maintenance requirements, if any, specified in the relevant approval documents.

### 3.3.4 Surveys of Water Jet Propulsion Systems, etc.

1 For ships fitted with water jet propulsion systems, the surveys are to be carried out in accordance with the following (1) and (2):

- (1) The general conditions of propulsion systems are to be confirmed to be in good order.
- (2) The following (a) to (d) tests are to be carried out:
  - (a) Performance tests of steering systems;
  - (b) Tests on operation of controls for steering systems, including tests on change-overs of control systems between navigation bridges and auxiliary steering stations, and change-overs between manual steering and automatic steering, if provided;
  - (c) Tests on the functioning of alarm and safety devices, and indication devices for deflector positions, reverser positions and impeller speed, and running indicators of electric motors for steering actuating systems;
  - (d) Specific tests for the supply of the alternative sources of power for propulsion systems.

2 Surveys for ships fitted with azimuth thrusters are to be carried out in accordance with the following (1) to (3):

- (1) The general conditions of propulsion systems are to be confirmed to be in good order.
- (2) The following (a) to (e) tests are to be carried out:
  - (a) Performance tests of azimuth steering gears;
  - (b) Tests on the functioning of alarm and safety devices as well as indication devices for azimuth angles, propeller speeds and direction of rotation and pitch positions, and running indicators of electric motors for azimuth steering gears;
  - (c) Tests on the operation of controls for steering, including tests on change-overs of control systems between navigation bridges and azimuth thruster compartments, and change-overs between manual steering and automatic steering, if provided;
  - (d) Specific tests for the supply of the alternative sources of power for propulsion systems;
  - (e) For azimuth thrusters which incorporate electric motors in propeller pods, performance tests of the following are to be carried out:
    - i) Audible and visual alarms for ingress of sea water into propeller pods;
    - ii) Fire detection and alarm systems in propeller pods (if provided);
    - iii) Cooling fans and auxiliary cooling fans for propulsion motors (if provided);
    - iv) Control means for stopping cooling fans for propulsion motors and closing any inlets and outlets of air for such fans (if provided).
- (3) Ships where vibration measurement systems or Fe-density measurement systems are used instead of the temperature sensors and temperature recorders, in the case of azimuth thrusters which use roller bearings as the bearings for propeller shafts Kind 1C, are to comply with the requirements specified in the following (a) and (b).
  - (a) For the analysis records with the data submitted by the executive management (hereinafter referred to as “management” in (3)), it is to be confirmed that the records have been evaluated by Society before the survey and retained on board. In the results, the management’s opinion, such as on the necessity for withdrawing the azimuth thrusters, is to be included.
  - (b) It is to be confirmed that the lubricating oil sampling and analysis specified in (1)(a), Item 5, [Table B8.1-1](#) is being carried out regularly.

### 3.3.5 Surveys of Selective Catalytic Reduction (SCR) Systems, Exhaust Gas Cleaning Systems (EGCS) and Exhaust Gas Recirculation (EGR) Systems.

1 For ships fitted with selective catalytic reduction (SCR) systems, the surveys are to be carried out in accordance with the following (1) to (5):

- (1) The general conditions of SCR systems are to be confirmed to be in good order.
- (2) General examinations of ventilation systems for reductant agent storage tank compartments are to be carried out.

- (3) General examinations of specific safety and protective equipment for SCR systems are to be carried out.
- (4) Instructions and operation manuals of SCR systems are to be confirmed to be kept on board.
- (5) Performance tests of the following (a) to (e) are to be carried out:

- (a) Control, safety and alarm devices;
- (b) Change-over devices of exhaust gas pipes and their corresponding indicators;
- (c) Remote shut-off devices for reductant agent storage tank valves;
- (d) Remote stopping devices for reductant agent supply pumps; and
- (e) Eyewashers.

2 For ships fitted with exhaust gas cleaning systems, the surveys are to be carried out in accordance with the following (1) to (4):

- (1) The general conditions of exhaust gas cleaning systems are to be confirmed to be in good order. In particular, the general conditions of piping systems for washwater used in scrubber chambers is to be confirmed to be in good order.
- (2) General examinations of safety and protective equipment for exhaust gas cleaning systems.
- (3) Instructions and operation manuals of exhaust gas cleaning systems are to be confirmed to be kept on board.
- (4) Performance tests of the following (a) to (f) are to be carried out:
  - (a) Control, safety and alarm devices;
  - (b) Change-over devices of exhaust gas pipes and their corresponding indicators;
  - (c) Remote shut-off devices of cocks or valves directly fitted to sodium hydroxide solution storage tanks (if fitted);
  - (d) Remote stopping devices for sodium hydroxide solution supply pumps (if fitted);
  - (e) Safety showers (if fitted); and
  - (f) Eyewashers (if fitted).

3 For ships fitted with exhaust gas recirculation systems, the surveys specified in -2 above are to be carried out (in this case the term “exhaust gas cleaning systems” is to be read as “exhaust gas recirculation systems”).

### 3.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk

#### 3.4.1 General

In addition to the requirements of 3.2 and 3.3, the requirements of 3.4 apply to Annual Surveys of ships carrying liquefied gases in bulk. Examinations of inerted cargo tanks or spaces may be omitted at the discretion of the Surveyor.

#### 3.4.2 Examinations\*

At Annual Surveys for ships carrying liquefied gases in bulk, structures and equipment of the spaces specified in Table B3.9 are to be generally examined in order to ascertain them being in good order. The extent of the survey may be increased to include performance tests, operation tests, open-up examinations, where deemed necessary by the Surveyor.

### 3.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

#### 3.5.1 General

In addition to the requirements of 3.2 and 3.3, the requirements of 3.5 apply to Annual Surveys of ships carrying dangerous chemicals in bulk.

#### 3.5.2 Examinations\*

At Annual Surveys of ships carrying dangerous chemicals in bulk, examinations of spaces, structures, fittings and equipment specified in Table B3.10 are to be carried out. The extent of the survey may be increased to include performance tests, operation tests, open-up examinations, etc. where deemed necessary by the Surveyor.

### 3.6 Special Requirements for Ships Using Low-flashpoint Fuels

#### 3.6.1 General\*

In addition to the applicable requirements of the previous sections, the requirements of 3.6 are to be applied at Annual Surveys of ships using low-flashpoint fuels.

**3.6.2 Examinations\***

At Annual Surveys of ships using low-flashpoint fuels, the examinations of spaces, structures and facilities, etc. specified in [Table B3.11](#) are to be carried out in order to ascertain them being in good order. The extent of the survey may be increased to include additional performance testing, operational testing or open-up examinations in cases where deemed necessary by the attending surveyor.

**3.7 Special Requirements for Bulk Carriers and Oil Tankers****3.7.1 General**

In addition to the requirements of [3.2](#) and [3.3](#), the requirements of [3.7](#) apply to the Annual Surveys of bulk carriers and oil tankers subject to *SOLAS Chapter II-1 Regulation 3-10*.

**3.7.2 Surveys**

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship's structure, taking into account areas identified in the Ship Construction File as needing special attention.

**3.8 Special Requirements for Ships Affixed with the Notation “HCM” or “HCM-GBS”****3.8.1 General**

In addition to the requirements of [3.2](#) and [3.3](#), the requirements of [3.8](#) apply to the Annual Surveys of ships affixed with the notation “HCM” or “HCM-GBS”.

**3.8.2 Surveys**

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship's structure, taking into account areas subject to construction monitoring survey.

**3.9 Special Requirements for Ships Affixed with the Notation “CybR”****3.9.1 General**

In addition to the requirements of [3.2](#) and [3.3](#), the requirements of [3.9](#) apply to the Annual Surveys of ships affixed with the notation “CybR”.

**3.9.2 Ship Cyber Security and Resilience Program**

**1** At Annual Surveys for ships affixed with the notation “CybR”, a ship cyber security and resilience program is to be submitted to the Society by the first Annual Survey and verified by the Society in accordance with [2.2.3-5\(7\), Part X](#).

**2** At the completion of Annual Surveys, the surveyor is to confirm that the ship cyber security and resilience program is kept on board.

**3** Change of vessel management company will require a new verification of the Ship cyber security and resilience program.

**3.9.3 Surveys\***

At Annual Surveys for ships affixed with the notation “CybR”, the items specified in [Table B3.12](#) are to be examined.

Table B3.1 Examination of Plans and Documents

Items	Examination
1 Loading Manual	(1) For ships required to have the manual on board in accordance with the requirements of <b>3.8.1.1, Part 1, Part C</b> , and <b>25.1.1, Part CS</b> , confirmation that the manual is kept on board is to be made.
2 Stability Information Booklet	(1) Confirmation as to whether the booklet is kept on board is to be made.
3 Damage Control Plan, Booklet and Damage Stability Information	(1) For ships required to have the damage control plan on board in accordance with the requirement in <b>2.3.4, Part 1, Part C</b> , confirmation that the approved plan is exhibited and the booklet containing the information shown in the plan and the damage stability information are kept on board is to be made.
4 Fire Control Plan	(1) Confirmation that the fire control plan is exhibited and properly stored is to be made.
5 Operating and Maintenance Manual for the door and inner door and notices indicating procedures for closing and securing	(1) For ships required to have the manual and notices on board in accordance with the requirements in <b>14.10, Part 1, Part C</b> , and <b>Chapter 21, Part CS</b> ; (2) Confirmation that the manual is kept on board is to be made. (3) Confirmation that the board is exhibited is to be made.
6 Instruction Manuals for the Inert Gas System	(1) For ships required to have the manual on board in accordance with the requirements of <b>4.5.5, Part R</b> , confirmation that the manual is kept on board is to be made.
7 Towing and Mooring Fitting Arrangement Plan	(1) Confirmation that the Towing and Mooring Fitting Arrangement Plan specified in <b>14.4, Part 1, Part C</b> or <b>23.2, Part CS</b> is kept on board is to be made.
8 Ship Structure Access Manual	(1) For ships required to have the manual on board in accordance with the requirements of <b>14.16.3.6, Part 1, Part C</b> or <b>26.2.6, Part CS</b> , confirmation that the manual is kept on board and updated as necessary is to be made.
9 Documents related to the surveys for bulk carriers, oil tankers and ships carrying dangerous chemicals in bulk with integral tanks	(1) Confirmation that the documents are kept on board is to be made.
10 Coating Technical File and/or Corrosion Resistant Steel Technical File	(1) For ships required to have a Coating Technical File for dedicated seawater ballast tanks, etc. on board in accordance with the requirements of <b>3.3.5.3, Part 1, Part C</b> , <b>22.4.2, Part CS</b> , <b>1.2.2 Section 5 Chapter 3, Part CSR-B</b> or <b>2.1.1.2 Section 6, Part CSR-T</b> , confirmation that the file is kept on board and that maintenance and repair work are properly recorded and kept on the file is to be made. (2) For ships required to have a Coating Technical File and/or a Corrosion Resistant Steel Technical File for cargo oil tanks on board in accordance with the requirements of <b>3.3.5.4, Part 1, Part C</b> or <b>22.4.3, Part CS</b> , confirmation that the files are kept on board and that maintenance and repair work are properly recorded and kept on the files is to be made.
11 Noise survey report	(1) Confirmation that the report is kept on board
12 Polar Water Operational Manual	(1) For ships required to have the manual on board in accordance with the requirements of <b>2.3.1, Part I</b> , confirmation that the manual is kept on board is to be made.
13 Drawings indicating critical structural areas, construction monitoring plan and all construction monitoring survey records	(1) For ships affixed with the notation “ <i>HCM</i> ” or “ <i>HCM-GBS</i> ”, confirmation that the documents are kept on board is to be made.
14 Watertight cable penetration register	(1) Confirmation that the register is kept on board and updated as necessary is to be made.



Items	Examination
15 Procedures for software and hardware change management and relevant change records	<p>(1) Confirmation that the procedures for software and hardware change management are kept on board in accordance with <b>3.6.12-1, Part X</b>.</p> <p>(2) Confirmation that the change records are updated in accordance with <b>3.6.11</b> and <b>3.6.12-1, Part X</b>.</p>
16 Management plans for inspection and maintenance of mooring equipment (including mooring lines)	<p>(1) For ships required to have the plan on board in accordance with the requirements of <b>14.4.5.1, Part 1, Part C</b> or <b>23.2.10, Part CS</b>, confirmation that the plan is kept on board and updated as necessary is to be made.</p>

Table B3.2 General Examination

Items	Examination
1 Shell plating	(1) Confirmation that areas visible above the load waterline are in good condition.
2 Weather deck plating	
3 Openings on deck and outside of the hull	(1) Confirmation that the means of securing the weathertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks are in good condition. (2) Confirmation that the watertight integrity of the closures to any openings in the ship's side below the freeboard deck is in good condition. (3) Confirmation that the side scuttles and deadlights are in good condition.
4 Casings of engine room	(1) Confirmation that the following are in good condition: exposed engine casings and their openings; and skylights of the engine room and boiler room and their closing appliances.
5 Ventilators	(1) Confirmation that the ventilators including their coamings and closing appliances are in good condition.
6 Air pipes and sounding pipes	(1) Confirmation that the air pipes and sounding pipes including their coamings and closing appliances are in good condition. (2) For closing appliances of air pipes, open up examinations may be required depending upon their condition.
7 Watertight bulkhead, superstructure end bulkhead and deckhouses	(1) Confirmation that watertight doors, penetrations and stop valves on watertight bulkheads, and closing appliances of openings in deckhouses or companions protecting hatchways giving access to spaces below freeboard deck are in good condition. (2) Confirmation that the superstructure end bulkheads and the openings therein are in good condition.
8 Load line marks	(1) Confirmation that deck line and load line markings are appropriate.
9 Bulwark	(1) Confirmation that bulwarks and the shutters of its freeing ports; and hinges and guard rails are in good condition.
10 Means of access	(1) Confirmation that the guardrails, gangways, walkways and other means provided for the protection of the crew and means for safe passage of crew are in good condition.
11 Scuppers, inlets, other discharge pipes and valves	(1) Confirmation that the scuppers, inlets and discharges including their valves are in good condition. (2) Confirmation that the garbage chutes including their valves are in good condition.
12 Securing arrangement for on-deck timber	(1) Confirmation that securing arrangement for on-deck timber including eye plates, lashing wires, etc. is in good condition regardless of timber freeboard markings.
13 Anchoring and mooring arrangement	(1) Confirmation that the anchoring and mooring arrangements including their accessories are in good condition as far as can be seen. (2) Confirmation that the means provided to minimize water ingress through the spurling pipes and chain lockers are in good condition.
14 Fire extinguishing arrangement	(1) Confirmation that the fire extinguishing arrangement is in good condition and the fixed fire extinguishing system, semi-portable and portable fire extinguishers, firefighters' outfits, emergency fire pumps and the international shore connection are maintained in good order.
15 Fire protection arrangement and means of escape	(1) Confirmation that no alteration has been made to these arrangements since the last survey. (This includes the confirmation that emergency escape breathing devices (EEBDs) are complete and in good condition.)
16 Sails and their accessories	(1) Confirmation that sails and their accessories are in good condition. They are to be in place and ready for unfolding at the time of examination.
17 Towing and mooring fittings	(1) Confirmation that the marks of Safe Towing Load ( <i>TOW</i> ) on towing fittings and Safe Working Load ( <i>SWL</i> ) on mooring fittings as specified in <a href="#">14.4.2.4</a> or <a href="#">14.4.3.5, Part 1, Part C</a> or <a href="#">23.2.3</a> or <a href="#">23.2.6, Part CS</a> are clearly visible and these fittings are in good condition.
18 Loading computer	(1) Confirmation that the computer of ships required to have one in accordance with the provisions of <a href="#">3.8.1.1, Part 1, 3.2.2.1, Part 2-2</a> , and <a href="#">3.2.2.1, Part 2-3, Part C</a> is maintained in good order.

Items	Examination
19 Ship Identification Number	(1) Confirmation that the markings of the ship's identification number for ships required to be so marked are in good condition.
20 Means of embarkation and disembarkation	(1) Confirmation that the means of embarkation and disembarkation are in good condition.
21 Bow doors, inner doors, side shell doors and stern doors	(1) Confirmation that the bow doors, inner doors, side shell doors and stern doors are in good condition.
22 Hearing protectors	(1) Confirmation that hearing protectors are in good condition
23 Portable gas detecting instruments	(1) Confirmation that portable gas detecting instruments are in good condition. (This includes the confirmation of calibration records.)
24 Helicopter facilities	(1) Confirmation that the helicopter facilities, such as helidecks, means of escape, fire-fighting appliances, helicopter refuelling and hanger facilities, are in good condition, and that operations manual is provided.
25 Special arrangements for carrying dangerous goods	(1) Confirmation, when appropriate, that the special arrangements for carrying dangerous goods are in good condition. (This includes the check of the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances.)
26 Arrangements of ballast piping systems	(1) Confirmation that ballast piping systems are not connected to fuel oil tanks. However, the requirements may be dispensed with when ballast piping systems are provided with suitable arrangements which comply with <b>13.5.1-11, Part D</b> .
Additional Requirement for Tankers, Ships Carrying Dangerous Chemicals in bulk and Ships Carrying Liquefied Gases in bulk	
27 Piping	(1) Confirmation that cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump room, cargo compressor rooms and on weather decks are in good condition. (2) Confirmation that the earthing between hull structures and cargo piping systems (cargo oil pipes, vent pipes, tank washing pipes, etc.) is in good condition.
28 Cargo tank	(1) Confirmation that the cargo tank openings, including gaskets, covers, coamings and screens are in good condition. (2) Confirmation that the cargo tank pressure/vacuum valves and devices to prevent the passage of flame are in good condition. (3) Confirmation that the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems are in good condition. (4) Confirmation that the earthing between hull structures and the cargo tank is in good condition.
29 Wire gauze to prevent the passage of flame	(1) Confirmation, as far as practicable, that the wire gauze to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces are in good condition.
30 Safe access to the bow	(1) Confirmation that the means of safe access to the bow is in good condition.
31 Emergency towing arrangements	(1) Confirmation that emergency towing arrangements for ships of not less than 20,000 tonnes deadweight are in good condition.
Additional Requirement for Bulk Carriers over 10 years of age	
32 Piping in the cargo holds	(1) Confirmation that all piping and penetrations in cargo holds, including overboard piping, are in good condition.
Additional Requirement for General Dry Cargo Ships of not less than 500 gross tonnage and over 15 years of age	
33 Piping in the cargo holds	(1) Confirmation that all piping and penetrations in cargo holds, including overboard piping, are in good condition.
Additional Requirement for Container Carriers	
34 Block-to-block butt joints of strength decks and hatch side coamings (including top plates and attached longitudinal stiffeners)	(1) In the case of container carriers using extremely thick steel plates which comply with <b>10.5, Part 2-1, Part C</b> , it is to be confirmed, as far as practicable, that block-to-block butt joints of strength decks and hatch side coamings (including top plates and attached longitudinal stiffeners) are in good condition.

Note: Examination of suspect areas identified at previous surveys is to be carried out.

Table B3.3 Performance Tests

Items	Tests
1 Weathertight hatch covers	<p>(1) Hose test (when deemed necessary by the Surveyor)</p> <p>(2) Random checking of the satisfactory operation of mechanically operated hatch covers including hydraulic and power components, wires, chains and link drives</p> <p>(3) For mechanically operated hatch covers on bulk carriers, hatch cover sets within the forward 0.25 <math>L_f</math> and at least one additional set, including hydraulic and power components, wires, chains and link drives, are to be checked for satisfactory operation so that all sets on the ship are checked at least once every 5 years between special surveys</p>
2 Closing appliances of watertight door on watertight bulkheads and openings on superstructure end bulkheads, deckhouses or companions protecting hatchways giving access to spaces below freeboard deck	<p>(1) Checking whether the appliances work in good order is to be made as deemed necessary by the Surveyor.</p> <p>(2) Hose tests or equivalent tests are to be carried out. Such tests may be dispensed with at the discretion of the Surveyor.</p>
3 Appliances related to fire protection and escape	<p>(1) Checking whether the appliances work in good order is to be carried out.</p>
4 Fire detection system and fire alarm system including manually operated call points and sample extraction smoke detection system	<p>(1) Checking, as far as possible, whether the systems work in good order (including proper operation of malfunction indicator) is to be made.</p>
5 Fire pumps (including emergency fire pumps) piping, hydrants, hoses, nozzles etc.	<p>(1) Performance test of the fire fighting system composed of fire pump, hydrants, etc. is to be carried out. For ships with fire pumps in periodically unattended machinery spaces, an operation test of the remote control system or automatic operation system of one pump is to be carried out.</p>
6 Fixed deck foam system	<p>(1) Checking whether the system works in good order is to be carried out by delivering water.</p>
7 Ventilation system	<p>(1) Checking whether the system works in good order is to be carried out.</p>
8 Stability Computer	<p>(1) A performance test is to be carried out on computers for stability calculation that are installed as a supplement to the stability information booklet on board ships contracted for construction on or after 1 July 2005.</p>
9 Water level detection and alarm systems	<p>(1) Checking whether the systems work in order is to be made at random.</p>
10 Dewatering arrangements	<p>(1) Checking whether the systems work in order is to be made.</p>
11 Bow doors, inner doors, side shell doors and stern doors	<p>(1) Checking whether the appliances work in good order is to be carried out.</p> <p>(2) Hose test (when deemed necessary by the Surveyor)</p>
12 General emergency alarm system	<p>(1) Checking whether the system works in good order is to be carried out.</p>
13 Special arrangements for carrying dangerous goods	<p>(1) Checking, when appropriate, whether the water supply, bilge pumping and any water spray system work in good order is to be carried out.</p>
14 Portable gas detectors for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo	<p>(1) Checking whether the detectors work in good order is to be carried out.</p>

Table B3.4 Internal Examinations of Spaces and Tanks

Items	Examination
Requirements for cargo ships except when specified otherwise	
1 Engine room and boiler room	(1) An internal examination is to be carried out.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	(1) An internal examination is to be carried out after the areas are thoroughly cleaned out and free of gas. Attention is to be paid to the bulkheads for signs of oil leakage or fractures (in particular, the sealing arrangements of all penetrations of bulkheads), ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	(1) For ships over 5 years of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last intermediate Survey or special survey, is to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Engine room and boiler room	(1) An internal examination is to be carried out.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	(1) An internal examination is to be carried out after the areas are thoroughly cleaned out and free of gas. Attention is to be paid to the bulkheads for signs of oil leakage or fractures (in particular, the sealing arrangements of all penetrations of bulkheads), ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	(1) For oil tankers, ships carrying dangerous chemicals in bulk and ships carrying liquefied gases in bulk over 5 years of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last intermediate Survey or special survey, is to be carried out.
Requirements for Bulk Carriers other than Double Skin Bulk Carriers *1	
1 Engine room and boiler room	(1) An internal examination is to be carried out.
2 Ballast tanks	(1) For bulk carriers over 5 years of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
3 Cargo holds	(1) For bulk carriers over 10 years of age, an internal examination of all cargo holds is to be carried out.
Requirements for Double Skin Bulk Carriers	
1 Engine room and boiler room	(1) An internal examination is to be carried out.
2 Ballast tanks	(1) For bulk carriers over 5 years of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
3 Cargo holds	(1) For bulk carriers over 10 years and up to 15 years of age, an internal examination of two selected cargo holds is to be carried out. (2) For bulk carriers over 15 years of age, an internal examination of all cargo holds is to be carried out.
4 Double side skin void spaces	(1) For bulk carriers over 20 years of age and of 150 m in length and upwards, an internal examination of the void spaces, of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
Requirements for General Dry Cargo Ships of not less than 500 gross tonnage	
1 Engine room and boiler room	(1) An internal examination is to be carried out.
2 Ballast tanks	(1) For general dry cargo ships over 5 years of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.

Items	Examination
3 Cargo holds	<p>(1) For general dry cargo ships carrying timber cargoes over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of all cargo holds is to be carried out to check the condition of lower part of hold frames, lower brackets and lower part of transverse bulkheads.</p> <p>(1) For general dry cargo ships over 10 <i>years</i> and up to 15 <i>years</i> of age, an internal examination of one forward and one after cargo hold (all cargo holds for ships carrying timber cargoes) and their associated tween deck spaces is to be carried out.</p> <p>(1) For general dry cargo ships over 15 <i>years</i> of age, an internal examination of all cargo holds and their associated tween deck spaces is to be carried out.</p>

Note:

- \*1: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B3.5 Close-up Surveys

Items	Examinations
Requirements for Cargo Ships except when specified otherwise	
1 Bow doors, inner doors, side shell doors and stern doors	(1) Close-up surveys of securing, supporting and locking devices, together with welded parts, are to be carried out.
Requirements for Bulk Carriers other than Double Skin Bulk Carriers <sup>*1</sup>	
1 Hatch covers and hatch coamings	(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	<p>(1) For bulk carriers over 10 <i>years</i> but not more than 15 <i>years</i> of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the side frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold.</p> <p>(2) For bulk carriers over 15 <i>years</i> of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the shell frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold and one other selected cargo hold.</p> <p>(3) Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) of all remaining cargo holds</p>
Requirements for Double Skin Bulk Carriers	
1 Hatch covers and hatch coamings	(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
Requirements for General Dry Cargo Ships of not less than 500 <i>gross tonnage</i>	
1 Hatch covers and hatch coamings	(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Cargo hold frames	<p>(1) For general dry cargo ships carrying timber cargoes over 5 <i>years</i> and up to 15 <i>years</i> of age, the extent of survey is to be increased to the satisfaction of the Surveyor where deemed necessary by the Surveyor as a consequence of the survey carried out in accordance with <a href="#">Table B3.4</a>.</p> <p>(2) For general dry cargo ships over 15 <i>years</i> of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the shell frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold (the forward lower cargo hold in the case of tween deck spaces) and one other selected cargo hold (one other selected lower cargo hold in the case of tween deck spaces).</p> <p>(3) Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of those cargo holds and associated tween deck spaces (as applicable) as well as a close-up survey of sufficient extent of all remaining cargo holds and tween deck spaces (as applicable).</p>

Note:

\*1: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B3.6 Thickness Measurements

Items	Note
Requirements for Cargo Ships except when specified otherwise	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in <b>Table B3.2</b> , thickness measurements are to be carried out.
2 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination specified in <b>Table B3.4</b> which is required for ships over 5 <i>years</i> of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-2</b> .
3 Bow doors, inner doors, side shell doors and stern doors	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in <b>Table B3.2</b> , thickness measurements are to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in <b>Table B3.2</b> , thickness measurements are to be carried out.
2 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in <b>Table B3.4</b> which is required for oil tankers, ships carrying dangerous chemicals in bulk and ships carrying liquefied gases in bulk over 5 <i>years</i> of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-3</b> or <b>-4</b> .
Requirements for Bulk Carriers other than Double Skin Bulk Carriers	
1 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in <b>Table B3.4</b> which is required for bulk carriers other than double skin bulk carriers over 5 <i>years</i> of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-5</b> .
2 Hatch covers and hatch coamings	(1) When deemed necessary by the Surveyor as a consequence of the internal examination required in <b>Table B3.4</b> or the close-up survey required in <b>Table B3.5</b> for bulk carriers other than double skin bulk carriers, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-5</b> .
3 Structural members in cargo holds	
Requirements for Double Skin Bulk Carriers	
1 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in <b>Table B3.4</b> which is required for double skin bulk carriers over 5 <i>years</i> of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-5</b> .
2 Double side skin void spaces	(1) When extensive corrosion is found in the examination of void spaces specified in <b>Table B3.4</b> which is required for double skin bulk carriers over 20 <i>years</i> of age and of 150 <i>m</i> in length and upwards, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <b>5.2.6-5</b> .



Items	Note
3 Hatch covers and hatch coamings	(1) When deemed necessary by the Surveyor as a consequence of the close-up survey required in <a href="#">Table B3.5</a> for double skin bulk carriers, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <a href="#">5.2.6-5</a> .
Requirements for General Dry Cargo Ships of not less than 500 <i>gross tonnage</i>	
1 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in <a href="#">Table B3.4</a> which is required for general dry cargo ships over 5 <i>years</i> of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <a href="#">5.2.6-6</a> .
2 Hatch covers and hatch coamings	(1) When deemed necessary by the Surveyor as a consequence of the close-up survey required in <a href="#">Table B3.5</a> , thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <a href="#">5.2.6-6</a> .
3 Structural members in cargo holds	(1) For general dry cargo ships over 10 <i>years</i> of age, when deemed necessary by the Surveyor as a consequence of the internal examination required in <a href="#">Table B3.4</a> and the close-up survey required in <a href="#">Table B3.5</a> , thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of <a href="#">5.2.6-6</a> .

Table B3.7 Performance Tests at Annual Surveys

Items	Examinations
1 Valves for oil tanks	(1) Operation tests for the arrangements for remote closing of valves for fuel oil tanks, lubricating oil tanks and other flammable oil tanks are to be carried out, as far as practicable and as appropriate.
2 Fuel oil pumps, cargo pumps, ventilating fans and boiler draught fans	(1) Operation tests for emergency stopping means are to be carried out.
3 Emergency electrical power source	(1) Operation tests for the emergency source of electrical power and its associated equipment are to be carried out in order to ascertain that the whole system is in good working order. Automatically operated equipment is to be tested in the automatic mode.
4 Communication systems	(1) Operation tests for the means of communication between the navigation bridge and the machinery control position and between the navigation bridge and the steering gear compartment are to be carried out.
5 Steering gears	(1) Performance tests are to be carried out for the main and auxiliary steering gears including their associated equipment and control systems;
6 Bilge systems	(1) Operation tests for the valves (including ones for emergency use), cocks, strainers, pumps, reach-rods and level alarms of the bilge systems are to be carried out.
7 Safety devices	1 Operation tests for the safety devices, etc. specified in the following (1) to (5) are to be carried out. However, the tests may be omitted at the Surveyor's discretion based on the general examination, reports of working conditions at sea and inspection records taken by the ship's crew.
(1) Main propulsion machinery and auxiliary machinery	(a) Operation tests of the following safety/alarm devices on prime movers of main propulsion machinery; electric generators; auxiliary machinery essential for propulsion; and auxiliary machinery for manoeuvring and crew safety are to be carried out. Where deemed necessary by the Surveyor, the maintenance records of the cooling water and lubricating oil are required to be presented for review. <ul style="list-style-type: none"> <li>i) Overspeed protective devices</li> <li>ii) Automatic shut-off and alarm devices in case of loss or low pressure of the lubricating oil</li> <li>iii) Automatic shut-off devices in case of abnormally low pressure of the main condenser vacuum for steam turbines used as main propulsion machinery</li> </ul>
(2) Boilers, thermal oil heaters, incinerators and gas combustion units (GCUs)	(a) Operation tests for the safety devices, alarm devices and pressure indicators are to be carried out. Calibration records for the pressure indicators are to be ascertained and the relieving gears of the safety valves are to be examined and tested to verify satisfactory operation. However, the relief valves provided on the exhaust gas economizers are to be tested by the Chief Engineer at sea prior to the Annual Survey within the period specified in 1.1.3-1(I). This test is to be recorded in the logbook for review by the attending surveyor. Where deemed necessary by the Surveyor, the control records of the boiler water and thermal heater oil are required to be presented for review.
(3) Monitoring devices	(a) Operation tests for pressure indicators, thermometers, ammeters, voltmeters and revolution meters are to be carried out.
(4) Automatic control devices or remote control devices	(a) Operation tests for automatic and remote control devices of auxiliary machinery essential for propulsion, manoeuvring, and crew safety as well as the means of remotely controlling the propulsion machinery (including electric propulsion plants for electric propulsion ships) from the navigating bridge (including the control, monitoring, reporting, alert and safety actions) are to be carried out.
(5) Engineer's Alarm	(a) It is to be confirmed that the engineer's alarm is clearly audible in the engineers' accommodation.

Table B3.8 Additional Requirements for Tankers, Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Cargo pumps, bilge pumps, ballast pumps, stripping pumps and ventilators	(1) Operation tests for the remote control systems and shut-off devices of the pumps installed in cargo pump rooms are to be carried out.
2 Bilge systems	(1) Operation tests of the bilge systems installed in cargo pump rooms of tankers and ships carrying dangerous chemicals in bulk, including checking of bilge level monitoring devices and alarms, are to be carried out.
3 Level indicators	(1) Operation tests of level indicators used in cargo tanks are to be carried out.
4 Pressure indicators	(1) Operation tests of pressure indicators installed in cargo discharge lines are to be carried out.
5 Inert gas systems	<p>(1) Inert gas systems installed in accordance with <b>4.5.5, Part R</b>, are to be subjected to the following general examinations and operation tests. After completion of these examinations and tests, when practicable, the proper operation of the inert gas system is to be checked. Other inert gas systems are to be examined as deemed appropriate by the Society.</p> <ul style="list-style-type: none"> <li>(a) Examining externally for any sign of gas or effluent leakage</li> <li>(b) Confirming the proper operation of both inert gas blowers</li> <li>(c) Observing the operation of the scrubber-room ventilation system</li> <li>(d) Checking the deck water seal for automatic filling and draining</li> <li>(e) Examining the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves</li> <li>(f) Observing a test of the interlocking feature of soot blowers</li> <li>(g) Observing that the gas pressure regulating valve automatically closes when the inert gas blowers are secured</li> <li>(h) Checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary: <ul style="list-style-type: none"> <li>i) High oxygen content of gas in the inert gas main</li> <li>ii) Low gas pressure in the inert gas main</li> <li>iii) Low pressure in the supply to the deck water seal</li> <li>iv) High temperature of gas in the inert gas main</li> <li>v) Low water pressure or low water-flow rate</li> <li>vi) Accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas</li> <li>vii) High water level in the scrubber</li> <li>viii) Failure of the inert gas blowers</li> <li>ix) Failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main</li> <li>x) Failure of the power supply to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main</li> <li>xi) High pressure of gas in the inert gas main</li> </ul> </li> </ul>
6 Gauging, detecting and alarming devices	<p>(1) General examinations and operation tests for the following are to be carried out for tankers and ships carrying dangerous chemicals in bulk. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality.</p> <ul style="list-style-type: none"> <li>(a) For fixed and portable gas detecting instruments and their associated alarms, the following items, in particular, are to be examined: <ul style="list-style-type: none"> <li>i) The provision of at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares is to be checked, and it is to be confirmed that suitable means are provided for the calibration of these instruments.</li> <li>ii) The arrangements for gas measurement in double-hull spaces and double bottom spaces, including the fitting of permanent gas sampling lines are to be examined, where appropriate.</li> <li>iii) The fixed hydrocarbon gas detection system for measuring hydrocarbon gas concentrations in all ballast tanks and void spaces of double-hull and double-bottom spaces adjacent to the cargo tanks are to be examined and tested, as far</li> </ul> </li> </ul>

Items	Examinations
	<p>as possible.</p> <ul style="list-style-type: none"> <li>iv) It is to be confirmed that the system for continuous monitoring of the concentration of flammable vapours in cargo pump room is satisfactory.</li> <li>v) It is to be confirmed that sampling points or detector heads of the system specified in iv) are located in suitable positions in order that potentially dangerous leakages are readily detected.</li> </ul> <p>(b) Gauging devices for oxygen density</p>
7 Fire extinguishing arrangement	<p>(1) For tankers, general examinations and operation tests for the following are to be carried out:</p> <ul style="list-style-type: none"> <li>(a) It is to be confirmed that the deck foam system, including the supplies of foam concentrate are in good condition.</li> <li>(b) It is to be checked that the two jets of water at the required pressure in the fire main is obtained when the system is in operation.</li> <li>(c) The fixed firefighting system for the cargo pump rooms are to be examined, and it is to be confirmed, as far as practicable and when appropriate, that the operation of the remote means for closing the various openings.</li> </ul>

Table B3.9 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations
1 Cargo containment system	(1) General condition of cargo tanks, secondary barriers and their insulation; and sealing arrangement for cargo tanks or tank covers penetrating decks is to be examined as far as accessible. At the first Annual Survey after delivery, examinations specified in 1(1)(a), (b) and 2 of Table B5.27 and an examination of the general condition of cargo tank foundations are to be carried out. However, these examinations may be dispensed with in accordance with the provisions specified otherwise by the Society.
2 Ventilating system for hold spaces and cargo containment system	(1) Pressure/Vacuum valves, safety systems and alarms, and their associated flame screens for cargo tanks, interbarrier spaces, and hold spaces, as well as the means for draining the vent pipes are to be examined generally as far as accessible to confirm that they are satisfactory. It is to be confirmed that the pressure relief valves for the cargo tanks are sealed and the relevant certificate for their opening/closing pressure is provided on board.
3 Cargo handling system	(1) The general condition of the equipment shown in (a) to (c) below is to be examined during operation, as far as is practical. Regarding (c), operation tests are also to be carried out. (a) Machinery for cargo handling including cargo heat exchangers, vaporizers, pumps and compressors. (b) Piping and its insulation for cargo handling system as far as accessible (c) ESD (emergency shutdown) systems for stopping cargo flow (performance tests are to be carried by manually activating emergency shutdown systems and confirming that cargo pumps and compressors automatically stop as a result.)
4 Gauging, detecting, safety, and alarming devices	(1) General examinations and performance tests of the following (a) to (i) are to be carried out. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality. (a) Liquid level gauges, high level alarms and valves associated with shut-off system (b) Liquid level indicators and overflow control for the cargo tanks (c) Temperature indication equipment and associated alarms (d) Pressure gauges, high pressure and, when applicable, low pressure alarms, for the cargo tanks (e) Pressure gauges and associated alarms for cargo tanks, interbarrier spaces and hold spaces (f) Arrangements for the cargo pressure/temperature control including, when fitted, any thermal oxidation systems, any refrigeration systems, and any associated safety measures and alarms (g) Fixed and portable gas detecting instruments and associated alarms (h) Gauging devices for oxygen density (i) Safety devices of the arrangements for the use of cargo as fuel
5 Environmental control system	(1) General examinations of the following (a) to (d) are to be carried out. (a) Gas free and purging systems for cargo tanks, arrangements for compensate for normal losses and atmosphere monitoring systems. (b) Confirmation that the use of inert gas has not increased beyond that needed to compensate for normal losses by examining records of inert gas usage (c) Confirmation that any air-drying system and any interbarrier and hold space purging inert gas system are satisfactory (d) Pressure control system for associated inert gas system components, means for preventing backflow of gases and monitoring system
6 Fire extinguishing arrangement	(1) In addition to the general examinations for arrangements for fire protection and fire extinction specified in <b>Chapter 11, Part N</b> , general examinations and operation tests for the following are to be carried out: (a) Proper operation of the remote means of starting one main fire pump is to be confirmed. (b) The fixed fire-fighting systems for enclosed cargo machinery spaces and enclosed cargo motor rooms located within cargo areas are to be examined. (c) The water spray system for cooling, fire protection and crew protection is to be examined. (d) The dry chemical powder fire-extinguishing system for the cargo area is to be examined. (e) The appropriate fire-extinguishing systems for the enclosed cargo machinery spaces for ships that are dedicated to the carriage of a restricted number of cargoes and the internal water spray systems for the turret compartments are to be examined. (f) It is to be confirmed that means of operation for arrangements specified in (b) to (e) are clearly marked. (g) Additional firefighters' outfits provided for flammable cargoes are to be examined. (h) Alarm devices for emergency escapes are to be examined.

Items	Examinations
7 Personnel protection	<p>(1) General examination of the equipment shown in (a) to (d) is to be carried out in addition to performance tests of decontamination shower and eye wash.</p> <p>(a) Protection equipment</p> <p>(b) Safety equipment</p> <p>(c) Stretcher and medical first-aid equipment</p> <p>(d) The following equipment if required by the provisions of <b>Part N</b>:</p> <ul style="list-style-type: none"> <li>i) respiratory protection for emergency escape purpose</li> <li>ii) decontamination showers and an eye wash</li> <li>iii) shelter in emergency</li> </ul>
8 Stability Instrument	<p>(1) Functional tests are to be carried out on stability instruments fitted in accordance with the requirements of <b>2.2.3, Part N</b>.</p>

Table B3.10 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Weather deck	<p>(1) The general condition of the following equipment shown in (a) to (d) is to be examined.</p> <p>(a) Sampling arrangements for cargoes from heating and cooling lines.</p> <p>(b) Wheelhouse doors and windows, sidescuttles and windows in superstructure and deckhouse ends facing the cargo area</p> <p>(c) Pump discharge pressure gauges provided outside the pump rooms.</p> <p>(d) Insulation of piping</p>
2 Cargo pump room and cargo handling spaces	<p>(1) General examinations of the following (a) to (f) are to be carried out. For the equipment shown in (a), operation tests are to be carried out on each.</p> <p>(a) Electrical and mechanical devices for remotely controlling cargo pumps and bilge system; and remote shut-off system</p> <p>(b) Personnel rescue arrangements in cargo pump room</p> <p>(c) Equipment for cargo separation</p> <p>(d) Ventilating system including spare fans or impellers for enclosed spaces and compartments in cargo area</p> <p>(e) System for flowback to land facilities of cargo liquid and its slop and vapour</p> <p>(f) Confirmation that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in a satisfactory condition</p>
3 Environmental control system for cargo containments and surrounding spaces	<p>(1) General examinations of the following (a) and (b) are to be carried out.</p> <p>(a) Confirmation that arrangements for sufficient gas to be carried or generated to compensate for normal losses, and that the means provided for monitoring ullage spaces, are satisfactory</p> <p>(b) Confirmation that arrangements are made for sufficient medium to be carried where drying agents are used on air inlets to cargo tanks</p>
4 Gauging, gas detecting and alarming devices	<p>(1) General examinations and performance tests of the following (a) to (d) are to be carried out. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality.</p> <p>(a) Liquid level gauges, high level alarms and valves associated with overflow control</p> <p>(b) Gauging devices for liquid level, temperature and pressure of cargo containment system and the associated alarming devices</p> <p>(c) Fixed and portable gas detecting instruments and the associate alarming devices</p> <p>i) It is to be confirmed that the required gas detection instruments are on board and arrangements have been made for the supply of the appropriate vapour detection tubes.</p> <p>(d) Gauging devices for oxygen density</p>
5 Fire extinguishing arrangement	<p>(1) In addition to the general examinations for arrangements for fire protection and fire extinction specified in <b>Chapter 11, Part S</b>, general examinations and operation tests for the following are to be carried out.</p> <p>(a) The fixed firefighting system for the cargo pump room and the deck foam system for the cargo area are to be examined.</p> <p>(b) It is to be confirmed that means of operation for arrangements specified in (a) are clearly marked.</p> <p>(c) It is to be confirmed that the condition of the portable fire extinguishing equipment for the cargoes to be carried in the cargo area is satisfactory.</p> <p>(d) Additional firefighters' outfits provided for flammable cargoes are to be examined.</p> <p>(e) Alarm devices for emergency escapes are to be examined.</p>
6 Personnel protection	<p>(1) General examination of the following equipment shown in (a) to (e) is to be carried out. Performance tests of decontamination shower and eye wash are to be carried out.</p> <p>(a) Protection equipment and its condition of stowage</p> <p>(b) Safety equipment</p> <p>(c) Stretcher and medical first-aid equipment (including oxygen resuscitation equipment and antidotes for the cargoes actually carried to be on board)</p> <p>(d) Decontamination showers and an eye wash</p> <p>(e) Where deemed necessary, respiratory protection for emergency escape purpose, eye protection and these condition of stowage</p>
7 Stability Instrument	<p>(1) Functional tests are to be carried out on stability instruments fitted in accordance with the requirements of <b>2.2.3, Part S</b>.</p>

Items	Examinations
8 Miscellaneous	<p>(1) The general condition of the equipment shown in (a) to (m) is to be examined. Regarding (c) and (m), operation tests are also to be carried out. The contents of items (k) and (l) are to be checked and confirmation that they are kept on board is to be made.</p> <p>(a) Facilities associated with damage stability requirements such as cross flooding equipment and watertight doors, as far as accessible. Where it is difficult to carry out a general examination of cross flooding equipment, alternative examinations considered appropriate by the Society may be carried out instead.</p> <p>(b) Cargo sample storage arrangements</p> <p>(c) Bow and stern loading/unloading arrangements and their related installations. (Operation of the means of communication and the remote shut down for the cargo pumps are to be examined.)</p> <p>(d) Fixed or portable trays or insulation that protects the deck located beneath the cargo hose connection against cargo leakage.</p> <p>(e) Identification marks of pipe lines including pumps and valves</p> <p>(f) Cargo tank ventilating system and means for draining its pipes</p> <p>(g) Cargo hoses</p> <p>(h) Special arrangements in accordance with the special requirements for certain cargoes</p> <p style="padding-left: 40px;">(i) Heating and cooling arrangement for cargoes</p> <p>(j) Electrical installations in gas dangerous spaces or zones.</p> <p>(k) Cargo log book, operational records and manuals related to cargo containment system and cargo handling system.</p> <p>(l) The <i>IMO Code</i> for chemical carriers or the Rules incorporating the provisions of this <i>Code</i></p> <p>(m) The arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area</p>



Table B3.11 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Fuel containment systems <sup>*1</sup>	<p>(1) The following (a) to (i) are to be carried out, so far as applicable.</p> <ul style="list-style-type: none"> <li>(a) External examination of the storage tanks including secondary barrier if fitted and accessible</li> <li>(b) General examination of the fuel storage hold place</li> <li>(c) Internal examination of tank connection space</li> <li>(d) External examination of tank and relief valves</li> <li>(e) Verification of satisfactory operation of tank monitoring system</li> <li>(f) Examination and testing of installed bilge alarms and means of drainage of the compartment</li> <li>(g) Examination of the general condition of the thermal insulation of fuel storage tanks and secondary barriers as far as accessible</li> <li>(h) Examination of the general condition of the sealing arrangements for fuel storage tanks or tank covers penetrating decks as far as accessible</li> <li>(i) At the first Annual Survey after delivery, the examinations specified in (1)(a) and (b) of item 1 and item 2 of <b>Table B5.29</b> as well as an examination of the general condition of the fuel storage tank connection to the hull are to be carried out when deemed necessary by the Surveyor.</li> </ul>
2 Pressure relief systems for fuel containment systems and fuel storage hold spaces	<p>(1) Pressure relief valves, vacuum protection systems and safety systems for fuel storage tanks, interbarrier spaces, and fuel storage hold spaces, as well as their associated protection screens and vent piping are to be examined generally as far as accessible. It is to be confirmed that records of sealing of pressure relief valves for fuel storage tanks and their pressure setting are maintained on board.</p>
3 Bunkering systems and fuel supply systems for low-flashpoint fuels <sup>*1</sup>	<p>(1) The following (a) to (c) are to be carried out, so far as applicable.</p> <ul style="list-style-type: none"> <li>(a) Examination of bunkering stations and the fuel bunkering system, including liquid level gauges, high level alarms and valves associated with emergency shutdown systems</li> <li>(b) Examination of the fuel supply system (including fuel heat exchangers, vaporizers, pumps and compressors) under its working condition as far as practicable</li> <li>(c) Examination of automatic and manual stopping devices for fuel pumps and compressors</li> </ul>
4 Fuel Handling Piping, Machinery and Equipment	<p>(1) Piping and its insulation, hoses, emergency shut-down valves, remote operating valves, relief valves, machinery and equipment for fuel storage, fuel bunkering, and fuel supply such as venting, compressing, refrigerating, liquefying, heating, cooling or otherwise handling the fuel are to be examined, as far as practicable. Stopping of pumps and compressors upon emergency shut-down of the system is to be confirmed as far as practicable.</p>
5 Control, Monitoring and Safety Systems	<p>(1) General examinations and performance testing of those specified in the following (a) to (c) are to be carried out. Simulation testing or other suitable methods may be used in cases where it is difficult to carry out testing under actual operating conditions.</p> <ul style="list-style-type: none"> <li>(a) Temperature indication equipment and associated alarms</li> <li>(b) Pressure gauges and associated alarms for fuel tanks, interbarrier spaces and fuel storage hold spaces</li> <li>(c) Oxygen content meters</li> </ul> <p>(2) The following (a) to (e) are to be carried out.</p> <ul style="list-style-type: none"> <li>(a) Gas detection equipment, including both fixed and portable instruments, and other leakage detection equipment in compartments containing fuel storage, fuel bunkering, and fuel supply equipment or components or associated systems, including indicators and alarms, is to be confirmed in satisfactory operating condition. Recalibration of the gas detection systems is to be verified in accordance with the manufacturers' recommendations.</li> <li>(b) Verification of the satisfactory operation of the control, monitoring and shutdown systems, including automatic shutdown systems, of the fuel supply and bunkering systems is to be carried out. General examinations and performance testing, simulation testing or other suitable methods in cases where it is difficult to carry out performance testing under actual operating conditions for liquid level gauges, high level alarms and valves associated with emergency shutdown systems for bunkering are to be carried out.</li> <li>(c) Testing of the remote and local closing of the installed main tank valve is to be carried out.</li> <li>(d) Testing of the remote and local closing of the master fuel valve for each engine compartment and verification of satisfactory operation of the fuel supply system control, monitoring and shut-down systems are to be carried out with the fuel supply system operating under its working condition as far as practicable.</li> </ul>

Items	Examinations
	(e) Operational test, as far as practicable, of the shutdown of <i>ESD</i> protected machinery spaces is to be carried out.
6 Environmental control systems	(1) Means for inerting specified in the following (a) to (c) is to be examined. (a) Systems for gas freeing and purging and gas sampling devices for fuel storage tanks (b) Inert gas generators and inert gas storage systems (c) Pressure control systems, means for preventing backflow of gases and monitoring systems for inert gas associated systems
7 Ventilating System	(1) Examination of the ventilation system, including portable ventilating equipment where fitted, is to be made for spaces containing fuel storage, fuel bunkering, and fuel supply units or components or associated systems, including air locks, tank connection spaces, <i>ESD</i> -protected machinery spaces, fuel preparation rooms including pump rooms and compressor rooms, fuel valve rooms, control rooms and spaces containing gas burning equipment as well as double pipes and ducts. Where alarms, such as differential pressure and loss of pressure alarms, are fitted, these should be operationally tested as far as practicable.
8 Fire-extinguishing arrangements	(1) General conditions of fire-fighting systems for enclosed hazardous areas and alarm devices for emergency escape are to be examined.
9 Other	(1) General conditions of those specified in the following (a) to (k) are to be examined. Checking the contents of items (i) to (k) and confirmation that they are maintained on board are to be carried out. (a) Closing appliances for openings such as windows and doors of the wheelhouse, deckhouses and superstructures that are required to be capable of being closed; and the arrangements for the air locks (b) Portable and fixed drip trays and insulation for the protection of the ship's structure in the event of leakage (c) Fuel preparation rooms, including fuel pump and compressor rooms, and the sealing of shafts penetrating gas-tight bulkheads (d) Means for preventing excessive cooling of hull structures (e) Approved fuel hoses (f) Electrical bonding arrangements in hazardous areas, such as those between hull structures and fuel piping or fuel storage tanks, including bonding straps where fitted (g) Equipment specially required depending upon fuel type (h) Electrical equipment and bulkhead/deck penetrations including access openings in hazardous areas <sup>*2</sup> (i) Bunker delivery notes for low-flashpoint fuel delivered as well as the operational procedures (17.2.2-3, Part GF) <sup>*3</sup> and emergency procedures (17.2.2-4, Part GF) for ships using low-flashpoint fuels (j) The <i>IMO International Code of Safety for Ships using Gases or Other Low-flashpoint Fuels</i> (k) Logbooks/Records <sup>*4</sup>

Notes:

- (\*1) Insulation need not be removed, but any deterioration or evidence of dampness is to be investigated.
- (\*2) The electrical equipment and bulkhead/deck penetrations including access openings are to be examined for continued suitability for their intended service and installation area.
- (\*3) The manufacturer/builder instructions and manuals covering the operations, safety and maintenance requirements and occupational health hazards relevant to fuel storage, fuel bunkering, and fuel supply and associated systems for the use of the fuel, are to be confirmed as being aboard the vessel.
- (\*4) The logbooks and operating records are to be examined with regard to correct functioning of the gas detection systems, fuel supply/gas systems, etc. The hours per day of the reliquefaction plant, gas combustion unit, as applicable, the boil-off rate, and nitrogen consumption (for membrane containment systems) are to be considered together with gas detection records.

Table B3.12 Special Requirements for Ships Affixed with the Notation “CybR”

Item	Examination
1 Ship cyber security and resilience program (First Annual Survey)	<p>(1) In accordance with the documents for management of change and, hardware and software modifications specified in <b>5.4.2(1)(d)iv), Part X</b>, confirm the following:</p> <ul style="list-style-type: none"> <li>(a) Vessel asset inventory is updated and completed at delivery.</li> <li>(b) Computer-based systems in the scope of applicability of this Chapter are correctly represented by the vessel asset inventory.</li> <li>(c) Software of the computer-based systems in the scope of applicability of this Chapter has been kept updated, e.g. by vulnerability scanning or by checking the software versions of computer-based systems while switched on.</li> </ul> <p>(2) In accordance with the documents for the management of security zone boundary devices specified in <b>5.4.3(1)(d)iv), Part X</b>, confirm that the zones and conduit diagram has been kept updated and security zone boundaries are managed.</p> <p>(3) In accordance with the documents for management of anti-malware specified in <b>5.4.3(3)(d)iv), Part X</b>, confirm the following:</p> <ul style="list-style-type: none"> <li>(a) Any anti-malware software has been maintained and updated.</li> <li>(b) Procedures for use of portable, mobile or removable devices have been followed.</li> <li>(c) Policies and procedures for access control have been followed.</li> <li>(d) Physical safeguards are maintained.</li> </ul> <p>(4) In accordance with the documents for the management of access and confidential information specified in <b>5.4.3(4)(d)iv), Part X</b>, confirm the following:</p> <ul style="list-style-type: none"> <li>(a) Personnel are authorized to access the computer-based systems in accordance with their responsibilities.</li> <li>(b) Only authorised devices are connected to the computer-based systems.</li> <li>(c) Visitors are given access to the computer-based systems according to relevant policies and procedures.</li> <li>(d) Physical access controls are maintained and applied.</li> </ul>

	<p>(e) Credentials, keys, secrets, certificates, relevant computer-based system documentation, and other sensitive information is managed and kept confidential according to relevant policies and procedures.</p> <p>(5) In accordance with the documents for the management of remote access and communication specified in <b>5.4.3(6)(d)iv), Part X</b>, confirm the following:</p> <p>(a) Remote access sessions have been recorded or logged and carried out as per relevant policies and user manuals.</p> <p>(b) Installation of security patches and other software updates have been carried out in accordance with Management of change procedures and in cooperation with the supplier.</p> <p>(6) In accordance with the documents for the management of mobile and portable devices specified in <b>5.4.3(7)(d)iv), Part X</b>, confirm the following:</p> <p>(a) The use of mobile, portable or removable media is restricted to authorised personnel and follows relevant policies and procedures.</p> <p>(b) Only authorized devices are connected to the computer-based systems.</p> <p>(c) Means to restrict use of physical interface ports are implemented as per approved design documentation.</p> <p>(7) In accordance with the documents for the management activities to detect anomalies in the computer-based systems and networks specified in <b>5.4.4(1)(d)iv), Part X</b>, confirm that the computer-based systems are routinely monitored for anomalies by inspection of security audit records and investigation of alerts in the computer-based systems.</p> <p>(8) In accordance with the documents for the management activities to verify correct operation of the security functions in the computer-based systems and networks specified in <b>5.4.4(2)(d)iv), Part X</b>, confirm that the security functions in the computer-based systems are periodically tested or verified.</p> <p>(9) In accordance with incident response plans specified in <b>5.4.5(1)(d)iv), Part X</b>, confirm the following:</p> <p>(a) The incident response plans are available for the responsible personnel onboard.</p>
	<p>(b) Procedures or instructions for local/manual controls are available for responsible personnel onboard.</p> <p>(c) Procedures or instructions for disconnection/isolation of security zones are available for responsible personnel onboard.</p> <p>(d) Any cyber incidents have been responded to in accordance with the incident response plans.</p> <p>(10) In accordance with incident recovery plans specified in <b>5.4.6(1)(d)iv), Part X</b>, confirm the following:</p> <p>(a) Instructions and/or procedures for incident recovery are available for the responsible personnel onboard.</p> <p>(b) Equipment, tools, documentation, and/or necessary software and data needed for recovery is available for the responsible personnel onboard.</p> <p>(c) Backup of the computer-based systems have been taken in accordance with the policies and procedures.</p> <p>(d) Manuals and procedures for shutdown, reset, restore and restart are available for the responsible personnel onboard.</p>
<b>2</b> Ship cyber security and resilience program (Subsequent Annual Survey)	<p>(1) In accordance with presenting records or other documented evidence described in the Ship cyber security and resilience program specified in <b>-1</b> above, confirm the implementation of the program upon request by the Society.</p>

## Chapter 4 INTERMEDIATE SURVEYS

### 4.1 General

#### 4.1.1 Surveys Equivalent to Special Surveys\*

1 Surveys equivalent to Special Surveys may be required when considered necessary by the Society, based on the service and repair history of the ship or damages history of similar ship types or ships with similar tanks and spaces.

2 Intermediate Surveys for bulk carriers, oil tankers, and ships carrying dangerous chemicals in bulk with integral tanks over 10 years of age and general dry cargo ships of not less than 500 *gross tonnage* over 15 years of age are to be carried out to the extent of the previous Special Survey. That is, the surveys specified in 4.2.2, 4.2.4, 4.2.5 and 4.2.6 are replaced by 5.2.2, 5.2.4, 5.2.5 and 5.2.6 (except -8) respectively; and the surveys specified in 5.2.3-2(3), (5) and Docking Surveys (except item 7 specified in Table B6.1) are to be carried out. However, the following (1) to (3) do not need to be carried out:

- (1) Internal examinations of fuel oil, lube oil and fresh water tanks;
- (2) Examinations (both external and internal) of automatic air pipe heads installed on the exposed deck and the ventilators and closing appliances for machinery and cargo spaces; and
- (3) Thickness measurements of each bottom plate within the cargo length area including lower turn of bilge for general dry cargo ships of not less than 500 *gross tonnage* over 15 years of age.

3 Where the Intermediate Survey is commenced in accordance with the requirements in 1.1.3-1(2)(b), the thickness measurement required in 5.2.6 is to be carried out at the commencement of the Survey in order to facilitate planning repairs, as far as practicable. Where the Intermediate Survey is commenced at the time of an Annual Surveys, at a minimum the examinations required in Chapter 3 are to be carried out.

4 Where the Intermediate Survey is commenced at any time between the second and third Annual Surveys and is completed at the third Annual Survey in accordance with the requirements in 1.1.3-1(2)(b), at a minimum the examinations required in Chapter 3 are to be carried out at the completion of the Intermediate Survey. However, the Surveyor may, based upon the above results, require examinations already carried out to be conducted again when deemed necessary.

#### 4.1.2 Survey for Combination Carriers

At Intermediate Surveys for combination carriers such as ore/oil carriers and ore/bulk/oil carriers, the surveys are to be carried out in accordance with the relevant requirements in this Chapter, considering the ship's equipment, structural configuration and past operational experience.

#### 4.1.3 Survey Results\*

Regardless of when Intermediate Surveys and Special Surveys are carried out, the results of surveys and thickness measurements of spaces carried out for Intermediate Surveys are not to be used as the results for Special Surveys and the results of surveys and thickness measurements of spaces carried out for Special Surveys are not to be used as the results for Intermediate Surveys.

### 4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings

#### 4.2.1 Examination of Plans and Documents\*

1 At Intermediate Surveys, the management conditions of plans and documents specified in 3.2.1 are to be examined.

2 For ships subject to SOLAS Chapter II-1 Regulation 3-10, the Ship Construction File in 2.1.5-2 are to be examined in accordance with (1) to (5) below:

- (1) For a Ship Construction File stored on board a ship, the Surveyor is to examine the information included in it on board the ship.
- (2) For a Ship Construction File stored in an onshore archive, the Surveyor is to examine the list of information included in it stored in the onshore archive.
- (3) The Surveyor is to confirm upon completion of the survey that the Ship Construction File has been updated whenever any modification of the documentation included in it has taken place.
- (4) The Surveyor is to confirm upon completion of the survey that any addition and/or renewal of materials used for the construction

of the hull structure are documented within the list of materials specified in item 85, [Table B2.1](#).

- (5) The Surveyor is to confirm that the Ship Construction File is available to the Society and the flag state throughout the ship's life.

#### **4.2.2 General Examination\***

At Intermediate Surveys, examinations of hull, equipment, fire-extinction and fittings specified in [3.2.2](#) are to be carried out. In addition, examinations specified in the following (1) and (2) are to be carried out.

- (1) General examinations of the spare parts of extinguishing systems
- (2) Visual examinations or examinations considered appropriate by the Society of cross flooding equipment

#### **4.2.3 Performance Tests\***

At Intermediate Surveys, performance tests listed in [Table B4.1](#) are to be carried out.

#### **4.2.4 Internal Examinations of Spaces and Tanks\***

At Intermediate Surveys, internal examinations of the areas listed in [Table B4.2](#) and suspect areas identified in the previous survey are to be carried out. However, assessment of the coating condition of ballast tanks for oil tankers and ships carrying dangerous chemicals in bulk with integral tanks is as defined by the Society.

#### **4.2.5 Close-up Surveys**

- 1 At Intermediate Surveys, close-up surveys listed in [Table B4.3](#) are to be carried out.
- 2 Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor.
- 3 When thickness measurements of structures subject to close-up surveys using RIT are required, temporary means of access for the corresponding thickness measurements is to be provided unless such remote inspection techniques are also able to carry out the required thickness measurements.

#### **4.2.6 Thickness Measurements**

- 1 At Intermediate Surveys, thickness measurements of the area listed in (1) to (3) below are to be carried out. As to the gauging equipment and thickness measurement report, the provisions of [5.2.6-1](#) are to be applied correspondingly as well.
  - (1) Structural members, etc. listed in [Table B4.4](#)
  - (2) Suspect areas identified in the previous survey where deemed necessary by the Surveyor as a consequence of internal examination of spaces and tanks specified in [4.2.4](#).
  - (3) Substantial corrosion areas identified in the previous survey
- 2 For structures built with materials other than steel, alternative thickness measurement requirements may be developed and applied as deemed necessary by the Society.

#### **4.2.7 Pressure Test**

At Intermediate Surveys for oil tankers and ships carrying dangerous chemicals in bulk, a pressure test, a thickness gauging or both for piping systems are to be carried out when deemed necessary by the Surveyor as a consequence of the general examination required in [4.2.2](#).

#### **4.2.8 Alternative Design and Arrangements**

For ships subject to *SOLAS Chapter II-2 Regulation 17*, alternative design and arrangements for fire safety are to be examined in accordance with the test, inspection and maintenance requirements, if any, specified in the relevant approval documents.

### **4.3 Intermediate Surveys for Machinery**

#### **4.3.1 General Examinations\***

At Intermediate Surveys for Machinery, in addition to the general examinations and inspections specified in [3.3.1](#), the examinations specified in [Table B4.5](#) are to be carried out.

#### **4.3.2 Performance Tests**

At Intermediate Surveys for Machinery, the performance tests specified in [3.3.2](#) are to be carried out.

#### **4.3.3 Alternative Design and Arrangements**

For ships subject to *SOLAS Chapter II-1 Regulation 55*, alternative design and arrangements for machinery, or electrical installations, or low-flashpoint fuel storage and distribution systems are to be examined in accordance with the test, inspection and

maintenance requirements, if any, specified in the relevant approval documents.

#### **4.3.4 Surveys of Water Jet Propulsion Systems, etc.**

For ships fitted with water jet propulsion systems or azimuth thrusters, the surveys are to be carried out in accordance with [3.3.4-1](#) and [-2](#) respectively.

#### **4.3.5 Surveys of Selective Catalytic Reduction (SCR) Systems, etc.**

For ships fitted with selective catalytic reduction (SCR) systems, exhaust gas cleaning systems or exhaust gas recirculation systems, the surveys are to be carried out in accordance with [3.3.5-1](#), [-2](#) and [-3](#) respectively.

### **4.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk**

#### **4.4.1 General**

In addition to the requirements of [4.2](#) and [4.3](#), requirements of [4.4](#) apply to Intermediate Surveys for ships carrying liquefied gases in bulk. Examinations of inerted cargo tanks or spaces may be omitted at the discretion of the Surveyor.

#### **4.4.2 Examinations\***

At Intermediate Surveys for ships carrying liquefied gases in bulk, examinations of spaces, structures and equipment specified in [Table B4.6](#) are to be carried out in addition to examinations required in [3.4.2](#). The survey may be expanded to include performance tests, operation tests, open-up examinations, etc. where deemed necessary by the Surveyor.

### **4.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk**

#### **4.5.1 General**

In addition to the requirements of [4.2](#) and [4.3](#), requirements of [4.5](#) apply to Intermediate Surveys of ships carrying dangerous chemicals in bulk.

#### **4.5.2 Examinations\***

At Intermediate Surveys of ships carrying dangerous chemicals in bulk, examinations of spaces, structures and equipment specified in [Table B4.7](#) are to be carried out in addition to examinations required in [3.5.2](#). The survey may be expanded to include performance tests, operation tests, open-up examinations, etc. where deemed necessary by the Surveyor.

### **4.6 Special Requirements for Ships Using Low-flashpoint Fuels**

#### **4.6.1 General\***

In addition to the applicable requirements of the previous sections, the requirements of [4.6](#) are to be applied at Intermediate Surveys of ships using low-flashpoint fuels.

#### **4.6.2 Examinations\***

At Intermediate Surveys of ships using low-flashpoint fuels, the examinations of structures and facilities, etc. specified in [Table B4.8](#) are to be carried out in order to ascertain them being in good order, in addition to the examinations specified in [3.6.2](#).

### **4.7 Special Requirements for Bulk Carriers and Oil Tankers**

#### **4.7.1 General**

In addition to the requirements of [4.2](#) and [4.3](#), the requirements of [4.7](#) apply to the Intermediate Surveys of bulk carriers and oil tankers subject to *SOLAS Chapter II-1 Regulation 3-10*.

#### **4.7.2 Surveys**

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship's structure, taking into account areas identified in the Ship Construction File as needing special attention.

#### **4.8 Special Requirements for Ships Affixed with the Notation “HCM” or “HCM-GBS”**

##### **4.8.1 General**

In addition to the requirements of 4.2 and 4.3, the requirements of 4.8 apply to the Annual Surveys of ships affixed with the notation “HCM” or “HCM-GBS”.

##### **4.8.2 Surveys**

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship’s structure, taking into account areas subject to construction monitoring survey.

#### **4.9 Special Requirements for Ships Affixed with the Notation “CybR”**

##### **4.9.1 General**

In addition to the requirements of 4.2 to 4.3, the requirements of 4.9 apply to the Intermediate Surveys of ships affixed with the notation “CybR”.

##### **4.9.2 Surveys**

At Intermediate Surveys of ships affixed with the notation “CybR”, the examinations specified in 3.9.2 are to be carried out.



Table B4.1 Performance Test

Items	Tests
1 Equipment or installations of items in <b>Table B3.3</b> (except item 2)	(1) Tests for each item specified in <b>Table B3.3</b> are to be carried out.
2 Doors on watertight bulkheads and closing appliances on superstructure end bulkheads, deckhouses or companions protecting hatchways giving access to spaces below freeboard deck	(1) Confirmation that the doors and closing appliances work in order is to be made. (2) Hose tests or equivalent tests are to be carried out. Such tests may be dispensed with at the discretion of the Surveyor.
3 Drainage, mooring and anchoring arrangements and their accessories	(1) Confirmation that the arrangements work in order is to be made. This check may be dispensed with at the discretion of the Surveyor.
4 Fixed dry-chemical powder fire fighting system	(1) Confirmation that the piping is maintained in good condition is made by delivering air through the pipes. Confirmation that monitors and hoses, and the remote control system and related automatic valves work in order is to be made. (2) Confirmation of quantity of starting or pressuring gases is to be made.
5 Water spray system	(1) Checking whether the system works in order is to be made by delivering water through the system. Checking of quantity of delivered water may be dispensed with.
6 Carbon dioxide extinguishing medium, halon extinguishing medium and dry chemical powder extinguishing medium	(1) Confirmation of quantity of media is to be made.
7 Fixed carbon dioxide fire fighting system and fixed halon fire fighting system	(1) Confirmation that piping is maintained in good condition is made by delivering air through the pipes. (2) Confirmation that system alarm works in order is to be made.
8 Fixed foam fire fighting system and fixed high expansion foam fire fighting system	(1) Confirmation that piping is maintained in good condition is to be carried out by delivering water through the pipes.
9 Fixed pressure water spraying fire fighting system	(1) Confirmation that the system works in order is to be made by delivering water through the system. (2) Confirmation that the system pump works in order is to be made.
10 Automatic sprinkler system	(1) Confirmation that the delivery alarm and pump work in order is to be made while fire detecting system is in operation.
11 Fixed Local Application Fire-fighting Systems	(1) Confirmation that the piping is to be made by delivering air through pipes. (2) Confirmation that the system alarm works in order is to be made. (3) Confirmation that the feed water pump and starting valve works in order is to be made.
12 Closing appliances of openings related to fire fighting in way of cargo holds	(1) Confirmation that closing appliances work in order is to be made.
Additional Requirements for Bulk Carriers	
13 Mechanically operated hatch covers	(1) Confirmation that hatch cover sets within the forward $0.25L_F$ and at least one additional set work in good order is to be carried out. The method is to be in a way that ensures all sets on the ship are checked at least once every 5 years between special surveys. (2) Confirmation that all hatch covers work in good order is to be carried out for ships over 10 years of age.
14 Weathertight hatch covers	(1) Hose tests or equivalent, for all hatch covers for ships over 10 years of age.
15 Water level detection and alarm systems	(1) Confirmation that the systems work in order is to be made for ships over 10 years of age.

Table B4.2 Internal Examinations of Spaces and Tanks

Items	Examinations
Requirements for cargo ships unless specified otherwise	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	(1) An internal examination is to be carried out after thoroughly cleaned out and gas freed. Attention is to be paid to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	<p>(1) For ships over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of representative ballast tanks is to be carried out. Where poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.</p> <p>(2) For ships over 10 <i>years</i> of age, an internal examination of all ballast tanks is to be carried out.</p> <p>(3) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.</p> <p>(4) For ballast tanks where a protective coating is found in poor condition, and it is not renewed or where a protective coating has not been applied, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks in this condition, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.</p>
4 Cargo holds	<p>(1) For cargo ships over 10 <i>years</i> of age, excluding ships solely carrying dry cargoes, an internal examination of selected cargo holds is to be carried out.</p> <p>(2) For ships over 15 <i>years</i> of age, an internal examination of one forward cargo hold and one after cargo hold is to be carried out.</p>
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	(1) An internal examination is to be carried out after thoroughly cleaned out and gas freed. Attention is to be paid to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	<p>(1) For Oil Tankers and Ships Carrying Dangerous Chemicals in bulk:</p> <p>(a) For oil tankers and ships carrying dangerous chemicals in bulk over 5 <i>years</i> of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.</p> <p>(b) For oil tankers and ships carrying dangerous chemicals in bulk over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of representative ballast tanks is to be carried out. For oil tankers except Double hull oil tankers, an internal examination of all ballast tanks is to be carried out.</p> <p>(c) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.</p> <p>(d) Where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.</p> <p>(e) As a result of internal examinations, ballast tanks with conditions shown in i) to iii) require an internal examination to be carried out at annual intervals.</p> <p>i) The protective coating is found to be in less than GOOD condition and it is not repaired to the satisfaction of the Surveyor</p> <p>ii) The protective coating has not been applied from the time of construction or only the soft coating has been applied (the examination is to be extended to other ballast tanks of the same type)</p> <p>iii) Substantial corrosion is found within the tanks</p>

Items	Examinations
	<p>(2) For Ships Carrying Liquefied Gases in bulk:</p> <p>(a) For ships over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of representative ballast tanks is to be carried out.</p> <p>(b) For ships over 10 <i>years</i> of age, an internal examination of all ballast tanks is to be carried out.</p> <p>(c) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.</p> <p>(d) For ballast tanks where a protective coating is found in poor condition, and it is not renewed or where a protective coating has not been applied, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks with the condition as specified, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.</p>
<b>Requirements for Bulk Carriers</b>	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Ballast tanks	<p>(1) For bulk carriers over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of representative ballast tanks and combined cargo/ballast tanks, if any, is to be carried out. Where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.</p> <p>(2) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.</p> <p>(3) For ballast tanks where a protective coating is found in less than good condition, and it is not renewed or where a protective coating has not been applied from the time of construction, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks in this condition, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.</p>
3 Cargo holds	(1) For bulk carriers over 5 <i>years</i> of age, an internal examination of all cargo holds is to be carried out.
<b>Requirements for General Dry Cargo Ships of not less than 500 gross tonnage</b>	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Ballast tanks	(1) Same as those for cargo ships
3 Cargo holds	<p>(1) For general dry cargo ships over 5 <i>years</i> and up to 10 <i>years</i> of age, an internal examination of one forward and one after cargo hold (all cargo holds for ships carrying timber cargoes) and their associated tween deck spaces is to be carried out.</p> <p>(2) For general dry cargo ships over 10 <i>years</i> of age, an internal examination of all cargo holds and their associated tween deck spaces is to be carried out.</p>

Note:

- (1) "Representative ballast tanks" means ballast tanks which include, at least, fore and aft peak tanks and two (for double hull oil tankers and double skin bulk carriers, three) deep tanks within the cargo length area.

Table B4.3 Close-up Surveys

Items	Examinations
Requirements for Cargo Ships except when specified otherwise	
1 Bow doors, inner doors, side shell doors and stern doors	(1) Close-up surveys of securing, supporting and locking devices, together with welded parts, are to be carried out.
Requirements for Ships Carrying Liquefied Gases in bulk	
1 Ballast tanks	<p>(1) For ships over 10 <i>years</i> of age and up to 15 <i>years</i> of age, close-up surveys of the following portions are to be carried out:</p> <p>(a) All web frames*<sup>1</sup> and both transverse bulkheads*<sup>2</sup> in a representative ballast tank</p> <p>(b) The upper part of one web frame and one transverse bulkhead*<sup>2</sup> in another representative ballast tank</p> <p>(2) For ships over 15 <i>years</i> of age, close-up surveys of all web frames*<sup>1</sup> and both transverse bulkheads*<sup>2</sup> in two representative ballast tanks are to be carried out.</p> <p>(3) Notwithstanding the above, for ships having independent tanks of type <i>C</i>, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating at the discretion of the Surveyor.</p>
Requirements for Bulk Carriers other than Double Skin Bulk Carriers* <sup>3</sup>	
1 Hatch covers and hatch coamings	(1) A close-up survey of all hatch cover plating and all hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds 1 Hold frames including their upper and lower end attachments, adjacent shell plating	<p>(1) For ships over 5 <i>years</i> of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out to establish the condition of shell frames including their upper and lower end attachments and adjacent shell plating in the forward cargo hold and one other selected cargo hold. Where considered necessary by the Surveyor as a result of the internal examination and close-up survey, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) of all remaining cargo holds.</p> <p>(2) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.</p>
2 Transverse bulkheads	<p>(1) For ships over 5 <i>years</i> of age, a close-up survey is to be carried out to establish the condition of transverse bulkheads in the forward cargo hold and one other selected cargo hold.</p> <p>(2) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.</p>
3 Other structural members	<p>(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.</p> <p>(2) Where considered necessary by the Surveyor as a result of the internal examination required in <a href="#">Table B4.2</a>, a close-up survey is to be carried out.</p>
3 Ballast tanks	(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.
Requirements for Double Skin Bulk Carriers	
1 Hatch covers and hatch coamings	(1) A close-up survey of all hatch cover plating and all hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	(1) Where considered necessary by the Surveyor as a result of the internal examination required in <a href="#">Table B4.2</a> , a close-up survey is to be carried out.
3 Ballast tanks	(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.
Requirements for General Dry Cargo Ships of not less than 500 <i>gross tonnage</i>	
1 Hatch covers and hatch coamings	(1) A close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	

Items	Examinations
1 Lower part of shell frames and their lower end brackets	(1) For ships carrying timber cargoes over 5 <i>years</i> of age, a close-up survey of structures listed in the left column is to be carried out in all cargo holds.
2 Lower parts of transverse bulkheads	
3 Lower parts (located on inner bottom plating) of pipes that pass through cargo holds such as air pipes, sounding pipes, etc.	

## Notes:

- \*1: Including structural members adjacent to cross ties and/or transverse web frame rings, such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets.
- \*2: Including vertical and horizontal girders and adjacent structural members, and adjacent longitudinal bulkhead structure.
- \*3: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B4.4 Thickness Measurements

Items	Note
Requirements for Cargo Ships except those specified in the followings	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in 4.2.2, thickness measurements are to be carried out.
2 Structural members in ballast tanks	For cargo ships over 5 years of age (1) Where considered necessary by the Surveyor as a result of the survey specified in Table B4.2, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. (2) Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of 5.2.6-2.
3 Bow doors, inner doors, side shell doors and stern doors	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in 4.2.2, thickness measurements are to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in 4.2.2, thickness measurements are to be carried out.
2 Structural members in ballast tanks (for ships over 5 years of age)	(1) Where considered necessary by the Surveyor as a result of the survey specified in Table B4.2, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. (2) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of 5.2.6-3 or -4.
3 Structural members in cargo tanks	(1) For ships over 5 years of age (excluding ships carrying liquefied gases in bulk), if the results of thickness measurements specified in 4.2.6 indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of 5.2.6-3 or -4.

Items	Note
Requirements for the Bulk Carriers over 5 years of age	
1 Structural members in ballast tanks	<p>(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out.</p> <p>(2) Where considered necessary by the Surveyor as a result of the survey specified in <a href="#">Table B4.2</a>, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction.</p> <p>(3) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of <a href="#">5.2.6-5</a>.</p> <p>(4) In addition to the above, for bulk carriers built under <a href="#">Part CSR-B</a> or <a href="#">Part CSR-B&amp;T</a>, identified substantial corrosion areas are to be in accordance with either the following (a) or (b):</p> <p>(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or,</p> <p>(b) Have thickness measurements taken annually</p>
2 Hatch covers and hatch coamings	<p>(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out.</p> <p>(2) Where considered necessary by the Surveyor as a result of the close-up survey of the bulk carriers specified in <a href="#">Table B4.3</a>, thickness measurements are to be carried out at the discretion of the Surveyor. If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of <a href="#">5.2.6-5</a>.</p> <p>(3) In addition to the above, for bulk carriers built under <a href="#">Part CSR-B</a> or <a href="#">Part CSR-B&amp;T</a>, identified substantial corrosion areas are to be in accordance with either the following (a) or (b):</p> <p>(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or,</p> <p>(b) Have thickness measurements taken annually</p>
3 Structural members in cargo holds	<p>(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out.</p> <p>(2) Thickness measurements are to be carried out to an extent that determines both general and local corrosion levels at the area subject to close-up survey.</p> <p>(3) The thickness measurements may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating provided the Surveyor is satisfied by the results of the close-up survey: that there is no structural diminution and the protective coating is found to be in a good condition.</p> <p>(4) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of <a href="#">5.2.6-5</a>.</p> <p>(5) In addition to the above, for bulk carriers built under <a href="#">Part CSR-B</a> or <a href="#">Part CSR-B&amp;T</a>, identified substantial corrosion areas are to be in accordance with either the following (a) or (b):</p> <p>(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or,</p> <p>(b) Have thickness measurements taken annually</p>

Items	Note
Requirements for General Dry Cargo Ships of not less than 500 <i>gross tonnage</i>	
1 Structural members in ballast tanks	<p>(1) Where considered necessary by the Surveyor as a result of the survey specified in <a href="#">Table B4.2</a>, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction.</p> <p>(2) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of <a href="#">5.2.6-6</a>.</p>
2 Hatch covers and hatch coamings	<p>(1) When deemed necessary by the Surveyor as a consequence of the close-up survey required in <a href="#">Table B4.3</a>, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of <a href="#">5.2.6-6</a>.</p>
3 Structural members in cargo holds	<p>(1) For ships carrying timber cargoes over 5 <i>years</i> of age</p> <p>(a) Thickness measurements of structural members that were subject to close-up survey in all cargo holds is to be carried out to the same extent as the previous Special Survey.</p> <p>(b) The thickness measurements may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating provided the Surveyor is satisfied by the results of the close-up survey: that there is no structural diminution and the protective coating remains effective.</p> <p>(2) For general dry cargo ships over 10 <i>years</i> of age (excluding ships carrying timber cargoes)</p> <p>(a) When deemed necessary by the Surveyor as a consequence of the internal examination required in <a href="#">Table B4.2</a>, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of <a href="#">5.2.6-6</a>.</p>

Table B4.5 Additional Requirements at Intermediate Surveys

Items	Examinations
1 Refrigerating Machinery	<p>(1) Examination of refrigerant leakage while the machinery is in operation and the general condition of the safety devices are to be carried out.</p>
Requirements for Tankers	
1 Electrical installations in hazardous areas	<p>(1) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in <a href="#">4.2.7, Part H</a> is to be carried out. In addition, confirmation that the installations are in good condition is to be made by measuring the insulation resistance. However, this measurement may be omitted at the discretion of the Surveyor, if accurate measurement records of the insulation resistance can be verified.</p> <p>(2) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out.</p>



Table B4.6 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations
1 Piping of fixed gas detecting instruments	(1) General examination is to be carried out.
2 Cargo tank pressure relief valves with non-metallic membranes	(1) If the cargo tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, it is to be confirmed that such non-metallic membranes are maintained in good condition.
3 Electrical installations in hazardous areas	(1) Examinations for tankers of <a href="#">Table B4.5</a> are to be carried out.
4 Drainage system for leaked cargo	(1) Performance test of drainage system for leaked cargo in interbarrier spaces and hold spaces is to be carried out.
5 Fire fighting system in enclosed gas dangerous spaces	(1) Fixed piping is to be tested by passing air through it. Performance test of alarming devices for emergency escape is to be carried out.
6 Personnel Protection	(1) Where air compressors are used with the safety equipment, performance tests of the air compressors are to be carried out.

Table B4.7 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Electrical installations in hazardous areas	(1) Examinations for tankers of <a href="#">Table B4.5</a> are to be carried out.
2 Fire fighting system in enclosed gas dangerous spaces	(1) Fixed piping is to be tested by passing air through it. Performance test of alarming devices for emergency escape is to be carried out.
3 Personnel Protection	(1) Where air compressors are used with the safety equipment, performance tests of the air compressors are to be carried out.

Table B4.8 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Piping of gas detection systems	(1) General examinations are to be carried out.
2 Fuel storage tank pressure relief valves with non-metallic membranes	(1) In cases where fuel storage tank relief valves with non-metallic membranes are main or pilot valves, it is to be confirmed that such non-metallic membranes are maintained in good condition.
3 Electrical installations in hazardous areas	(1) Examinations for tankers of <a href="#">Table B4.5</a> are to be carried out.
4 Bilge systems for interbarrier spaces, fuel storage hold spaces and tank connection spaces	(1) Performance testing of bilge systems is to be carried out.
5 Fire-fighting system in enclosed hazardous areas	(1) Fixed piping is to be tested by passing air through it.
6 Safety Systems	(1) Gas detectors, temperature sensors, pressure sensors, level indicators, and other equipment providing input to the fuel safety system are to be randomly tested to confirm satisfactory operating condition. Proper response of the fuel safety system upon fault conditions is to be verified.

## Chapter 5 SPECIAL SURVEYS

### 5.1 General

#### 5.1.1 Examinations to be Carried Out at the Commencement or Completion of Special Surveys

1 Where the Special Survey is commenced in accordance with the requirements in [1.1.3-1\(3\)\(b\)](#) or [1.1.4-3](#), the thickness measurements required in [5.2.6](#) are to be carried out at the commencement of the Survey if possible in order to facilitate planning repairs. Where the Special Survey is commenced at or prior to the time of the 4th Annual Survey, at a minimum the examinations required in [Chapter 3](#) are to be carried out.

2 Where the Special Surveys is completed in accordance with the requirements in [1.1.3-1\(3\)\(b\)](#) or [1.1.4-3](#), at a minimum the examinations required in [Chapter 3](#) are to be carried out at the completion of the Special Survey. However, the Surveyor may, based upon the above results, require examinations already carried out to be conducted again when deemed necessary.

#### 5.1.2 Survey for Combination Carriers

At Special Surveys for combination carriers such as ore/oil carriers and ore/bulk/oil carriers, the surveys are to be carried out in accordance with the relevant requirements in this Chapter, considering the ship's equipment, structural configuration and past operational experience.

#### 5.1.3 Survey for the Postponement of Special Surveys

Where postponement of the Special Survey for a ship is granted in accordance with the requirements in [1.1.5](#), the content of the Special Survey is determined based on the original expiry date of the Classification Certificate of the ship.

#### 5.1.4 Survey Results\*

Regardless of when Intermediate Surveys and Special Surveys are carried out, the results of surveys and thickness measurements of spaces carried out for Intermediate Surveys are not to be used as the results for Special Surveys and the results of surveys and thickness measurements of spaces carried out for Special Surveys are not to be used as the results for Intermediate Surveys.

### 5.2 Special Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings

#### 5.2.1 Examination of Plans and Documents\*

1 At Special Surveys, the management conditions of plans and documents specified in [3.2.1](#) are to be examined.

2 For ships subject to *SOLAS Chapter II-1 Regulation 3-10*, the Ship Construction File in [2.1.5-2](#) are to be examined in accordance with (1) to (5) below:

- (1) For a Ship Construction File stored on board a ship, the Surveyor is to examine the information included in it on board the ship.
- (2) For a Ship Construction File stored in an onshore archive, the Surveyor is to examine the list of information included in it stored in the onshore archive.
- (3) The Surveyor is to confirm upon completion of the survey that the Ship Construction File has been updated whenever any modification of the documentation included in it has taken place.
- (4) The Surveyor is to confirm upon completion of the survey that any addition and/or renewal of materials used for the construction of the hull structure are documented within the list of materials specified in item 85, [Table B2.1](#).
- (5) The Surveyor is to confirm that the Ship Construction File is available to the Society and the flag state throughout the ship's life.

#### 5.2.2 General Examination\*

1 At Special Surveys, items (1) to (4) below in addition to hull, equipment, fire-extinction, and fittings specified in [4.2.2](#) are to be examined carefully.

- (1) All bilge and ballast piping systems
- (2) Automatic air pipe heads which are located on exposed decks as well as the ventilators and closing appliances of machinery and cargo spaces
- (3) For ships having bow doors, inner doors, side shell doors and stern doors, the surveys specified in (a) and (b) below are to be

carried out.

- (a) Clearance measurements of hinges, bearings and thrust bearings are to be taken. Unless otherwise specified in the Operating and Maintenance Manual or by manufacturer recommendation, such clearance measurements may be limited to representative bearings in cases where dismantling is necessary in order to perform such measurements. If dismantling is carried out, a visual examination of hinge pins and bearings together with non-destructive testing of the hinge pin is to be carried out.
- (b) The non-return valves of the drainage system are to be dismantled and examined.
- (4) For watertight cable penetrations, the surveys specified in (a) to (c) below are to be carried out.
  - (a) All watertight cable penetrations are to be examined to confirm their satisfactory condition.
  - (b) The results of surveys are to be recorded in the watertight cable penetration register and the register is to be kept on board.
  - (c) Firms approved by the Society under the “**Rules for Approval of Manufacturers and Service Suppliers**” may carry out inspections of watertight cable penetrations in cases where special consideration is given by the attending surveyor. The attending surveyor is to review the watertight cable penetration register which is recorded by the firm.

2 At Special Surveys for tankers and ships carrying dangerous chemicals in bulk, in addition to -1, cargo piping, vent piping, purging piping, gas free piping, inert gas piping and all other piping systems within all cargo tanks, all ballast tanks and all tanks and spaces bounding cargo tanks such as pump rooms, pipe tunnels, cofferdams, and void spaces and on weather decks are to be examined.

3 At Special Surveys for ships carrying liquefied gases in bulk, in addition to -1, cargo piping, vent piping, purging piping, gas free piping, inert gas piping and all other piping systems within all cargo tanks, all ballast tanks and all tanks and spaces bounding cargo tanks such as pump rooms, cargo compressor rooms, pipe tunnels, cofferdams, and void spaces and on weather decks are to be examined.

4 At Special Surveys for bulk carriers and general dry cargo ships of not less than 500 *gross tonnage*, in addition to -1, all piping systems within all cargo holds, all ballast tanks, and all tanks and spaces bounding cargo holds such as pipe tunnels, cofferdams and void spaces, and on the weather deck are to be examined.

5 At Special Surveys for container carriers using extremely thick steel plates which comply with 10.5, Part 2-1, Part C, in addition to -1, the block-to-block butt joints of strength decks, hatch side coamings (including top plates and attached longitudinal stiffeners), sheer strakes, and the topmost strakes of inner hulls and bulkheads (only one strake adjacent to strength decks) are to be examined from both sides as far as practicable. Furthermore, additional non-destructive inspections may be required based upon the results of such examination when deemed necessary by the attending surveyor.

### 5.2.3 Performance Test\*

1 At Special Surveys, performance tests specified in 4.2.3 are to be carried out. In addition to such performance tests, it is to be confirmed that the loading instrument required in 3.8.1.1, Part 1, 3.2.2.1, Part 2-2 and 3.2.2.1, Part 2-3, Part C works in order. Moreover, the performance tests for mooring and anchoring arrangements specified in item 3 of Table B4.1 may not be omitted.

2 In addition to -1 above, the performance tests and operation tests specified in (1) to (10) below are to be carried out.

- (1) Operation test for all mechanically operated hatch covers, including the testing of all hydraulic and power components, wires, chains and link drives
- (2) Hose tests or equivalent, for all weathertight hatch covers
- (3) Performance tests and operation tests for all bilge and ballast piping system
- (4) Hose tests or equivalent, for all bow doors, inner doors, side shell doors and stern doors
- (5) The hose tests or equivalent tests, for the doors of watertight bulkheads and the closing appliances of superstructure end bulkheads, deckhouses or companions protecting hatchways giving access to spaces below freeboard deck
- (6) For oil tankers and ships carrying dangerous chemical in bulk, performance tests and operation tests of cargo and ballast piping systems within all cargo tanks, all ballast tanks and all tanks and spaces bounding cargo tanks such as pump rooms, pipe tunnels, cofferdams and void spaces, and on the weather deck
- (7) For ships carrying liquefied gases in bulk, performance test and operation test of cargo and ballast piping systems within all cargo tanks, all ballast tanks and all tanks and spaces bounding cargo tanks such as pump rooms, cargo compressor rooms, pipe tunnels, cofferdams and void spaces, and on weather deck
- (8) For bulk carriers and general dry cargo ships of 500 *gross tonnage*, performance test and operation test of all piping systems within cargo holds, all ballast tanks and all tanks and spaces bounding cargo holds such as pipe tunnels, cofferdams, void spaces,

and other similar spaces bounding cargo holds, and those on weather decks

(9) Performance tests listed in item 1 of **Table B4.1**, for all water level detection and alarm systems.

(10) Performance test for the means of embarkation and disembarkation, for ships not less than 500 *gross tonnage* which are engaged on international voyages.

3 Where considered necessary by the Surveyor, an execution of the inclining test and alterations to the stability information may be required.

#### **5.2.4 Internal Examinations of Spaces and Tanks\***

1 At Special Surveys, examinations of structures and fittings such as piping in tanks and spaces are to be carried out carefully paying due attention to items (1) through (7) below.

- (1) Areas sensitive to corrosion (on parts such as structural members, piping, and hatch covers) in cargo holds where cargoes highly corrosive to steel such as logs, salt, coal, and sulphide ore have been loaded
- (2) Areas sensitive to deterioration by heat such as plating under boilers
- (3) Structurally discontinuous portions such as corners of hatchway openings on deck, openings (including side scuttles), cargo port, etc. on shell
- (4) Condition of coating and corrosion prevention system if applied
- (5) Condition of striking plates under sounding pipes
- (6) Condition of deck covering (e.g. cement)
- (7) Locations on which defects such as cracking, buckling, and corrosion have been found in similar ships or similar structures

2 At Special Surveys, internal examinations of tanks or spaces listed in **Table B5.1** are to be carried out paying attention to the items in -1 above.

3 At Special Surveys for tankers and ships carrying dangerous chemicals in bulk with integral tanks, in addition to -1 and -2 above, an internal examination of tanks and spaces listed in **Table B5.2** is to be carried out. Tanks and spaces identified as suspect areas at previous surveys are to be examined. The examination of the coating condition in ballast tanks for oil tankers and ships carrying dangerous chemicals in bulk is to be based on the coating criteria defined by the Society. However, for ships carrying dangerous chemicals in bulk, stainless steel tanks may be exempted from internal examinations where deemed appropriate by the Society.

4 At Special Surveys for bulk carriers, in addition to -1 and -2 above, an internal examination of tanks and spaces listed in **Table B5.3** is to be carried out.

5 At Special Survey No. 3 and subsequent special surveys, in addition to -1 to -3, structural downflooding ducts and structural ventilation ducts are to be internally examined.

#### **5.2.5 Close-up Surveys\***

1 At Special Surveys, Close-up Surveys are to be carried out for portions (1) to (4) below:

- (1) Lower parts of shell frames, tank side brackets and transverse bulkheads in cargo holds
- (2) Lower parts of air pipes and sounding pipes located on top of inner bottom plating in cargo holds
- (3) All hatch cover plating, hatch coaming plating, and stiffeners
- (4) Securing, supporting and locking devices together with the welded parts of bow doors, inner doors, side shell doors and stern doors

2 At Special Surveys for oil tankers and ships carrying dangerous chemical in bulk with integral tanks, notwithstanding the provision of -1 above, a Close-up Survey is to be carried out for structural members listed in **Table B5.5-1**.

3 At Special Surveys for ships carrying liquefied gases in bulk, notwithstanding the provision of -1 above, a Close-up Survey is to be carried out for structural members and so forth listed in **Table B5.5-2**.

4 At Special Surveys for bulk carriers, notwithstanding the provision of -1 above, a Close-up Survey is to be carried out for structural members listed in **Table B5.6-1**. For ore carriers, a Close-up Survey is to be carried out in accordance with the requirements in **Table B5.6-2** instead of **Table B5.6-1**.

5 At Special Surveys for general dry cargo ships of not less than 500 *gross tonnage*, notwithstanding the provision of -1 above, a Close-up Survey is to be carried out for structural members listed in **Table B5.7**.

6 Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor.

7 When thickness measurements of structures subject to close-up surveys using RIT are required, temporary means of access for

the corresponding thickness measurements is to be provided unless such remote inspection techniques are also able to carry out the required thickness measurements.

#### **5.2.6 Thickness Measurements\***

**1** At Special Surveys, thickness measurements are to be carried out in accordance with **(1)** to **(5)** below.

- (1) Thickness measurements are to be carried out using appropriate ultra-sonic gauging machines or other approved means. The Surveyor may request that the accuracy of the equipment be demonstrated.
- (2) Thickness measurements are to be carried out at or after the time of the 4th Annual Survey under the attendance of the Surveyor by the firm approved by the Society under the “**Rules for Approval of Manufacturers and Service Suppliers**”. The surveyor may request to have the measurements taken again to ensure acceptable accuracy.
- (3) Additional thickness measurements are to be carried out before the completion of the survey.
- (4) A thickness measurement record is to be prepared and submitted to the Society.
- (5) Thickness measurements of structures in areas where close-up surveys are required are to be carried out simultaneously with close-up surveys.

**2** At Special Surveys, thickness measurements are to be carried out according to **-1** above for structural members listed in **Table B5.8**. Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Table B5.9**.

**3** At Special Surveys for oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, notwithstanding the provision of **-2** above, thickness measurements are to be carried out according to **-1** for structural members listed in **Table B5.10-1**, and tanks and spaces identified as suspect areas at previous surveys. Stainless steel hull structure and piping except for clad steel may be exempted from thickness measurements where deemed appropriate by the Society. Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Tables B5.11** through **B5.14**.

**4** At Special Surveys for ships carrying liquefied gases in bulk, notwithstanding to the provision of **-2** above, a thickness measurement is to be carried out for structural members and so forth listed in **Table B5.10-2** according to **-1** above. Where substantial corrosion is found in the results of such thickness measurements, the thickness measurement is to be expanded to all the structural members listed in the **Table B5.9**, of which the sub-title corresponds to substantially corroded members. For ships having independent tanks of type *C*, with a midship section similar to that of a general cargo ship, the extent of thickness measurements may be increased to include the tank top plating at the discretion of the Surveyor.

**5** At Special Surveys for Bulk Carriers, notwithstanding the provision of **-2** above, thickness measurements are to be carried out according to **-1** above for structural members listed in **Table B5.15** and tanks and spaces identified as suspect areas at previous surveys. Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Tables B5.16** through **Table B5.20**. In addition to the above, for bulk carriers built under **Part CSR-B** or **Part CSR-B&T**, identified substantial corrosion areas are to be in accordance with either the following **(1)** or **(2)**:

- (1) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or,
- (2) Have thickness measurements taken annually.

**6** At Special Surveys for general dry cargo ships of not less than 500 *gross tonnage*, notwithstanding the provision of **-2** above, thickness measurements are to be carried out according to **-1** above for structural members listed in **Table B5.21**. Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Table B5.9**.

**7** At Special Surveys for double hull oil tankers built under **Part CSR-T** or **Part CSR-B&T** and bulk carriers built under **Part CSR-B** or **Part CSR-B&T**, thickness measurements are to be carried out in accordance with **(1)** through **(3)** below in addition to provisions **-3** and **-5** above.

- (1) Interpretations specified in **Table B5.30** and **Table B5.31** are to be considered when structural members subject to thickness measurements and the extent of thickness measurements are determined in accordance with **Table B5.10-1** to **Table B5.15**. The locations of the points to be measured are to be given for the most important items of the structure.
- (2) Thickness measurement results are to comply with the criteria specified in **Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **Chapter 13, Part 1 of Part CSR-B&T**.
- (3) Thickness measurement results for areas subject to pitting corrosion, edge corrosion and grooving corrosion are to comply with

the respective criteria for each type of corrosion.

8 The ship's longitudinal strength is to be evaluated by using the thickness of structural members measured in transverse sections specified in [Table B5.8](#), [Table B5.10](#), [Table B5.15](#) and [Table B5.21](#).

9 For structures built with materials other than steel, alternative thickness measurement requirements may be developed and applied as deemed necessary by the Society.

#### 5.2.7 Pressure Tests\*

1 At Special Surveys, a pressure test of tanks is to be carried out according to (1) through (3) below.

(1) A pressure test is to be carried out under the pressure specified below:

- (a) For tanks: the pressure corresponding to the maximum head that can be experienced in service
- (b) For piping: the working pressure

(2) A pressure test of tanks may be carried out when the ship is afloat, provided that an internal examination of the bottoms of the tanks has also been carried out while afloat.

(3) At Special Surveys for ships having many water tanks and oil tanks, some of the tanks may be exempted from a pressure test where deemed appropriate by the Surveyor taking into account the ship's present condition, age and interval from the previous test.

2 At Special Surveys for cargo ships, a pressure test is to be carried out according to -1 above for tanks listed in [Table B5.22](#).

3 At Special Surveys for oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, notwithstanding the provisions of -2 above, a pressure test is to be carried out for tanks listed in [Table B5.23-1](#). With respect to the pressure tests for the cargo tanks of tankers and ships carrying dangerous chemicals in bulk, when pressure tests are conducted in the presence of the Master or any other representative personnel of the ship, such pressure tests may be regarded as the pressure tests required for Special Surveys at the discretion of the Surveyor provided the following (1) to (6) conditions are complied with. For pressure tests conducted in the presence of the master or any other representative personnel, guidance is specified in [Annex 5.2.7](#). For double hull oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, any testing of double bottom tanks and other watertight compartments not designed to carry liquids may be omitted, provided that satisfactory internal and/or external examinations are carried out.

- (1) The procedure (including information such as fill heights, the tanks being filled and the bulkheads being tested) for the pressure test has been submitted by the owner and reviewed by the Society prior to the pressure test being carried out.
- (2) The pressure test is carried out prior to internal examination or close-up survey.
- (3) The pressure test is carried out at the time of the special survey and not more than 3 *months* prior to the date on which the internal examination or close-up survey is completed.
- (4) The pressure test has been satisfactorily carried out and there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank.
- (5) The satisfactory results of the pressure test are recorded in the ship's logbook.
- (6) The internal and external condition of the tanks and associated structure are found satisfactory by the Surveyor at the time of the internal examination and close-up survey.

4 At Special Surveys for ships carrying liquefied gases in bulk, notwithstanding the provision of -2 above, a pressure test is to be carried out for tanks listed in [Table B5.23-2](#).

5 At Special Surveys for bulk carriers and dry cargo ships of not less than 500 *gross tonnage*, notwithstanding the provisions of -2 above, a pressure test is to be carried out according to -1 above for tanks listed in [Table B5.24](#). For bulk carriers, any testing of double bottom tanks and other watertight compartments not designed to carry liquids may be omitted, provided that satisfactory internal and/or external examinations are carried out.

#### 5.2.8 Alternative Design and Arrangements

For ships subject to *SOLAS Chapter II-2 Regulation 17*, alternative design and arrangements for fire safety are to be examined in accordance with the test, inspection and maintenance requirements, if any, specified in the relevant approval documents.

### 5.3 Special Surveys for Machinery

#### 5.3.1 General Examinations\*

At Special Surveys for Machinery, in addition to the general examination and inspections specified in [3.3.1](#), the verification

runs specified in 1.1.9-1 and -3, and the surveys specified in Table B5.25 are to be carried out.

### 5.3.2 Performance Tests and Pressure Tests\*

At Special Surveys for Machinery, in addition to the performance tests specified in 3.3.2, the performance tests specified in Table B5.26 are to be carried out.

### 5.3.3 Alternative Design and Arrangements

For ships subject to *SOLAS Chapter II-1 Regulation 55*, alternative design and arrangements for machinery, or electrical installations, or low-flashpoint fuel storage and distribution systems are to be examined in accordance with the test, inspection and maintenance requirements, if any, specified in the relevant approval documents.

### 5.3.4 Surveys of Water Jet Propulsion Systems, etc.

1 For ships fitted with water jet propulsion systems, in addition to the surveys specified in 3.3.4-1, the surveys are to be carried out in accordance with the following (1) to (5):

- (1) Waterjet pump units are to be opened up and it is to be confirmed that their principal components are in good working order;
- (2) Shafting bearings are to be opened up and the following tests are to be carried out:
  - (a) The principal components of shafting are to be confirmed to be in good order;
  - (b) Non-destructive tests of the contact faces of impeller bosses and main shafts (keyways and flanges), and coupling bolts are to be carried out;
- (3) Holding parts and pins of deflectors or reversers are to be opened up and it is to be confirmed that they are in good working order;
- (4) Oil piping for lubrication is to be examined; and
- (5) Sea water piping for lubrication is to be examined.

2 For ships fitted with azimuth thrusters, in addition to the surveys specified in 3.3.4-2, inspections of the supporting parts of azimuth steering gear are to be carried out.

### 5.3.5 Surveys of Selective Catalytic Reduction (SCR) Systems, etc.

1 For ships fitted with selective catalytic reduction (SCR) systems, in addition to the surveys specified in 3.3.5-1, the surveys are to be carried out in accordance with the following (1) to (3):

- (1) Internal examinations of reductant agent storage tanks are to be carried out.
- (2) In cases where reductant agents are carried in tanks which form part of the ship hull, the pressure tests required for “cargo tank” in Table B5.23-1 are to be carried out. In cases where pressure tests at specified pressures have been conducted in the presence of the Master or any other representative personnel of the ship at suitable occasions prior to the survey, such pressure tests may be regarded as the pressure tests required for Special Surveys.
- (3) The following (a) to (c) equipment is to be opened for examinations:
  - (a) SCR chambers;
  - (b) Reductant agent supply pumps;
  - (c) Other items as deemed necessary by the Society.

2 For ships fitted with exhaust gas cleaning systems, in addition to the surveys specified in 3.3.5-2, the surveys are to be carried out in accordance with the following (1) to (3):

- (1) Internal examinations of sodium hydroxide solution storage tanks (if fitted).
- (2) In cases where sodium hydroxide solutions are carried in tanks which form part of the ship hull, the pressure tests required for “cargo tank” in Table B5.23-1 are to be carried out. In cases where pressure tests at specified pressures have been conducted in the presence of the Master or any other representative personnel of the ship at suitable occasions prior to the survey, such pressure tests may be regarded as the pressure tests required for Special Surveys.
- (3) The following (a) and (b) equipment is to be opened for examinations:
  - (a) Sodium hydroxide solution supply pumps and washwater supply pumps (if fitted);
  - (b) Other items as deemed necessary by the Society.

3 For ships fitted with exhaust gas recirculation systems, in addition to the surveys specified in 3.3.5-3, the surveys specified in -2 above are to be carried out (in this case the term “exhaust gas cleaning systems” is to be read as “exhaust gas recirculation systems”).

## 5.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk

### 5.4.1 General

In addition to the requirements of 5.2 and 5.3, the requirements of 5.4 apply to Special Surveys of ships carrying liquefied gases in bulk.

### 5.4.2 Examinations\*

At Special Surveys for ships carrying liquefied gases in bulk, examinations specified in 4.4.2 and examinations of spaces, structures and equipment specified in Table B5.27 are to be carried out.

## 5.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

### 5.5.1 General

In addition to the requirements of 5.2 and 5.3, the requirements of 5.5 apply to Special Surveys of ships carrying dangerous chemicals in bulk.

### 5.5.2 Examinations\*

At Special Surveys for ships carrying dangerous chemicals in bulk, examinations specified in 4.5.2 and examinations of spaces, structures and equipment specified in Table B5.28 are to be carried out.

## 5.6 Special Requirements for Ships Using Low-flashpoint Fuels

### 5.6.1 General\*

In addition to the applicable requirements of previous sections, the requirements of 5.6 are to be applied at Special Surveys of ships using low-flashpoint fuels.

### 5.6.2 Examinations\*

At Special Surveys of ships using low-flashpoint fuels, the examinations specified in Table B5.29 are to be carried out thoroughly in order to ascertain them being in good order, in addition to the examinations specified in 4.6.2.

## 5.7 Special Requirements for Bulk Carriers and Oil Tankers

### 5.7.1 General

In addition to the requirements of 5.2 and 5.3, the requirements of 5.7 apply to the Special Surveys of bulk carriers and oil tankers subject to *SOLAS Chapter II-1 Regulation 3-10*.

### 5.7.2 Surveys

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship's structure, taking into account areas identified in the Ship Construction File as needing special attention.

## 5.8 Special Requirements for Ships Affixed with the Notation “HCM” or “HCM-GBS”

### 5.8.1 General

In addition to the requirements of 5.2 and 5.3, the requirements of 5.8 apply to the Annual Surveys of ships affixed with the notation “HCM” or “HCM-GBS”.

### 5.8.2 Surveys

In cases where considered necessary by the Surveyor, examinations are to be carried out on the ship's structure, taking into account areas subject to construction monitoring survey.



## **5.9 Special Requirements for Ships Affixed with the Notation “CybR”**

### **5.9.1 General**

In addition to the requirements of 5.2 to 5.3, the requirements of 5.9 apply to the Special Surveys of ships affixed with the notation “CybR”.

### **5.9.2 Surveys**

At Special Surveys of ships affixed with the notation “CybR”, examinations specified in 3.9.2 and examinations specified in Table B5.32 are to be carried out in accordance with ship cyber resilience test procedure specified in 2.2.3-4(2), Part X.

Table B5.1 Internal Examinations of Tanks and Spaces

Special Survey	Tanks and spaces subject to examination
1 Special Survey for ships up to 5 years of age (Special Survey No. 1)	(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk), except for fuel oil tanks, lubricating oil tanks and fresh water tanks which are not peak tanks.
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No. 2)	(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk as well as fuel oil tanks in engine rooms and lubricating oil tanks which are not peak tanks) However, if fuel oil tanks and fresh water tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated number of tanks: (a) Fuel oil tanks fitted within cargo length areas (within cargo areas for tankers): 1 tank (b) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at locations other than engine rooms (if fitted): 1 tank (c) Fresh water tanks: 1 tank
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No. 3)	(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk and lubricating oil tanks which are not peak tanks) However, if fuel oil tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated number of tanks: (a) Fuel oil tanks fitted within engine rooms: 1 tank (b) Fuel oil tanks fitted within cargo length areas (within cargo areas for tankers): 2 tanks (In cases where deep fuel oil tanks are provided, one or more deep fuel oil tanks are to be included.) (c) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at locations other than engine rooms (if fitted): 1 tank
4 Special Survey for ships over 15 years of age (Special Survey No. 4 and subsequent Special Surveys)	(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk) However, if fuel oil tanks and lubricating oil tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated numbers of tanks: (a) Fuel oil tanks fitted within engine room: 1 tank (b) Fuel oil tanks fitted within cargo length areas (for tankers, within cargo areas): half the total number of tank, but not less than 2 tanks. (in cases where deep fuel oil tanks are provided, one or more deep tanks are to be included.) (c) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at location other than engine rooms (if fitted): 2 tanks (d) Lubricating oil tanks: 1 tank

## Notes:

- Ballast tanks (excluding double bottom tanks) where the protective coating is found in poor condition and has not been renewed or where a protective coating has not been applied, internal examinations are to be carried out at annual intervals. For double bottom ballast tanks in this condition, internal examinations are to be carried out at annual intervals where considered necessary by the Surveyor.
- For holds insulated for the carriage of refrigerated cargo, limber boards and cover plates are to be removed and an examination of the inside is to be carried out. In addition, an examination behind the insulation is to be carried out at representative locations. The examination may be limited to verification that the protective coating remains effective and that there are no visible structural defects. Where the protective coating is found to be in a poor condition, the examination is to be extended as deemed necessary by the Surveyor.
- Ballast tanks converted to void spaces are to be examined in accordance with the provisions for ballast tanks.

Table B5.2 Additional Requirements of Internal Examinations for Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Tanks and spaces subject to examination	Notes
1 All Special Surveys	1 All cargo tanks	<p>(1) For oil tankers, combined cargo/ballast tanks, if any, are to be examined carefully taking account of ballast history and the extent of the corrosion prevention system provided.</p> <p>(2) For oil tankers, condition of the inner surface of the bottom plating of the tank is to be examined carefully in order to ascertain that there is no excessive pitting of the plating.</p> <p>(3) For oil tankers, bell mouths of the cargo suction pipes are to be removed and the bottom plating of the tank and bulkheads in that vicinity are to be examined as considered necessary by the Surveyor.</p>
	2 All ballast tanks and pump rooms	<p>(1) As a result of internal examinations, ballast tanks with conditions shown in (a) to (c) require an internal examination to be carried out at annual intervals.</p> <p>(a) The protective coating is found to be in less than GOOD condition and is not repaired to the satisfaction of the Surveyor.</p> <p>(b) The protective coating has not been applied from the time of construction or the soft coating has been applied (the examination is to be extended to other ballast tanks of the same type)</p> <p>(c) Substantial corrosion is found within the tanks</p> <p>(2) An internal examination of the pump room is to be carried out carefully paying attention to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps.</p>

Table B5.3 Additional Requirements of Internal Examinations for Bulk Carriers

Special Survey	Tanks and spaces subject to examination	Notes
Requirements for Bulk Carriers other than Double Skin Bulk Carriers		
1 All Special Surveys	1 Ballast tanks	<p>(1) As a result of internal examinations, ballast tanks (excluding double bottom tanks) with conditions shown in <b>(a)</b> or <b>(b)</b> require an internal examination to be carried out at annual intervals.</p> <p>(a) The protective coating is found in less than GOOD condition and is not repaired to the satisfaction of the Surveyor.</p> <p>(b) The protective coating has not been applied from the time of construction.</p>
Requirements for Double Skin Bulk Carriers		
1 All Special Surveys	1 Ballast tanks	<p>(1) As a result of internal examinations, ballast tanks (excluding double bottom tanks) with conditions shown in <b>(a)</b> or <b>(b)</b> require an internal examination to be carried out at annual intervals.</p> <p>(a) The protective coating is found in less than GOOD condition and is not repaired to the satisfaction of the Surveyor.</p> <p>(b) The protective coating has not been applied from the time of construction.</p>
	2 Double side skin void spaces	<p>(1) As a result of internal examinations, double-side skin void spaces bounding cargo holds for bulk carriers exceeding 20 years of age and of 150 m in length and upwards with conditions shown in <b>(a)</b> or <b>(b)</b> require an internal examination to be carried out at annual intervals.</p> <p>(a) The protective coating is found in POOR condition and is not repaired to the satisfaction of the Surveyor.</p> <p>(b) The protective coating has not been applied from the time of construction.</p>

Table B5.4  
(Deleted)

Table B5.5-1 Requirements of Close-up Surveys for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Structural members subject to the Close-up Survey
Requirements for Tankers and Ships Carrying Dangerous Chemicals in bulk without Double Hull Structure	
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) One Web Frame (A) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast (2) One Deck Transverse (B) - in a cargo tank or on deck (3) The lower part of one Transverse Bulkhead (D) - in a ballast tank (4) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank (5) The lower part of one Transverse Bulkhead (D) - in a cargo centre tank
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) All Web Frames (A) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast (2) One Deck Transverse (B) - in or on each of the remaining ballast tanks, if any (3) One Deck Transverse (B) - in or on a cargo wing tank (4) One Deck Transverse (B) - in or on two cargo centre tanks (5) Both Transverse Bulkheads (C) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast (6) The lower part of one Transverse Bulkhead (D) - in each remaining ballast tank (7) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank (8) The lower part of one Transverse Bulkhead (D) - in two cargo centre tanks
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) All Web Frames (A) - in all ballast tanks (2) All Web Frames (A) - in a cargo wing tank (3) A minimum of 30% <sup>*1</sup> of all Web Frames (A) - in each remaining cargo wing tank (only for oil tankers) (4) One Web Frame (A) - in each remaining cargo tank (except for oil tankers) (5) All Transverse Bulkheads (C) - in all cargo and ballast tanks (6) A minimum of 30% <sup>*1</sup> of all Deck and Bottom Transverses (E) - in each cargo centre tank (only for oil tankers)
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) As Special Survey No.3. Additional transverses included as deemed necessary by the Surveyor.
Requirements for Tankers and Ships Carrying Dangerous Chemicals in bulk having Double Hull Structure	
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) One Web Frame (A) - in a ballast double hull tank <sup>*2</sup> (2) One Deck Transverse (B) - in a cargo tank or on deck (3) One Transverse Bulkhead (C) - in a ballast double hull tank <sup>*2</sup> (4) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank <sup>*3</sup> (5) The lower part of one Transverse Bulkhead (D) - in a cargo centre tank
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) All Web Frames (A) - in a ballast double hull tank <sup>*2</sup> (2) The knuckle area and the top part of one Web Frame (G) - in each remaining ballast tank (3) One Deck Transverse (B) - in or on two cargo tanks (4) One Transverse Bulkhead (C) - in all ballast double hull tanks <sup>*2</sup> (5) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank <sup>*3</sup> (6) The lower part of one Transverse Bulkhead (D) - in two cargo centre tanks
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) All Web Frames (A) - in all ballast tanks (2) All Web Frames (A) - in a cargo wing tank (or a cargo tank for oil tankers) (3) One Web Frame (A) - in each remaining cargo tank (4) All Transverse Bulkheads (C) - in all cargo and ballast tanks

Special Survey	Structural members subject to the Close-up Survey
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) As Special Survey No.3. Additional transverses included as deemed necessary by the Surveyor.

Notes:

Letters in this table mean:

- (A): Cross ties and complete transverse web frame ring including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, and brackets
- (B): Including deck structural members adjacent to deck transverses such as deck plating, longitudinal stiffeners, and brackets
- (C) and (D): Including vertical and horizontal girders and structural members adjacent to transverse bulkheads such as longitudinal bulkheads, inner bottom plating, hopper plating, bottom girders, brackets, and stiffeners; and internal structure of lower and upper stools, where fitted
- (E): Including structural members adjacent to deck and bottom transverses such as deck plating, bottom plating, and longitudinal stiffeners
- (F): Additional complete transverse web frame ring including adjacent structural members listed in A
- (G): The knuckle area includes the slope hopper plating and where it connects to the inner hull bulkhead and inner bottom plating; up to 2 meters from the corners along the bulkhead and double bottom; and adjacent structural members

The top part includes the top 5 meters (3 meters for ships carrying dangerous chemicals in bulk) of the web frame and adjacent structural members

\*1: The 30% is to be rounded up to the next whole integer

\*2: "Ballast double hull tank" means the following, apart from the fore and aft peak tanks:

- (a): all ballast compartments (hopper tank, side tank and double-deck tank, if separate from double-bottom tank) located on one side, i.e. portside or starboard side, and additionally double-bottom tank on portside plus starboard side, when the longitudinal central girder is not watertight and, therefore, the double bottom tank is a unique compartment from portside to starboard side; or
- (b): all ballast compartments (double-bottom tank, hopper tank, side tank and double-deck tank) located on one side, i.e. portside or starboard side, when the longitudinal central girder is watertight and, therefore, the portside double-bottom tank separate from the starboard-side double-bottom tank.

\*3: For double hull that have no centre cargo tanks (as in the case of tanks with a centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed

Table B5.5-2 Requirements of Close-up Surveys for Ships Carrying Liquefied Gases in Bulk

Special Survey	Structural members subject to the Close-up Survey <sup>*2</sup>
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) One web frame in a representative ballast tank of the topside, hopper side and double hull side type (A) (2) Lower part of one transverse bulkhead in a ballast tank <sup>*1</sup> (C)
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) All web frames in a ballast tank, which is to be a double hull side tank or a topside tank (If such tanks are not fitted another ballast tank is to be selected. <sup>*1</sup> ) (A) (2) One web frame in each remaining ballast tank (A) (3) One transverse bulkhead in each ballast tank (B)
3 Special Survey for ships over 10 years of age (Special Survey No.3 and subsequent Special Surveys)	(1) All web frames in all ballast tanks (A) (2) All transverse bulkheads in all ballast tanks (B)

Notes:

Letters in this table mean:

(A): Cross Ties and complete transverse web frame rings including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets, etc.

(B): Including vertical and horizontal girders, adjacent structural members and adjacent longitudinal bulkhead structure

(C): Including vertical and horizontal girders and adjacent structural members

<sup>\*1</sup>: One ballast tank can be selected from ballast tanks including peak tanks.<sup>\*2</sup>: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating at the discretion of the Surveyor.

Table B5.6-1 Requirements of Close-up Surveys for Bulk Carriers (Excluding Ore Carriers)

Special Survey	Structural members subject to Close-up Survey	
Requirements for Bulk Carriers other than Double Skin Bulk Carriers * <sup>1</sup>		
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1)	A sufficient number (at least 1/4 of the total number) of shell frames at the forward, middle, and aft parts on both sides of forward cargo holds and selected frames in remaining cargo holds (A)
	(2)	Two selected cargo hold transverse bulkheads (including stiffeners and girders) (C)
	(3)	One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (topside or bilge hopper tank) (B)
	(4)	Air pipes and sounding pipes in cargo holds in way of tank top
	(5)	All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1)	All shell frames in forward cargo hold and a sufficient number (at least 1/4 of the total number for ships less than 100,000 DWT and at least 1/2 of the total number for ships of 100,000 DWT or more) of shell frames in each of the remaining cargo holds including their end attachments and adjacent shell plating (A)
	(2)	All transverse bulkheads (including stiffeners and girders) in all cargo holds (C)
	(3)	One transverse web with associated plating and longitudinals in each ballast tank (B)
	(4)	Both forward and aft transverse bulkheads (including stiffeners and girders) in one ballast tank (B)
	(5)	All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches
	(6)	All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out.
	(7)	All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1)	All shell frames in the forward and one other selected cargo holds and a sufficient number (at least 1/2 of the total number) of shell frames in each of the remaining cargo holds including their end attachments and adjacent shell plating (A)
	(2)	All transverse bulkheads (including stiffeners and girders) in all cargo holds (C)
	(3)	All transverse webs with associated plating and longitudinals and all transverse bulkheads (including stiffeners and girders) in each ballast tank (B)
	(4)	Structural members specified in (5) to (7) of Special Survey No.2 above
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1)	All shell frames in all cargo holds including their end attachments and adjacent shell plating (A)
	(2)	Structural members specified in (2) to (4) of Special Survey No.3 above
Requirements for Double Skin Bulk Carriers (excluding Ore Carriers)		
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1)	Two selected cargo hold transverse bulkheads (including stiffeners and girders) (C)
	(2)	One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (this is to include the foremost topside and double side ballast tanks on either side) (B)
	(3)	Air pipes and sounding pipes in cargo holds in way of tank top
	(4)	All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1)	One transverse bulkhead in each cargo hold (including stiffeners and girders) (C)
	(2)	One transverse web with associated plating and longitudinals in each ballast tank (B)
	(3)	Both forward and aft transverse bulkheads (including stiffeners and girders) in a transverse section including topside, bilge hopper and double side ballast tanks on one side of the ship (B)
	(4)	A sufficient number (at least 1/4 of total number) of stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead at forward, middle, and aft parts on both sides of the foremost double side tanks (A)
	(5)	All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches
	(6)	All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out.
	(7)	All hatch cover plating, hatch coaming plating, and stiffeners



Special Survey	Structural members subject to Close-up Survey
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) All transverse bulkheads (including stiffeners and girders) in all cargo holds (C) (2) All transverse webs with associated plating and longitudinals and all transverse bulkheads (including stiffeners and girders) in each ballast tank (B) (3) A sufficient number (at least 1/4 of total number) of stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead at forward, middle, and aft parts on both sides of all double side tanks (A) (4) Structural members specified in (5) to (7) of Special Survey No.2 above
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) All stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead in all double side tanks (A) (2) Structural members specified in (1), (2) and (4) of Special Survey No.3 above

Notes:

- (1) A double side tank of double skin bulk carriers is to be considered as a separate tank even if it is in connection to either the topside tank or the bilge hopper tank.
- (2) Letters in this table mean:
  - (A): Cargo hold transverse frames, or stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell or longitudinal bulkhead in double side tanks
  - (B): Transverse web or watertight transverse bulkhead in fore and aft peak, topside, bilge hopper, double side ballast tanks and double bottom tanks including adjacent structural members
  - (C): Including plating and internal structures of lower and upper stools, where fitted
- (3) Close-up Surveys of transverse bulkheads are to be carried out at least at four levels as specified as follows:
  - (i) Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.
  - (ii) Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.
  - (iii) About mid-height of the bulkhead.
  - (iv) Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.
- \*1: For bulk carriers with hybrid cargo hold arrangements, that is, with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B5.6-2 Requirements of Close-up Surveys for Ore Carriers

Special Survey	Structural members subject to Close-up Survey
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) One web frame rings in a ballast wing tank (A) (2) Lower part of one transverse bulkhead in a ballast tank (D) (3) Two selected cargo hold transverse bulkheads (including stiffeners and girders) (E) (4) Air pipes and sounding pipes in cargo holds in way of tank top (5) All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) All web frame rings in a ballast wing tank (A) (2) One deck transverse in each remaining ballast tank (B) (3) Forward and aft transverse bulkheads in a ballast wing tank (C) (4) Lower part of one transverse bulkhead in each remaining ballast tank (D) (5) One transverse bulkhead in each cargo hold (including stiffeners and girders) (E) (6) All deck plating and under deck structure inside line of hatch openings between cargo hold hatches (7) All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out. (8) All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) All web frame rings in each ballast tank (A) (2) All transverse bulkheads in each ballast tank (C) (3) One web frame ring in all in each wing void space (A) However, additional close-up surveys may be carried out for other web frame rings in void spaces as deemed necessary by the Surveyor. (4) All transverse bulkhead in each cargo hold (including stiffeners and girders) (E) (5) Structural members specified in (6). to (8) of Special Survey No.2 above
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) As for Special Survey No.3

Notes:

- (1) Letters in this table mean:
  - (A): Cross Ties and complete transverse web frame rings including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets, etc.
  - (B): Including deck structures adjacent to deck transverse such as deck plating, longitudinal stiffeners, brackets, etc.
  - (C) and (D): Including vertical and horizontal girders, and adjacent structural members such as longitudinal bulkheads, inner bottom plating, hopper plating, bottom girders, brackets, stiffeners, etc.
  - (E): Including plating and internal structures of lower and upper stools, where fitted
- (2) Close-up Surveys of transverse bulkheads are to be carried out at least at four levels as specified as follows:
  - (i): Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.
  - (ii): Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.
  - (iii): About mid-height of the bulkhead.
  - (iv): Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

Table B5.7 Requirements of Close-up Surveys for General Dry Cargo Ships of Not less than 500 *gross tonnage*

Special Survey	Structural members subject to Close-up Survey	
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1)	Selected shell frames in one forward and one after cargo holds and associated tween deck spaces and lower part of remaining shell frames including their end attachments and adjacent shell plating
	(2)	Lower parts of shell frames in remaining cargo holds including their end attachments and adjacent shell plating
	(3)	One selected transverse bulkhead and lower part of remaining transverse bulkheads (including stiffeners and girders)
	(4)	Air pipes and sounding pipes in cargo holds in way of tank top
	(5)	All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1)	Selected shell frames in all cargo holds and associated tween deck spaces and lower part of remaining shell frames including their end attachments and adjacent shell plating
	(2)	One transverse bulkhead and lower part of the remaining transverse bulkhead in each cargo hold (including stiffeners and girders)
	(3)	Both forward and aft bulkhead (including stiffeners and girders) in one side ballast tank
	(4)	One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (topside, bilge hopper, side tank or double bottom tank)
	(5)	Selected area of deck plating and under deck structure inside the line of hatch openings between cargo hatches
	(6)	Selected area of inner bottom plating
	(7)	Air pipes and sounding pipes in cargo holds in way of tank top
	(8)	All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1)	All shell frames in the forward cargo hold (the forward lower cargo hold in the case of tween deck spaces), and 25% of frames in each of the remaining cargo holds (tween deck spaces including the cargo holds except for the forward lower cargo hold in the case of tween deck spaces), and lower part of remaining shell frames including their end attachments and adjacent shell plating
	(2)	All transverse bulkheads (including stiffeners and girders) in all cargo holds
	(3)	All transverse bulkheads (including stiffeners and girders) in all ballast tanks
	(4)	All transverse webs with associated plating and longitudinals in each ballast tank
	(5)	All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches
	(6)	All area of inner bottom plating
	(7)	Air pipes and sounding pipes in cargo holds in way of tank top
	(8)	All hatch cover plating, hatch coaming plating, and stiffeners
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1)	All shell frames in all cargo holds and associated tween deck spaces including their end attachments and adjacent shell plating
	(2)	Structural members specified in (2) to (8) of Special Survey No.3 above

Notes:

Close-up Surveys of transverse bulkheads are to be carried out at least at three levels as specified as follows:

- Immediately above the inner bottom and immediately above the tween decks, as applicable.
- Mid-height of the bulkheads for holds without tween decks.
- Immediately below the upper deck plating and tween deck plating.

Table B5.8 Requirements for Thickness Measurements for Cargo Ships

Special Survey	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) Suspect areas (2) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) Suspect areas (2) Each plate in one section of the strength deck plating for the full beam of the ship within 0.5 <i>L</i> amidships (in way of a cargo space, if applicable) (3) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) Suspect areas (2) Each plate and member in two transverse sections within 0.5 <i>L</i> amidships. (in way of two cargo spaces, if applicable). When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. (3) Internals in fore and aft. peak ballast tanks (4) Both ends and the middle part of each hatch side and end coaming (plating and stiffeners) (5) All cargo hold hatch covers (plating and stiffeners) (6) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) Suspect areas (2) The following portions of structural members: (a) All exposed main deck plates, full length (b) Each plate and member in three transverse sections within 0.5 <i>L</i> amidships (in way of cargo spaces, if applicable). When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. (c) All wind and water strakes, port and starboard, full length (3) Representative exposed superstructure deck plating (poop, bridge and forecastle deck) (4) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery spaces and aft end of tanks (5) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor) (6) In all cargo holds, all lowest strakes and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces together with internals in way (7) Structural members specified in (3) to (6) of Special Survey No.3

Table B5.9 Requirements of Additional Thickness Measurements for Cargo Ships in way of Substantial Corrosion

Structural Member	Extent of Measurement	Pattern of Measurement
1 Plating	(1) Suspect areas and adjacent plates	5 point pattern over 1 <i>square metre</i>
2 Girders	(1) Suspect areas	5 point pattern over 1 <i>square metre</i>
3 Stiffeners	(1) Suspect areas	3 measurements in line across web 3 measurements on flange

Table B5.10-1 Requirements of Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Surveys	Structural members subject to thickness measurement	
Requirements for Double Hull Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk		
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1)	Suspect areas
	(2)	Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in 5.2.2
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1)	Suspect areas
	(2)	Within the cargo area:
	(a)	Each deck plate
	(b)	One transverse section. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.
	(3)	Structural members subject to close-up survey for general assessment and recording of corrosion pattern
	(4)	Selected wind and water strakes outside the cargo area
	(5)	Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in 5.2.2
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1)	Suspect areas
	(2)	Within the cargo area:
	(a)	Each deck plate
	(b)	Two transverse sections. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.
	(3)	Structural members subject to close-up survey for general assessment and recording of corrosion pattern
	(4)	Selected wind and water strakes outside the cargo area
	(5)	All wind and water strakes within the cargo area
	(6)	Internals in fore and aft. peak ballast tank
	(7)	Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in 5.2.2
	(8)	For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks
Special Surveys	Structural members subject to thickness measurement	
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1)	Suspect areas
	(2)	Within the cargo area:
	(a)	Each deck plate
	(b)	Three transverse sections. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.
	(c)	Each bottom plate
	(3)	Structural members subject to close-up survey for general assessment and recording of corrosion pattern
	(4)	All wind and water strakes
	(5)	Internals in fore peak tank and after peak ballast tank
	(6)	All exposed main deck plating outside the cargo area
	(7)	Representative exposed superstructure deck plating (poop, bridge and forecastle deck)
	(8)	All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks
	(9)	Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor)
	(10)	Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in 5.2.2
	(11)	For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks

Special Surveys		Structural members subject to thickness measurement	
		and ballast pipes passing through cargo tanks	
Requirements for Ships Other Than Double Hull Oil Tankers			
1	Special Survey for ships up to 5 <i>years</i> of age (Special Survey No.1)	(1)	Suspect areas
		(2)	One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)
		(3)	Structural members subject to close-up survey for general assessment and recording of corrosion pattern
		(4)	Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in <a href="#">5.2.2</a>
2	Special Survey for ships over 5 years and up to 10 <i>years</i> of age (Special Survey No.2)	Same as required for Special Survey No.2 for Double Hull Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk	
3	Special Survey for ships over 10 <i>years</i> and up to 15 <i>years</i> of age (Special Survey No.3)	Same as required for Special Survey No.3 for Double Hull Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk	
4	Special Survey for ships over 15 <i>years</i> of age (Special Survey No.4 and subsequent Special Surveys)	Same as required for Special Survey No.4 and subsequent Special Surveys for Double Hull Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk	

Table B5.10-2 Requirements of Thickness Measurements for Ships Carrying Liquefied Gases in Bulk

Special Surveys	Structural members and so forth subject to thickness measurement
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	<ul style="list-style-type: none"> <li>(1) Suspect area</li> <li>(2) One transverse section of deck plating for the full beam of the ship within 0.5 <i>L</i> amidships in way of a ballast tank, if any</li> <li>(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> </ul>
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	<ul style="list-style-type: none"> <li>(1) Suspect area</li> <li>(2) Within the cargo area: <ul style="list-style-type: none"> <li>(a) Each deck plate</li> <li>(b) One transverse section within 0.5 <i>L</i> amidships in way of a ballast tank, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> </ul> </li> <li>(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) Selected wind and water strakes outside the cargo area</li> </ul>
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	<ul style="list-style-type: none"> <li>(1) Suspect area</li> <li>(2) Within the cargo area <ul style="list-style-type: none"> <li>(a) Each deck plating</li> <li>(b) Two transverse sections. At least one section is to include a ballast tank within 0.5 <i>L</i> amidships, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> <li>(c) All wind and water strakes</li> </ul> </li> <li>(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) Selected wind and water strakes outside the cargo area</li> <li>(5) Internals in fore peak tank and after peak ballast tank</li> </ul>
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	<ul style="list-style-type: none"> <li>(1) Suspect area</li> <li>(2) Within the cargo area: <ul style="list-style-type: none"> <li>(a) Each deck plate</li> <li>(b) Three transverse sections. At least one section is to include a ballast tank within 0.5 <i>L</i> amidships, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> <li>(c) Each bottom plate</li> <li>(d) Duct keel plating and internals</li> </ul> </li> <li>(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) All wind and water strakes</li> <li>(5) Internals in fore peak tank and after peak ballast tank</li> <li>(6) All exposed main deck plating outside the cargo area</li> <li>(7) Representative exposed superstructure deck plating (poop, bridge and forecastle deck)</li> <li>(8) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks</li> <li>(9) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor)</li> </ul>

Table B5.11 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in bulk with integral tanks (Bottom Structure)

Structural member	Extent of Measurement	Pattern of Measurement
1 Inner bottom, bottom and hopper structure plating	(1) Minimum of 3 bays across tank, including aft bay. Measurements around and under all bell mouths. (2) Suspect plates and adjacent plates, if any	(1) 5 point pattern for each panel between longitudinals and floors/webs (2) 5 point pattern over 1 m length for each panel between longitudinals
2 Inner bottom, bottom and hopper structure longitudinals	(1) Minimum of 3 longitudinals in each bay where plating was measured.	3 measurements in line across flange and 3 measurements on vertical web.
3 Bottom girders and brackets	(1) At fore and aft floors or transverse bulkhead bracket toes, and in centre of tanks.	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat, if any. 5 point pattern on girder-bulkhead brackets, if any.
4 Bottom transverse webs/floors	(1) 3 webs/floors in bays where bottom plating was measured, with measurements at both ends and middle.	5 point pattern over 2 m <sup>2</sup> area. Single measurements on face flat, if any.
5 Panel stiffening (if any)	(1) Where fitted.	Single measurement
6 Hopper structure web frame rings (except for single hull oil tankers)	(1) 3 web frame rings in bays where bottom plating was measured.	5 point pattern over 1 m <sup>2</sup> of plating. Single measurements on flange.
7 Hopper structure transverse watertight bulkheads or swash bulkheads (except for single hull oil tankers)	(1) lower 1/3 of bulkhead (2) upper 2/3 of bulkhead (3) stiffeners (minimum of three)	(1) 5 point pattern over 1 m <sup>2</sup> of plating (2) 5 point pattern over 2 m <sup>2</sup> of plating (3) For web, 5 point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span.



Table B5.12 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Deck Structure)

Structural member	Extent of Measurement	Pattern of Measurement
1 Deck plating	(1) Two transverse bands across tank	Minimum of three measurements per plate per band
2 Deck longitudinals	(1) Minimum of 3 longitudinals in each of two bays (only for single hull oil tankers) (1) Every third longitudinal in each of two bands with a minimum of one longitudinal (except for single hull oil tankers)	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted)
3 Deck girders and brackets	(1) At fore and aft transverse bulkheads, bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across flange. 5 point pattern on girder-bulkhead brackets
4 Deck transverse webs	(1) Minimum of two webs with measurements at both ends and middle of span	5 point pattern over about $1\text{ m}^2$ (for single hull oil tankers, $2\text{ m}^2$ ) areas. Single measurement on flange.
5 Vertical webs and transverse bulkheads in wing ballast tank within 2 m from deck (only for double hull)	(1) Minimum of two webs, and both transverse bulkheads	5 point pattern over $1\text{ m}^2$ areas.
6 Panel stiffening	(1) Where applicable	Single measurement

Table B5.13 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Side Shell and Longitudinal Bulkheads)

Structural member	Extent of Measurement	Pattern of Measurement
1 Side shell and longitudinal bulkhead plating: 1 Deckhead and bottom strakes, and strakes in way of horizontal stringers 2 All other strakes	(1) Plating between each pair of longitudinals in a minimum of 3 bays (1) Plating between every 3rd pair of longitudinals in same 3 bays	Single measurement Single measurement
2 Side shell and longitudinal bulkhead longitudinal on: 1 Deckhead and bottom strakes 2 All others strakes	(1) Each longitudinal in same 3 bays (1) Every third longitudinal in same 3 bays	3 measurements across web and 1 measurement on flange 3 measurements across web and 1 measurement on flange
3 Brackets fitted to longitudinals	(1) Minimum of 3 at top, middle and bottom of tank in same 3 bays	5 point pattern over area of bracket
4 Vertical webs and transverse bulkheads excluding deckhead area (only for wing ballast tanks of double hull oil tankers and ships carrying dangerous chemicals in bulk): 1 Strakes in way of horizontal girders 2 All other strakes	(1) Minimum of 2 webs and both transverse bulkheads (1) Minimum of 2 webs and both transverse bulkheads	5 point pattern over approximately 2 m <sup>2</sup> area 2 measurements between each pair of vertical stiffeners
5 Horizontal girders (only for ships carrying dangerous chemicals in bulk and wing ballast tanks of double hull oil tankers)	(1) Plating on each girder in a minimum of 3 bays	2 measurements between each pair of horizontal girder stiffeners
6 Horizontal girder stiffeners (only for ships carrying dangerous chemicals in bulk and wing ballast tanks of double hull oil tankers)	(1) Where applicable	Single measurement
7 Web frames, transverses and cross ties (except for wing ballast tanks of double hull oil tankers and ships carrying dangerous chemicals in bulk)	(1) 3 webs with minimum of three locations on each web, including in way of cross tie connections	5 point pattern over about 2 m <sup>2</sup> area, plus single measurement on flanges of web frame, transverses and cross ties
8 Lower end brackets opposite transverses (only for cargo tanks of double hull oil tankers)	(1) Minimum of three brackets	5 point pattern over approximately 2 m <sup>2</sup> area, plus single measurement on bracket flanges

Table B5.14 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Transverse Bulkheads and Swash Bulkheads except for Wing Ballast Tanks of Double Hull Oil Tankers)

Structural member	Extent of Measurement	Pattern of Measurement
1 Upper and lower stool, where fitted	(1) Transverse band within 25 mm of welded connection to inner bottom or deck plating (2) Transverse band within 25 mm of welded connection to shelf plate	5 point pattern over 1 m length
2 Deckhead and bottom strakes, and strakes in way of horizontal stringers	(1) Plating between pairs of stiffeners at 3 locations at approximately 1/4, 1/2 and 3/4 width of tank	5 point pattern over 1 m length between stiffeners
3 All other strakes	(1) Plating between pair of stiffeners at middle location	Single measurement
4 Strakes in corrugated bulkheads	(1) Plating for each change of scantling at centre of panel and at flange of fabricated connection	5 point pattern over about 1 m <sup>2</sup> of plating
5 Stiffeners	(1) Minimum of three typical stiffeners	For web, 5 point pattern over span between bracket connections (2 measurements across web at each bracket connection, and one at centre of span). For flange, single measurement at each bracket toe and at centre of span.
6 Brackets	(1) Minimum of three at top, middle and bottom of tank	5 point pattern over area of bracket
7 Deep webs and girders	(1) Measurements at toe of bracket and at centre of span	For web, 5 point pattern over about 1 m <sup>2</sup> . 3 measurements across face flat.
8 Horizontal Stringers	(1) All horizontal stringers with measurements at both ends and middle	5 point pattern over 1 m <sup>2</sup> area, plus single measurements near bracket toes and on face flats

Table B5.15 Requirements of Thickness Measurements for Bulk Carriers

Special Surveys	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	<ul style="list-style-type: none"> <li>(1) Suspect areas</li> <li>(2) Air pipes and sounding pipes in cargo holds in way of tank top. Depending upon the results of close-up surveys, measurements may be omitted at the discretion of the Surveyor.</li> </ul>
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	<ul style="list-style-type: none"> <li>(1) Suspect areas</li> <li>(2) Structural members within the cargo length area: <ul style="list-style-type: none"> <li>(a) Two transverse sections of deck plating, outside the line of cargo hatch openings</li> <li>(b) All strength deck plating, where log cargoes or other cargoes that are prone to accelerate corrosion are loaded</li> </ul> </li> <li>(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor.</li> <li>(5) All cargo hold hatch coamings (plating and stiffeners)</li> <li>(6) All cargo hold hatch covers (plating and stiffeners)</li> <li>(7) Wind and water strakes in way of the transverse sections of (2)(a) above</li> <li>(8) Selected wind and water strakes outside the cargo length area</li> </ul>
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	<ul style="list-style-type: none"> <li>(1) Suspect areas</li> <li>(2) Structural members within the cargo length area: <ul style="list-style-type: none"> <li>(a) Each deck plating outside the line of cargo hatch openings</li> <li>(b) Two transverse sections, one in the midship area, outside the line of cargo hatch openings. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> </ul> </li> <li>(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor.</li> <li>(5) All cargo hold hatch coamings (plating and stiffeners)</li> <li>(6) All cargo hold hatch covers (plating and stiffeners)</li> <li>(7) Internals in fore and aft peak ballast tanks</li> <li>(8) All wind and water strakes within the cargo length area</li> <li>(9) Selected wind and water strakes outside the cargo length area</li> </ul>
Special Surveys	Structural members subject to thickness measurement
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	<ul style="list-style-type: none"> <li>(1) Suspect areas</li> <li>(2) Structural members within the cargo length area: <ul style="list-style-type: none"> <li>(a) Each deck plating outside the line of cargo hatch openings</li> <li>(b) Three transverse sections, one in the midship area, outside the line of cargo hatch openings. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> <li>(c) Each bottom plate</li> </ul> </li> <li>(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern</li> <li>(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor.</li> <li>(5) All cargo hold hatch coamings (plating and stiffeners)</li> <li>(6) All cargo hold hatch covers (plating and stiffeners)</li> <li>(7) Internals in fore and aft peak ballast tanks</li> <li>(8) All exposed main deck plating outside the cargo length area</li> <li>(9) Representative exposed superstructure deck plating (poop, bridge and forecastle deck)</li> <li>(10) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks</li> <li>(11) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor)</li> <li>(12) All wind and water strakes</li> </ul>

Table B5.16 Requirements of Additional Thickness Measurements for Bulk Carriers (Shell Structures for Cargo Holds of Single Side Skin, or Structures in Double Side Skin Spaces including Wing Void Spaces in Ore Carriers)

Structural member	Extent of Measurement	Pattern of Measurement
For cargo holds of single side skin		
1 Bottom and Side Shell Plating	(1) Suspect plates and four adjacent plates (2) For tanks and cargo holds, see other tables for particulars on gauging	5 point pattern for each panel between longitudinals
2 Bottom/Side Shell Longitudinals	(1) Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange
For cargo holds of double side skin		
1 Side shell and inner plating: 1Upper strake and strakes in way of horizontal girders  2All other strakes	(1) Plating between each pair of transverse frames or longitudinals in a minimum of three bays (along the tank) (1) Plating between every third pair of longitudinals in same three bays	Single measurement  Single measurement
2 Side shell and inner side transverse frames / longitudinals on: 1Upper strake  2All other strakes	(1) Each transverse frame / longitudinal in same three bays (1) Every third transverse frame / longitudinal in same three bays	Three measurements across web and 1 measurement on flange Three measurements across web and 1 measurement on flange
3 Transverse frames / longitudinals - brackets	(1) Minimum of three areas at top, middle and bottom of tank in same three bays	Five-point pattern over area of bracket
4 Vertical web and transverse bulkheads: 1Strakes in a way of horizontal girders 2Other strakes	(1) Minimum of two webs and both transverse bulkheads (1) Minimum of two webs and both transverse bulkheads	Five-point pattern over approx. two square <i>metre</i> area Two measurements between each pair of vertical stiffeners
5 Horizontal girders	(1) Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
6 Panel stiffening	(1) Where applicable	Single measurements

Table B5.17 Requirements of Additional Thickness Measurements for Bulk Carriers  
(Transverse Bulkheads in Cargo Holds)

Structural member	Extent of Measurement	Pattern of Measurement
1 Lower Stool	(1) Transverse band within 25 <i>mm</i> of welded connection to inner bottom (2) Transverse band within 25 <i>mm</i> of welded connection to shelf plate	(a) 5 point over 1 <i>metre</i> length between stiffeners
2 Transverse Bulkhead	(1) Transverse band at approximately middle height (2) Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with an upper stool)	(a) 5 point pattern over 1 <i>sq. metre</i> of plating

Table B5.18 Requirements of Additional Thickness Measurements for Bulk Carriers

(Deck Structure Including Cross Deck, Main Deck, Cargo Hatchways, Hatch Covers, Coamings and Topside Tanks)

Structural member	Extent of Measurement	Pattern of Measurement
1 Cross Deck Strip Plating	(1) Suspect cross deck strip plating	5 point pattern over 1 <i>metre</i> length between underdeck stiffeners
2 Underdeck Stiffeners	(1) Transverse members (2) Longitudinal member	(1) 5 point pattern at each end and mid span (2) 5 point pattern on both web and flange
3 Hatch Covers	(1) Side and end skirt, each 3 locations (2) 3 longitudinal bands, outboard strakes (2) and centreline strake (1)	(1) 5 point pattern at each location (2) 5 point measurement each band
4 Hatch Coamings	(1) Lower 1/3 and upper 2/3 of each side and end coaming	5 point measurement at each band i.e. end or side coaming
5 Topside Water Ballast Tanks	(1) Watertight transverse bulkheads (a) lower 1/3 of bulkhead  (b) upper 2/3 of bulkhead  (c) stiffeners	(a) 5 point pattern over 1 <i>sq. metre</i> of plating (b) 5 point pattern over 1 <i>sq. metre</i> of plating (c) 5 point pattern over 1 <i>metre</i> length
	(2) 2 representative swash transverse bulkheads (a) lower 1/3 of bulkhead  (b) upper 2/3 of bulkhead  (c) stiffeners	(a) 5 point pattern over 1 <i>sq. metre</i> of plating (b) 5 point pattern over 1 <i>sq. metre</i> of plating (c) 5 point pattern over 1 <i>metre</i> length
	(3) 3 representative bays of sloping plating (a) lower 1/3 of tank  (b) upper 2/3 of tank	(a) 5 point pattern over 1 <i>sq. metre</i> of plating (b) 5 point pattern over 1 <i>sq. metre</i> of plating
	(4) Longitudinals, suspect and adjacent	5 point pattern both web and flange over 1 meter length
6 Main Deck Plating	(1) Suspect plates and adjacent (4)	5 point pattern over 1 <i>sq. metre</i> of plating
7 Main Deck Longitudinals	(1) Minimum of 3 longitudinals where plating measured	5 point pattern on both web and flange over 1 <i>metre</i> length
8 Web Frames/Transverses	(1) Suspect plates	5 point pattern over 1 <i>sq. metre</i>

Table B5.19 Requirements of Additional Thickness Measurements for Bulk Carriers  
(Bottom, Inner Bottom and Hopper Structure)

Structural member	Extent of Measurement	Pattern of Measurement
For cargo holds of single side skin		
1 Inner / Double Bottom Plating	(1) Suspect plates plus all adjacent plates	5 point pattern over 1 <i>metre</i> length for each panel between longitudinals
2 Inner / Double Bottom Longitudinals	(1) 3 longitudinals where plates measured	3 measurements in line across web and 3 measurements on flange
3 Longitudinal Girders or Transverse Floors	(1) Suspect plates	5 point pattern over about 1 <i>sq. metre</i>
4 Watertight Bulkheads (WT Floors)	(1) lower 1/3 of tank	(1) 5 point pattern over 1 <i>sq. metre</i> of plating
	(2) upper 2/3 of tank	(2) 5 point pattern on alternate plates over 1 <i>sq. metre</i> of plating
5 Web Frames	(1) Suspect plates	5 point pattern over 1 <i>sq. metre</i> of plating
6 Bottom / Side shell longitudinals	(1) Minimum of 3 longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange
For cargo holds of double side skin		
1 Bottom, inner bottom and hopper structure plating	(1) Minimum of three bays across double bottom tank, including aft bay Measurements around and under all suction bell mouths	Five-point pattern for each panel between longitudinals and floors
2 Bottom, inner bottom and hopper structure longitudinals	(1) Minimum of three longitudinals in each bay where bottom plating measured	Three measurements in line across flange and three measurements on the vertical web
3 Bottom girders, including the watertight ones	(1) At fore and aft watertight floors and in centre of tanks	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements
4 Bottom floors, including the watertight ones	(1) Three floors in the bays where bottom plating measured, with measurements at both ends and middle	Five-point pattern over 2 <i>sq. metre</i> area
5 Hopper structure web frame ring	(1) Three floors in bays where bottom plating measured	Five-point pattern over 1 <i>sq. metre</i> of plating Single measurements on flange
6 Hopper structure transverse watertight bulkhead or swash bulkhead	(1) Lower 1/3 of bulkhead	five-point pattern over 1 <i>sq. metre</i> of plating
	(2) upper 2/3 of bulkhead	five-point pattern over 2 <i>sq. metres</i> of plating
	(3) stiffeners (minimum of three)	For web, five-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
7 Panel stiffening	(1) Where applicable	Single measurements

Table B5.20 Requirements of Additional Thickness Measurements for Bulk Carriers  
(Cargo Holds of Single Side Skin)

Structural member	Extent of Measurement	Pattern of Measurement
1 Side Shell Frames	(1) Suspect frames and adjacent frames	At each end and mid span: 5 point pattern of both web and flange 5 point pattern within 25 mm of welded attachment to both shell and lower slope plate

Table B5.21 Requirements of Thickness Measurements for General Dry Cargo Ships of Not less than 500 gross tonnage

Special Surveys	Structural members subject to thickness measurement	
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) Suspect areas (2) At least the following structural members for general assessment and recording of corrosion pattern: (a) In cargo holds where cargoes highly corrosive to steel such as logs, salt, coal, and sulfide ore have been loaded: lower parts of web (thinnest parts of web in case of built-up type frame) and their lower end brackets of at least three hold frames at forward, middle and aft parts on both sides of each cargo hold (b) At least one plate of lowest strake and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces specified in (a) above together with internals in way (c) For top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part (including face plate) of one transverse ring or corresponding main structural members in one tank selected arbitrarily from each type	
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) Suspect areas (2) Following portions of structural members within 0.5 L amidships: (a) Each plate in one section of the strength deck plating for the full beam of the ship (b) Each strength deck plate in way of water ballast tanks, if any (c) Each strength deck plate on or underneath which log cargoes or other cargoes that are prone to accelerate corrosion have been carried (3) At least the following structural members for general assessment and recording of corrosion pattern: (a) In cargo holds specified in (2)(a) of Special Survey No.1 above: lower and upper parts of web (thinnest parts of web in case of built-up type frame) and their end brackets of a sufficient number (at least 1/3 of total number) of frames at forward, middle, and aft parts on both sides of each cargo hold (b) All plates of lowest strake and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces specified in (a) above together with internals in way (c) In cargo holds other than (a) above, structural members specified in (2)(a) and (b) of Special Survey No.1 above. (d) For top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part (including face plate) of approximately half the number of transverse rings or corresponding main structural members and at least one plate of upper and lower ends of each bulkhead in one tank selected arbitrarily from each type (e) For remaining top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part of one transverse ring or corresponding main structural members (including face plate) (f) Other structural members subject to close-up survey (g) Air pipes and sounding pipes in cargo holds in way of tank top (4) All cargo hold hatch coamings (plating and stiffeners) (5) All cargo hold hatch covers (plating and stiffeners)	
3 Special Survey for ships over 10 years and up to 15 years of age (Special Survey No.3)	(1) Suspect areas (2) Structural members within the cargo length area: (a) Each deck plating outside the line of cargo hatch openings (b) Each deck plating inside the line of cargo hatch openings within 0.5 L amidships (c) Each plate and member in two transverse sections, one in the midship area, within 0.5 L amidships. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. (d) All wind and water strakes	



Special Surveys	Structural members subject to thickness measurement
	<ul style="list-style-type: none"> <li>(3) Selected wind and water strakes outside the cargo length area</li> <li>(4) At least the following structural members for general assessment and recording of corrosion pattern: <ul style="list-style-type: none"> <li>(a) Lower and upper parts of web (thinnest parts of web in case of built-up type frame) and their end brackets of a sufficient number (at least 1/3 of total number) of frames at forward, middle, and aft parts on both sides of each cargo hold</li> <li>(b) Other structural members subject to close-up survey</li> <li>(c) Air pipes and sounding pipes in cargo holds in way of tank top</li> </ul> </li> <li>(5) Internals in fore and aft peak ballast tank</li> <li>(6) All cargo hold hatch coamings (plating and stiffeners)</li> <li>(7) All cargo hold hatch covers (plating &amp; stiffeners)</li> </ul>
4 Special Survey for ships over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	<ul style="list-style-type: none"> <li>(1) Suspect areas</li> <li>(2) Following portions of structural members <ul style="list-style-type: none"> <li>(a) All exposed main deck plates, full length</li> <li>(b) Each plate and member in three transverse sections, one in the midship area, within 0.5 <i>L</i> amidships. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included.</li> <li>(c) Each bottom plate within cargo length area, including lower turn of bilge</li> <li>(d) Duct keel or pipe tunnel plating and internals within cargo length area</li> </ul> </li> <li>(3) All wind and water strakes</li> <li>(4) At least the following structural members for general assessment and recording of corrosion pattern: <ul style="list-style-type: none"> <li>(a) Structural members subject to close-up survey</li> <li>(b) Air pipes and sounding pipes in cargo holds in way of tank top</li> </ul> </li> <li>(5) Representative exposed superstructure deck plating (poop, bilge and forecastle deck)</li> <li>(6) All keel plate full length, and an appropriate number of bottom plates in way of cofferdams, machinery spaces and aft end of tanks</li> <li>(7) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor)</li> <li>(8) Structural members specified in (5) to (7) of Special Survey No.3 above</li> </ul>

Table B5.22 Requirements of Pressure Tests for Cargo Ships

Special Survey	Tanks subject to pressure tests
1 All Special Survey	<ul style="list-style-type: none"> <li>(1) All water tanks including cargo holds used for ballast and all cargo tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society.</li> <li>(2) All fuel oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.</li> <li>(3) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.</li> </ul>

Table B5.23-1 Requirements of Pressure Tests for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Tanks subject to pressure tests
1 Special Survey for ships up to 5 years of age (Special Survey No.1)	(1) Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, fuel oil tanks, pump rooms and cofferdams (2) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. (3) All fuel oil tanks Pressure tests may be specially considered when deemed appropriate by the Society. (4) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.
2 Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)	(1) All cargo tank bulkheads (2) For water tanks, fuel oil tanks and lubrication oil tanks, as Special Survey No.1
3 Special Survey for ships over 10 years of age (Special Survey No.3 and subsequent Special Surveys)	(1) All cargo tank bulkheads (2) For water tanks, fuel oil tanks and lubrication oil tanks, as Special Survey No.1 (3) For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks

Table B5.23-2 Requirements of Pressure Tests for Ships Carrying Liquefied Gases in Bulk

Special Survey	Tanks subject to pressure tests
1 All Special Surveys	(1) All boundaries of ballast tanks and deep tanks within the cargo area (2) Representative fuel oil tanks within the cargo area. When deemed appropriate by the Society, pressure tests may be specially considered. (3) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. (4) All fuel oil tanks outside the cargo area Pressure tests may be specially considered when deemed appropriate by the Society. (5) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.

Table B5.24 Requirements of Pressure Tests of Bulk Carriers and Dry Cargo Ships of Not less than 500 gross tonnage

Special Survey	Tanks subject to pressure tests
1 All Special Surveys	(1) All boundaries of ballast tanks, deep tanks and cargo holds used for ballast within the cargo length area (2) Representative fuel oil tanks within the cargo length area. When deemed appropriate by the Society, pressure tests may be specially considered. (3) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. (4) All fuel oil tanks outside the cargo length area Pressure tests may be specially considered when deemed appropriate by the Society. (5) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.

Table B5.25 Additional Requirements at Special Surveys for Machinery

Items	Examinations
1 Reciprocating internal combustion engines (main propulsion machinery and auxiliary machinery for propulsion, manoeuvring and personnel safety)	(1) The essential part of the crankcase and cylinder jacket, the foundation bolts, the chock liners and the tie rod bolts are to be generally examined. (2) The doors of the crankcase and the explosion relief devices of the crankcase and scavenge space are to be generally examined. (3) The anti-vibration dampers, detuners, balancers, and compensators are to be generally examined. (4) The crankshaft alignment is to be checked and if necessary, adjusted.
2 Electrical installations	(1) The switchboards (including those for emergency), distribution boards, cables, etc. are, as far as practicable, to be generally examined. (2) Insulation resistance of the generators and switchboards (the both including those for emergency use), the motors and the cables; the main circuits of control gears for electric propulsion motors and semiconductor converters for propulsion of electric propulsion ships are to be tested to ensure that they are placed in good order, and to be adjusted if it is found not to comply with the requirements <b>2.18.1, Part H</b> . However, where a proper record of measurement is maintained and deemed appropriate by the Surveyor, consideration may be given to accepting recent readings.
3 Refrigerating machinery	(1) Safety devices are to be generally examined to ascertain that they are placed in good order. (2) The machinery is to be examined while in operation to ascertain that there is no leakage of refrigerant.
4 Spare parts and associated fittings	(1) Spare parts and their associated fittings for machinery are to be examined.
Requirements for Tankers	
1 Electrical installations in hazardous areas	(1) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in <b>4.2.7, Part H</b> is to be carried out. In addition, confirmation that the installations are in good order is to be made by measuring the insulation resistance. However, this measurement may be omitted at the discretion of the Surveyor, if accurate measurement records of the insulation resistance can be verified. (2) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out.

Table B5.26 Additional Requirements at Special Surveys

Items	Examinations
1 Speed governors, generator circuit breakers and associated relays	(1) Performance tests are to be carried out with all generators operating under loaded condition, either separately or in parallel, as far as practicable.
2 Condensers, evaporators, and receivers	(1) For those that use $NH_3$ (R717) as the refrigerant, the parts exposed to the primary refrigerant are to be tested at a pressure of 90% of the design pressure (the pressure may be reduced down to 90% of the setting pressure of the relief valves). However, the pressure test may be replaced by other means as deemed appropriate by the Society.
3 All other piped machinery and parts not specified in -2 above	(1) Pressure tests are to be handled in accordance with the requirements of <b>item 2, Table B2.8</b> where deemed necessary by the Surveyor.
4 Lighting systems, communication and signalling systems, ventilating systems, and other electrical equipment	(1) Performance tests (including operation tests) of interlocking devices used to ensure safe operation are to be carried out where deemed necessary by the Surveyor.
5 Electric generator sets, etc.	(1) Performance tests of electric generator sets and important auxiliaries are to be carried out.

Table B5.27 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations
1 Cargo tanks	<p>(1) The following examinations are to be carried out <sup>*1</sup>:</p> <ul style="list-style-type: none"> <li>(a) An internal examination of all cargo tanks</li> <li>(b) A visual examination of insulation <sup>*2</sup> or cargo tank surface (if insulation is not fitted) Special attention is to be paid to chocks, supports, keys and other parts of the tank foundations. Removal of insulation may be required where deemed necessary by the Surveyor.</li> <li>(c) Thickness measurements for cargo tank plate (where deemed necessary by the Surveyor)</li> <li>(d) Non-destructive test for independent tank of Type <i>B</i> in accordance with the approved program This program is to be prepared according to the cargo tank design. Cargo tanks other than independent tanks of Type <i>B</i> are to be examined by non-destructive tests on welded connections of the tank shell, main structural members and other parts liable to bear high stress <sup>*3</sup>. However, non-destructive testing for independent tanks of Type <i>C</i> cannot be dispensed with totally.</li> <li>(e) Leak tests of all cargo tanks However, the leak test of independent tanks below deck may be omitted, if it is verified by the log book or other proper means that gas detecting devices are in normal condition and no leak is recorded.</li> </ul> <p>(2) Where there is any doubt on the integrity of any of the cargo tanks as a result of the examinations (1)(a) through (e), the tank is to be tested under the pressures specified below.</p> <ul style="list-style-type: none"> <li>(a) For independent tanks of Type <i>C</i>: Not less than 1.25 times maximum allowable design pressure (hereinafter referred to as <i>MARVS</i>) of pressure relief valves</li> <li>(b) For independent tanks of Type <i>A</i> and <i>B</i> and integral tanks: Appropriate pressure according to the cargo tank design</li> </ul> <p>(3) For independent tanks of Type <i>C</i>, either of the following tests (a) or (b) is to be carried out at every second Special Survey in addition to examinations (1)(a) through (e).</p> <ul style="list-style-type: none"> <li>(a) Tests at a pressure 1.25 times <i>MARVS</i>, and thereafter, the non-destructive test stipulated in (1)(d)</li> <li>(b) Non-destructive test according to the program prepared for the cargo tank design <sup>*4</sup></li> </ul>
2 Hold spaces and secondary barriers	<p>(1) Tank supporting and surrounding hull structures in hold spaces, secondary barriers and their insulation are to be visually examined.</p> <p>(2) For membrane containment systems, it is to be verified that secondary barriers keep a specific level of tightness required in the system design in accordance with programs and acceptance criteria approved in advance. However, low differential pressure tests are not to be considered an acceptable test for the tightness of secondary barriers. For membrane containment systems with glued secondary barriers, if the verification results do not satisfy the approved acceptance criteria, an investigation is to be carried out and additional testing such as thermographic or acoustic emissions testing is to be carried out.</p> <p>(3) For other cargo containment systems, in cases where there is any doubt about integrity of secondary barriers, the integrity is to be verified by pressure or vacuum test or other proper means. <sup>*5</sup></p>
3 Venting system for cargo tanks	<p>(1) Pressure relief valves for cargo tanks are to be overhauled, readjusted, performance-tested and sealed. <sup>*6</sup> Pressure/vacuum relief devices and associated safety systems for interbarrier spaces and hold spaces are to be examined, overhauled and tested depending on their design. <sup>*6</sup></p>
4 Cargo and process piping	<p>(1) Examinations (a) and (b) are to be carried out. Removal of insulation may be required where deemed necessary by the Surveyor.</p> <ul style="list-style-type: none"> <li>(a) Where deemed necessary by the Surveyor; whole or a part of the valves and associated fittings are to be overhauled, or a pressure test at a pressure 1.25 times <i>MARVS</i> is to be carried out and after the pipes that were removed are reinstalled, a leak test is to be carried out</li> <li>(b) Pressure relief valves are to be visually examined and whole or a part of these valves are to be overhauled, readjusted, performance tested and sealed.</li> </ul>

Items	Examinations
5 Cargo handling equipment	<p>(1) Examinations and tests (a) through (c) are to be carried out.</p> <p>(a) Cargo pumps, cargo gas compressors and gas blowers, and their prime movers are to be overhauled and performance tests for safety devices are to be carried out. Overhaul of electric motors as prime movers may be dispensed with. <sup>*7</sup></p> <p>(b) Heat exchangers, pressure vessels and evaporators are to be overhauled and pressure relief valves are to be performance tested. If an internal examination of vessels is impracticable, a pressure test of vessels and a performance test of pressure relief valves are to be carried out. <sup>*7</sup></p> <p>(c) The following tests i) through iii) are to be carried out for refrigerating equipment.</p> <p>i) Overhaul of pumps and compressors and performance tests of pressure vessels such as condensers, evaporators, inter-coolers, oil separators and relief valves <sup>*7</sup></p> <p>ii) Leak test of pressure vessels and heat exchangers at a pressure of not less than 90% of the set pressure of relief valves</p> <p>iii) Leak test of refrigerant piping system at a pressure of not less than 90% of set pressure of relief valves</p> <p>(d) Gas combustion units (GCU)s are to be overhauled.</p>
6 Emergency shutdown devices	<p>(1) For emergency shutdown valves, open-up examinations and leakage testing of valve seats are to be carried out. <sup>*6 *8</sup></p>
7 Electrical installations in hazardous areas	<p>(1) Examinations for tankers of <a href="#">Table B5.25</a> are to be carried out.</p>

Notes:

- (\*1) For membrane and semi-membrane tanks and internal insulation tanks, examination and testing are to be carried out in accordance with programs specially prepared according to approved methods for each tank system.
- (\*2) If visual examination of the insulation of tanks is impossible, the surrounding structural members are to be examined for cold spots when the cargo tanks are cooled. However, where integrity of cargo tanks and their insulation is verified by the cargo log book, the examination of cold spots may be omitted.
- (\*3) Parts liable to bear high stress:
- cargo tank supports and anti-rolling / anti-pitching devices
  - web frames or stiffening rings
  - swash bulkhead boundaries
  - dome and sump connections to tank shell
  - foundations for pumps, towers, ladders, etc.
  - pipe connections
- (\*4) If an approved non-destructive test program does not exist, then a non-destructive test of at least 10 % of the length of the welded connections in each of the highly stressed areas below is to be conducted. This test is to be carried out from both inside and outside of the tank as appropriate and insulation is to be removed, as necessary.
- cargo tank supports and anti-rolling / anti-pitching devices
  - stiffening rings
  - Y-connections between tank shell and a longitudinal bulkhead of bilobe tanks
  - swash bulkhead boundaries
  - dome and sump connections to tank shell
  - foundations for pumps, towers, ladders, etc.
  - pipe connections
- (\*5) Appropriate pressure or vacuum tests and examination for cold spots are to be carried out. However, where integrity of insulation is verified by the log book, examination for cold spots may be omitted.
- (\*6) For valves of which continuous open-up examinations and operation tests have been carried out in the presence of a Surveyor after the previous Special Survey and whose test records are confirmed, open-up examinations may be replaced by visual examinations to the extent that such visual examinations are feasible.
- (\*7) Equipment that has the open inspection at Planned Machinery Surveys need only be visually examined at Special Surveys.

(\*8) In cases where the conditions of valve bodies and valve seats can be checked without removing their valve casings from the fitted piping, internal confirmatory examinations may be regarded as open-up examinations. In cases where the condition of the valve is confirmed to be good during such examinations, leakage testing may be omitted.

Table B5.28 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Insulation of cargo tanks	(1) A general examination of the insulation is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation may be required.
2 Cargo tank foundations	(1) A general examination of the foundations of cargo tanks including supports, keys and anti-rolling / anti-pitching devices is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation may be required.
3 Sealing arrangement for tanks	(1) A general examination of the sealing arrangement for tanks and tank covers penetrating decks is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation or covers, or performance tests of the closing devices may be required.
4 Cargo pumps	(1) Main parts of cargo pumps are to be opened up and examined.*1
5 Electrical installations in hazardous areas	(1) Examinations specified for tankers in item 2 of <a href="#">Table B5.25</a> are to be carried out.

Note:

(\*1) Equipment that has the open inspection at Planned Machinery Surveys need only be visually examined at Special Surveys.

Table B5.29 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Fuel storage tanks	<p>(1) The following examinations and testing are to be carried out <sup>*1</sup>:</p> <ul style="list-style-type: none"> <li>(a) Internal examinations of all fuel storage tanks. Vacuum insulated independent fuel storage tanks of type <i>C</i> without access openings, however, need not be examined internally. Where fitted, the vacuum monitoring system is to be examined, and records are to be reviewed.</li> <li>(b) Visual examinations of thermal insulation<sup>*2</sup> or surfaces of fuel storage tanks without thermal insulation <ul style="list-style-type: none"> <li>i) Special attention is to be paid in way of chocks of tank foundations, tank supports, keys, etc. Removal of thermal insulation may be required where deemed necessary by the Surveyor.</li> <li>ii) Non-destructive testing may be required if conditions raise doubt to the structural integrity.</li> </ul> </li> <li>(c) Thickness measurements for tank plates may be required where deemed necessary by the Surveyor.</li> <li>(d) Non-destructive testing for independent fuel storage tanks of Type <i>B</i> in accordance with the approved programme is to be carried out. The programme is to be that prepared according to fuel storage tank design. Fuel storage tanks other than independent fuel storage tanks of Type <i>B</i> are to be examined by non-destructive testing on welded connections of the tank plates, main structural members and parts where high stress is deemed likely to occur where deemed necessary by the Surveyor.<sup>*3</sup></li> <li>(e) Leakage testing of all fuel storage tanks</li> </ul> <p>(2) Where there is any doubt regarding the integrity of a fuel storage tank as a result of examinations specified in (1)(a) to (e), such a fuel storage tank is to be tested by hydraulic or hydro-pneumatic testing under the pressures specified below:</p> <ul style="list-style-type: none"> <li>(a) Independent fuel storage tanks of Type <i>C</i>: a pressure not less than 1.25 times the maximum allowable relief valve setting (hereinafter referred to as “<i>MARVS</i>”); or</li> <li>(b) For integral tanks and for independent tanks of Type <i>A</i> and <i>B</i>: an appropriate pressure according to fuel storage tank design, as far as practicable, with the pressure at the top of the tank corresponding at least to the <i>MARVS</i>.</li> </ul> <p>(3) For all independent fuel storage tanks of Type <i>C</i>, either the following (a) or (b) examination is to be carried out at every second Special Survey in addition to examinations (1)(a) to (e).</p> <ul style="list-style-type: none"> <li>(a) Hydraulic or hydro-pneumatic testing at a pressure not less than 1.25 times <i>MARVS</i>, and the non-destructive testing specified in (1)(d)</li> <li>(b) Non-destructive testing according to a programme prepared based upon fuel storage tank design<sup>*4</sup></li> </ul> <p>(4) Where water cannot be tolerated and the fuel storage tank cannot be dried prior to putting the tank into service, the Surveyor may accept alternative testing fluids or alternative means of testing.</p>
2 Tank support arrangements, tank fixing arrangements, etc.	<p>(1) Tank support arrangements, anti-rolling or anti-pitching devices, and surrounding hull structures and their thermal insulation are to be visually examined. Non-destructive testing may be required if conditions raise doubt to the structural integrity.</p> <p>(2) For membrane tanks, it is to be verified that the gas-tightness of secondary barriers is kept on the level of tightness required for system design in accordance with the programme and acceptance criteria approved in advance. Low differential pressure testing, however, is not to be adopted for testing the tightness of secondary barriers. For glued secondary barriers, if the verification results do not satisfy the required level of gas-tightness, an investigation is to be carried out to analyse the causes of failure, and additional testing such as thermographic or acoustic emission testing is to be carried out taking into account the analysis.</p> <p>(3) For other secondary barriers, gas-tightness is to be verified by pressure or vacuum testing or other proper means in cases where there is any doubt.<sup>*5</sup></p>
3 Venting systems for fuel containment systems	<p>(1) The pressure relief valves for the fuel storage tanks are to be opened for examination, adjusted, function tested and sealed.<sup>*6</sup> If the tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such non-metallic membranes are to be replaced.</p> <p>(2) The pressure/vacuum relief valves, rupture disc and other pressure relief devices for interbarrier spaces and fuel storage hold spaces are to be opened, examined, tested and readjusted as necessary, depending on their design.<sup>*7</sup></p> <p>(3) The vacuum protection systems for fuel storage tanks are to be overhauled and tested appropriately for the design.<sup>*8</sup></p>

Items	Examinations
4 Fuel piping and process piping systems, etc.	<p>(1) The following examinations and testing are to be carried out.</p> <ul style="list-style-type: none"> <li>(a) All piping for fuel storage, fuel bunkering, and fuel supply such as venting, compressing, refrigerating, liquefying, heating, storing, burning or otherwise handling the fuel and liquid nitrogen installations are to be examined. Removal of thermal insulation from the piping and opening for examination may be required where deemed necessary by the Surveyor.</li> <li>(b) Where deemed suspect by the Surveyor during (a) above, a hydrostatic test to 1.25 times the <i>MARVS</i> for the pipeline is to be carried out. After reassembly, the complete piping is to be tested for leaks. Where water cannot be tolerated and the piping cannot be dried prior to putting the system into service, the Surveyor may accept alternative testing fluids or alternative means of testing.</li> <li>(c) Pressure relief valves for the fuel supply and bunkering piping is to be opened for examination, adjusted, and function tested and sealed. Where a proper record of continuous overhaul and retesting of individually identifiable relief valves is maintained, consideration will be given to acceptance on the basis of opening, internal examination, and testing of a representative sampling of valves, including each size and type of liquefied gas or vapor relief valve in use, provided there is logbook evidence that the remaining valves have been overhauled and tested since crediting of the previous Special Survey.</li> <li>(d) All emergency shut-down valves, check valves, block and bleed valves, master gas valves, remote operating valves, isolating valves for pressure relief valves in the fuel storage, fuel bunkering, and fuel supply piping systems are to be examined and proven operable. A random selection of valves is to be opened for examination.</li> <li>(e) Leakage testing of the emergency shut-down valves opened in accordance with (d) above is to be carried out.</li> </ul>
5 Components of bunkering systems, fuel containment systems, gas consumers and fuel supply systems for low-flashpoint fuels	<p>(1) The following examinations and testing are to be carried out.</p> <ul style="list-style-type: none"> <li>(a) Fuel pumps and fuel compressors as well as their prime movers are to be overhauled, and performance testing of safety devices is to be carried out. Overhauling of electric motors for prime movers, however, may be omitted.*<sup>9</sup></li> <li>(b) Heat exchangers, pressure vessels, including process pressure vessels, evaporators and other components used in connection with fuel handling are to be overhauled. Pressure relief systems are to be performance tested. If an internal examination of the pressure vessels, including process pressure vessels, is impracticable, pressure testing of the vessels and performance testing of pressure relief systems are to be carried out.*<sup>9</sup></li> <li>(c) The examinations specified in the following i) to iii) are to be carried out for refrigerating equipment. <ul style="list-style-type: none"> <li>i) Overhauling of pumps and compressors and performance testing of pressure vessels such as condensers, evaporators, inter-coolers and oil separators and the relief systems*<sup>9</sup></li> <li>ii) Leakage testing of pressure vessels and heat exchangers at a pressure not less than 90% of the setting pressure of their relief systems</li> <li>iii) Leakage testing of refrigerant piping systems at a pressure of not less than 90% of the setting pressure of their relief systems</li> </ul> </li> <li>(d) General examinations of inert gas generators are to be carried out.</li> <li>(e) Gas combustion units (GCUs) are to be overhauled.</li> </ul>
6 Electrical installations	<p>(1) The following examinations and testing are to be carried out.</p> <ul style="list-style-type: none"> <li>(a) Examination of electrical equipment to include the physical condition of electrical cables and supports, intrinsically safe, explosion proof, or increased safety features of electrical equipment.</li> <li>(b) Testing of systems for de-energizing electrical equipment which is not certified for use in hazardous areas.</li> <li>(c) An electrical insulation resistance test of the circuits terminating in, or passing through, the hazardous zones and spaces is to be carried out. However, this test may be omitted at the discretion of the Surveyor, if accurate test records of the insulation resistance can be verified.</li> <li>(d) The earthing between fuel storage tanks or fuel piping systems (fuel pipes, vent pipes, etc.) and hull structures is to be examined.</li> <li>(e) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in 4.2.7, Part H is to be carried out.</li> <li>(f) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out. In addition, functional testing of pressurized equipment and associated alarms is to be carried out.</li> </ul>



Items	Examinations
7 Safety Systems	<p>(1) Gas detectors, temperature sensors, pressure sensors, level indicators, and other equipment providing input to the fuel safety system are to be tested to confirm satisfactory operating condition.</p> <p>(a) Proper response of the fuel safety system upon fault conditions is to be verified.</p> <p>(b) Pressure, temperature and level indicating equipment are to be calibrated in accordance with the manufacturer's requirements.</p>

## Notes:

- (\*1) For membrane tanks, examinations and testing are to be carried out in accordance with a programme specially prepared according to methods approved for each tank system.
- (\*2) If visual examinations of the thermal insulation of tanks are impossible, their surrounding structural members are to be examined for cold spots when the fuel storage tanks are cooled. Where the integrity of fuel storage tanks and their thermal insulation is verified by checking the bunker delivery note for the low-flashpoint fuel delivered, however, the examinations of cold spots may be omitted.
- (\*3) For type C tanks, non-destructive testing is not to be totally dispensed with. Parts where high stress is deemed likely to occur:
- fuel storage tank supports and anti-rolling/anti-pitching devices
  - web frames or stiffening rings
  - swash bulkhead boundaries
  - dome and sump connections to tank shell
  - foundations for fuel pumps, towers or ladders, etc.
  - pipe connections
- (\*4) If an approved non-destructive testing programme does not exist, non-destructive testing of at least 10% of the length of the welded connections in each highly stressed area given below is to be conducted. This testing is to be carried out from both inside and outside of the tank, as appropriate, with thermal insulation removed, as necessary.
- fuel storage tank supports and anti-rolling/anti-pitching devices
  - stiffening rings
  - Y-connections between tank plates and longitudinal bulkheads of bilobe tanks
  - swash bulkhead boundaries
  - dome and sump connections to the tank shell
  - foundations for fuel pumps, towers or ladders, etc.
  - pipe connections
- (\*5) Appropriate pressure or vacuum testing and examinations for cold spots are to be carried out. Where the integrity of thermal insulation is verified by checking the bunker delivery note for the low-flashpoint fuel delivered, however, the examinations for cold spots may be omitted.
- (\*6) In cases where it is confirmed through the examination of records that the pressure relief valves have been opened for examination, adjusted, function tested and sealed at an interval not exceeding five *years*, general examinations of the pressure relief valves need only be carried out at Special Surveys.
- (\*7) In cases where it is confirmed through the examination of records that the pressure/vacuum relief valves, rupture disc or other pressure relief devices have been opened, examined, tested and readjusted at an interval not exceeding five *years*, respective general examinations of the pressure/vacuum relief valves, rupture disc or other pressure relief devices need only be carried out.
- (\*8) For systems whose continuous open-up examinations and performance testing since the previous Special Survey have been carried out in the presence of a Surveyor and whose test records are confirmed, visual examinations to the extent as far as practical may be carried out in lieu of the required testing.
- (\*9) For equipment that is overhauled at Planned Machinery Surveys, overhauling at Special Surveys may be replaced by visual examinations to the extent as far as practical.

Table B5.30 Interpretations of Rule Requirements for the Number and Location of Thickness Measurements for Bulk Carriers Built under **Part CSR-B** or **Part CSR-B&T**

Item	Interpretation	Reference
1 Selected plates on deck, tank top, bottom, double bottom and wind-and-water area	(1) «Selected» means at least a single point on one out of three plates, to be chosen as representative areas of average corrosion	
2 All deck, tank top and bottom plates and wind-and-water strakes	(1) At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion	
3 Transverse section	(1) Single side skin construction: A transverse section includes all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, side, bottom; inner bottom and hopper side plating and bottom plating in top wing tanks. (2) Double side skin construction: A transverse section includes all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, sides, bottom, inner bottom, hopper sides, inner sides and top wing inner sides.	<b>Fig B5.1</b>
4 All cargo hold hatch covers and coamings	(1) Including plates and stiffeners	<b>Fig. B5.2</b>
5 Transverse section of deck plating outside line of cargo hatch openings	(1) Two single points on each deck plate (to be taken either at each 1/4 extremity of the plate or at representative areas of average corrosion) between the ship sides and hatch coamings in the concerned transverse section	
6 All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches	(1) «All deck plating» means at least two points on each plate to be taken either at each 1/4 extremity of the plate or at representative areas of average corrosion. “Under deck structure”: at each short longitudinal girder: three points for web plating (fwd/middle/aft), one point for face plate, one point for web plating and one point for face plating of transverse beams in way. At each end of transverse beams, one point for web plating and one point for face plate	<b>Fig. B5.6</b>
7 Selected side shell frames in cargo holds of single side skin construction	(1) Includes side shell frames, upper and lower end attachments and adjacent shell plating. (2) 25% of frames: one out of four frames should preferably be chosen throughout the cargo hold length on each side. (3) 50% of frames: one out of two frames should preferably be chosen throughout the cargo hold length on each side. (4) «Selected frames» means at least 3 frames on each side of cargo holds	<b>Fig. B5.3</b>
8 Transverse frame in double skin tank of double side skin construction	---	<b>Fig. B5.1</b>
9 Transverse bulkheads in cargo holds	(1) Includes bulkhead plating, stiffeners and girders. Also includes internal structures of upper and lower stools, where fitted. Two selected bulkheads: one is to be the bulkhead between the two foremost cargo holds and the second may be chosen in another position	<b>Fig. B5.4</b>
10 One transverse bulkhead in each cargo hold	(1) This means that close-up surveys and related thickness measurements are to be performed on one side of the bulkhead; the side is to be chosen based on the outcome of the overall survey of both sides. In the event of doubt, the Surveyor may also require (possibly partial) close-up surveys on the other side	<b>Fig. B5.4</b>
11 Transverse bulkheads in one topside, hopper, double bottom ballast tank and side ballast tank (double side skin)	(1) Includes bulkhead and stiffening systems. (2) The ballast tank is to be chosen based on the history of ballasting among those prone to have the most severe conditions	<b>Fig. B5.5</b>

Item	Interpretation	Reference
12 Transverse webs in ballast tanks	<p>(1) Includes web plating, face plates, stiffeners and associated plating and longitudinals.</p> <p>(2) One of representative tanks of each type (i.e. topside or hopper or side tank) is to be chosen for in the forward part</p>	<p><b>Fig. B5.1</b></p> <p><b>Fig. B5.3</b></p>

Table B5.31 Interpretations of Rule Requirements for the Number and Location of Thickness Measurements for Double Hull Oil Tankers Built under **Part CSR-T** or **Part CSR-B&T**

Item	Interpretation	Reference
1 Selected plates	(1) «Selected» means at least a single point on one out of three plates, to be chosen as representative areas of average corrosion.	
2 Deck, bottom plates and wind-and-water strakes	(1) At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion.	
3 Transverse section	<p>(1) Measurements to be taken on all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, side, bottom, longitudinal bulkheads, inner bottom and hopper. One point to be taken on each plate. Both web and flange to be measured on longitudinals, if applicable.</p> <p>(2) For tankers older than 10 years of age:</p> <ul style="list-style-type: none"> <li>• Within 0.1 <i>D</i> (where <i>D</i> is the ship's moulded depth) of the deck and bottom at each transverse section to be measured,</li> <li>• Every longitudinal and girder is to be measured on webs and face plates</li> <li>• Every plate is to be measured at one point between longitudinals.</li> </ul>	<b>Fig. B5.7</b>
4 Transverse rings <sup>(1)</sup> in cargo and ballast tanks	<p>(1) At least two points on each plate in a staggered pattern and two points on the corresponding flange, where applicable.</p> <p>(2) Minimum 4 points on the first plate below deck.</p> <p>(3) Additional points in way of curved parts.</p> <p>(4) At least one point on each of two stiffeners between stringers / longitudinal girders.</p>	<b>Fig. B5.8</b>
5 Transverse bulkheads in cargo tanks	<p>(1) At least two points on each plate. Minimum 4 points on the first plate below main deck.</p> <p>(2) At least one point on every third stiffener to be taken between each stringer.</p> <p>(3) At least two points on each plate of stringers and girders, and two points on the corresponding flange.</p> <p>(4) Additional points in way of curved parts.</p> <p>(5) Two points of each diaphragm plate of stools (if fitted).</p>	<b>Fig. B5.9</b>
6 Transverse bulkheads in ballast tanks	<p>(1) At least 4 points on plates between stringers / longitudinal girders, or per plate if stringers / girders are not fitted.</p> <p>(2) At least two points on each plate of stringers and girders, and two points on the corresponding flange.</p> <p>(3) Additional points in way of curved parts.</p> <p>(4) At least one point on two stiffeners between each stringer / longitudinal girder.</p>	<b>Fig. B5.10</b>
7 Adjacent structural members	(1) On adjacent structural members, one point per plate and one point on every third stiffener / longitudinal.	

- (1) "Transverse rings" means all transverse material appearing in a cross-section of the ship's hull in way of a double bottom floor, vertical web and deck transverse

Table B5.32 Special Requirements for Ships Affixed with the Notation “CybR”

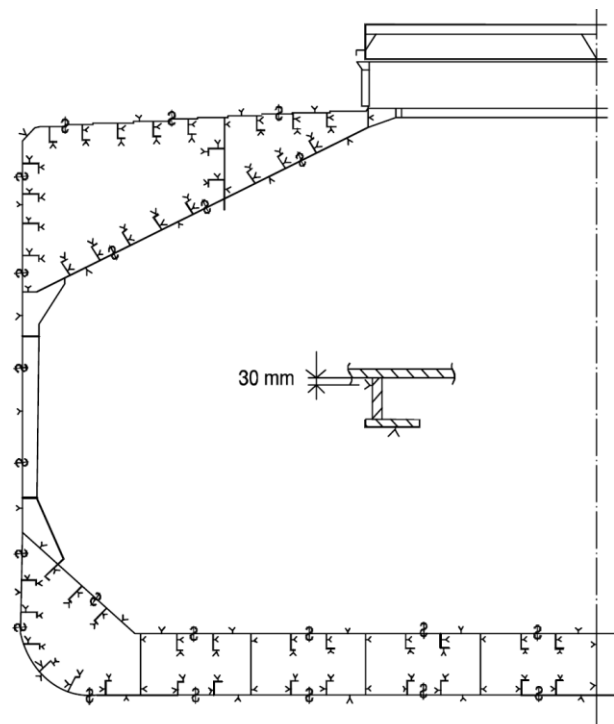
Item	Examination
Security requirements for “Identify”	
1 Vessel asset inventory(5.4.2(1), Part X)	<p>(1) Vessel asset inventory is updated and completed at delivery</p> <p>(2) Computer-based systems in the scope of applicability of Chapter 5, Part X are correctly represented by the vessel asset inventory</p> <p>(3) Software of the computer-based systems in the scope of applicability of Chapter 5, Part X has been kept updated, e.g. by vulnerability scanning or by checking the software versions of computer-based systems while switched on.</p>
Security requirements for “Protect”	
2 Security zones and network segmentation (5.4.3(1), Part X)	<p>(1) The security zones on board are implemented in accordance with the approved documents (i.e. zones and conduit diagram, cyber security design description, asset inventory, and relevant documents provided by the supplier). This may be done by e.g., inspection of the physical installation, network scanning and/or other methods providing the Surveyor assurance that the installed equipment is grouped in security zones according to the approved design.</p> <p>(2) Security zone boundaries allow only the traffic that has been documented in the approved Cyber security description. This may be done by e.g., evaluation of firewall rules or port scanning.</p>
3 Network protection safeguards (5.4.3(2), Part X) <sup>(1), (2)</sup>	<p>(1) Test denial of service (DoS) attacks targeting zone boundary protection devices, as applicable.</p> <p>(2) Test denial of service (DoS) to ensure protection against excessive data flow rate, originating from inside each network segment. Such denial of service (DoS) tests are to cover flooding of network (i.e., attempt to consume the available capacity on the network segment), and application layer attack (i.e., attempt to consume the processing capacity of selected endpoints in the network)</p> <p>(3) Test e.g. by analytic evaluation and port scanning that unnecessary functions, ports, protocols and services in the computer-based systems have been removed or prohibited in accordance with hardening guidelines provided by the suppliers.</p>
4 Antivirus, antimalware, antispam and other protections from malicious code (5.4.3(3), Part X) <sup>(2)</sup>	<p>(1) Approved anti-malware software or other compensating countermeasures is effective (test e.g., with a trustworthy anti-malware test file)</p>
5 Wireless communication(5.4.3(5), Part X) <sup>(2)</sup>	<p>(1) Only authorised devices can access the wireless network.</p> <p>(2) Secure wireless communication protocol is used as per approved documentation by the respective supplier (demonstrate e.g. by use of a network protocol analyser tool).</p>
6 Remote access control and communication with untrusted networks (5.4.3(6), Part X)	<p>(1) Communication with untrusted networks is secured in accordance with 4.4.3, Part X and that the communication protocols cannot be negotiated to a less secure version (demonstrate e.g., by use of a network protocol analyzer tool).</p> <p>(2) Remote access requires multifactor authentication of the remote user.</p> <p>(3) A limit of unsuccessful login attempts is implemented, and that a notification message is provided for the remote user before session is established.</p> <p>(4) Remote connections must be explicitly accepted by responsible personnel on board.</p> <p>(5) Remote sessions can be manually terminated by personnel on board or that the session will automatically terminate after a period of inactivity.</p> <p>(6) Remote sessions are logged (see No.13 in Table X4.1, Part X).</p> <p>(7) Instructions or procedures are provided by the respective product suppliers (see 4.4.1(3), Part X)</p>
7 Use of mobile and portable devices (5.4.3(7), Part X)	<p>(1) Use of mobile and portable devices is restricted to authorised users.</p> <p>(2) Interface ports can only be used by specific device types.</p> <p>(3) Files cannot be transferred to the system from such devices.</p> <p>(4) Files on such devices will not be automatically executed (by disabling autorun).</p> <p>(5) Network access is limited to specific MAC or IP addresses.</p> <p>(6) Unused interface ports are disabled.</p> <p>(7) Unused interface ports are physically blocked.</p>

Security requirement for the “Detect”		
8	Network operation monitoring (5.4.4(1), Part X) <sup>(1), (2)</sup>	(1) Test that disconnected network connections will activate alarm and that the event is recorded. (2) Test that abnormally high network traffic is detected, and that alarm and audit record is generated. This test may be carried on together with the test specified in -11. (3) Demonstrate that the computer-based system will respond in a safe manner to network storm scenarios, considering both unicast and broadcast messages (see also 5.4.3(2)(d)iii), Part X) (4) Demonstrate generation of audit records (logging of security-related events) (5) If Intrusion detection systems are implemented, demonstrate that this is passive and will not activate protection functions that may affect intended operation of the computer-based systems.
Security requirements for “Respond”		
9	Local, independent and/or manual operation (5.4.5(2), Part X) <sup>(1), (2)</sup>	(1) The required local controls needed for safety of the ship can be operated independently of any remote or automatic control systems. The tests are to be carried out by disconnecting all networks from the local control system to other systems/devices.
10	Network isolation (5.4.5(3), Part X) <sup>(1), (2)</sup>	(1) By disconnecting all networks traversing security zone boundaries, that the computer-based systems in the security zone will maintain adequate operational functionality without network communication with other security zones or networks.
11	Fallback to a minimal risk condition (5.4.5(4), Part X) <sup>(1), (2)</sup>	(1) Respond to cyber incidents in a safe manner (as per 5.4.5(4)(d)i), Part X), e.g. by maintaining its outputs to essential services and allowing operators to carry out control and monitoring functions by alternative means. The tests are to at least include denial of service (DoS) attacks and may be done together with related test specified in -8.
Security requirements for “Recover”		
12	Backup and restore capability (5.4.6(2), Part X) <sup>(1), (2)</sup>	(1) The procedures and instructions for backup and restore provided by the suppliers for computer-based systems.
13	Controlled shutdown, reset, restore and restart (5.4.6(3), Part X) <sup>(1), (2)</sup>	(1) Manuals or procedures are established for shutdown, reset and restore of the computer-based systems.

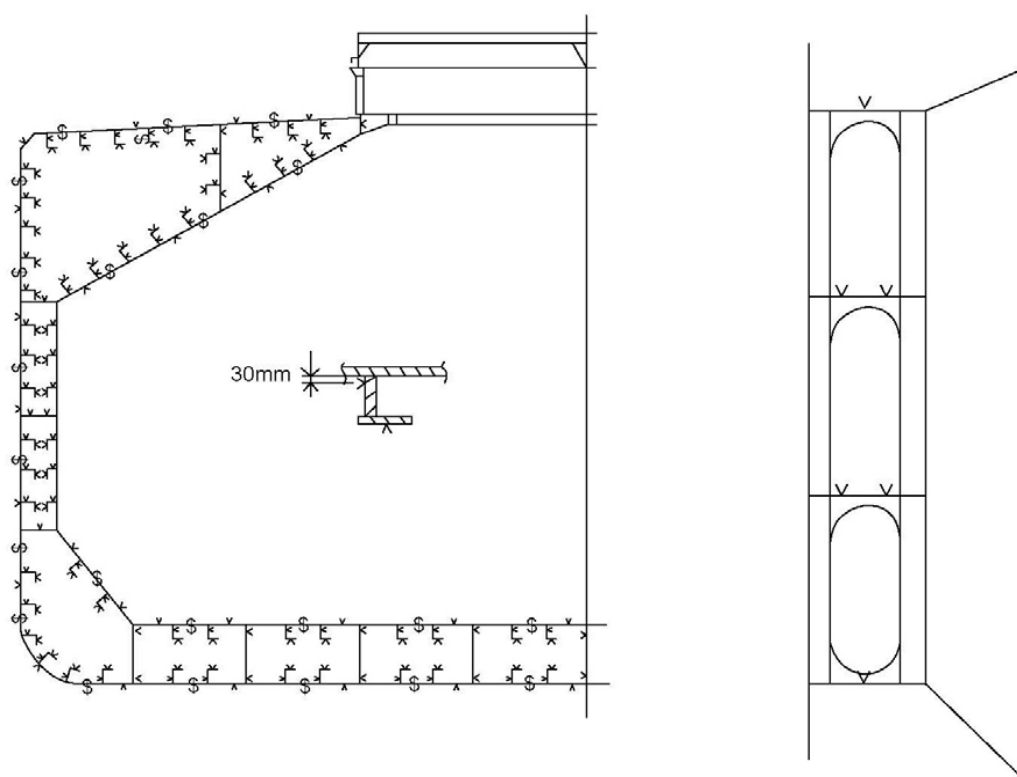
Notes:

- 1 Subject to modifications of the computer-based systems, the tests are carried out.
- 2 The tests may be omitted if performed during the certification of computer-based systems as per 2.2.3-3(2), Part X.

Fig. B5.1 Example of Locations subject to Thickness Measurements in Transverse Sections (Bulk Carriers)



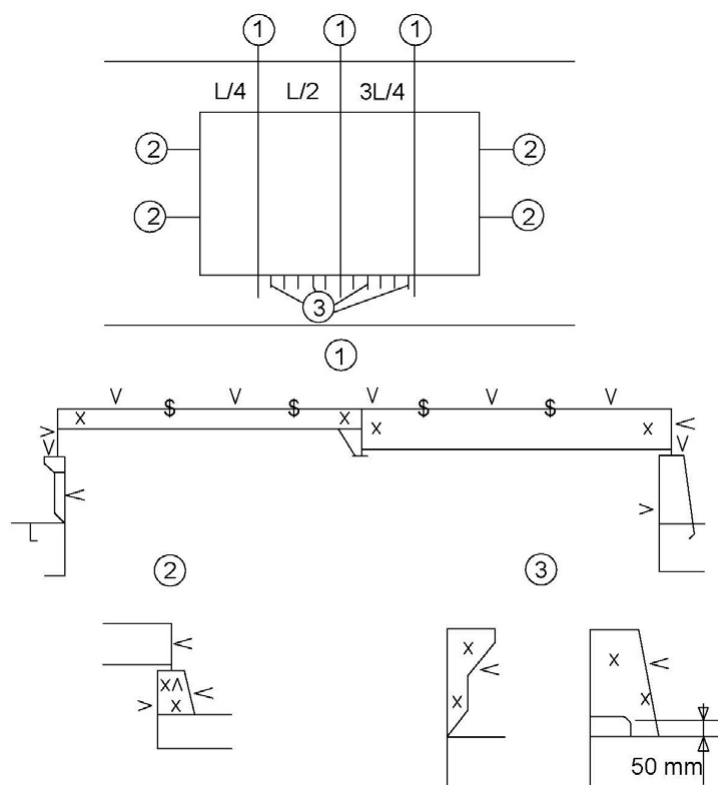
Single side bulk carriers



Double side bulk carriers

Note: Measurements are to be taken for both the port and starboard sides of the selected transverse section.

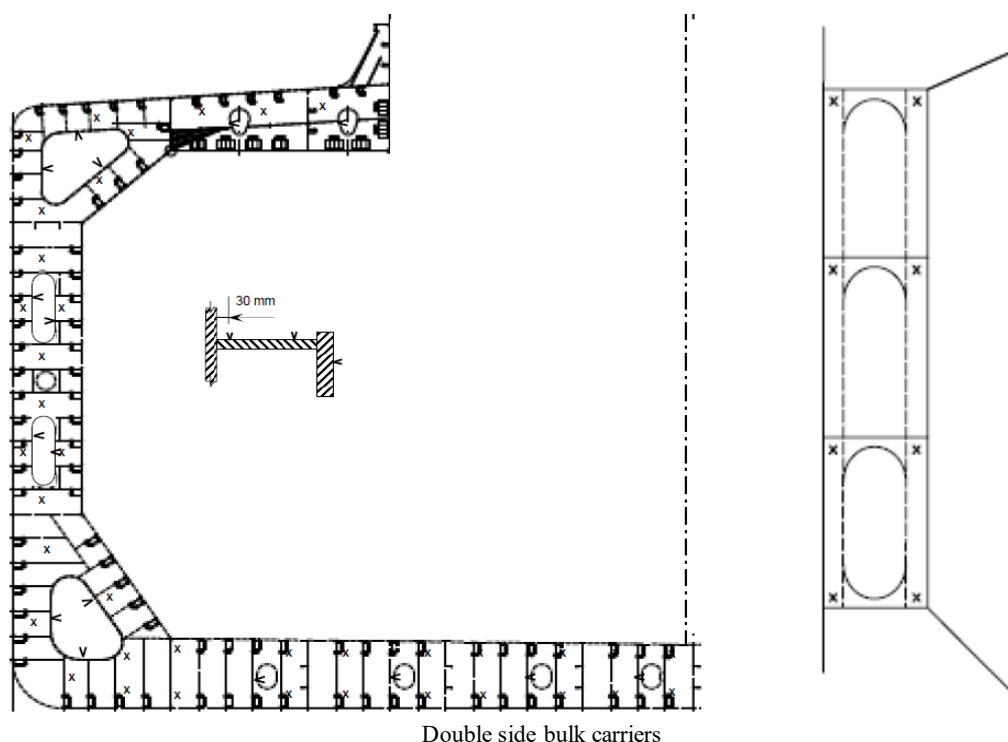
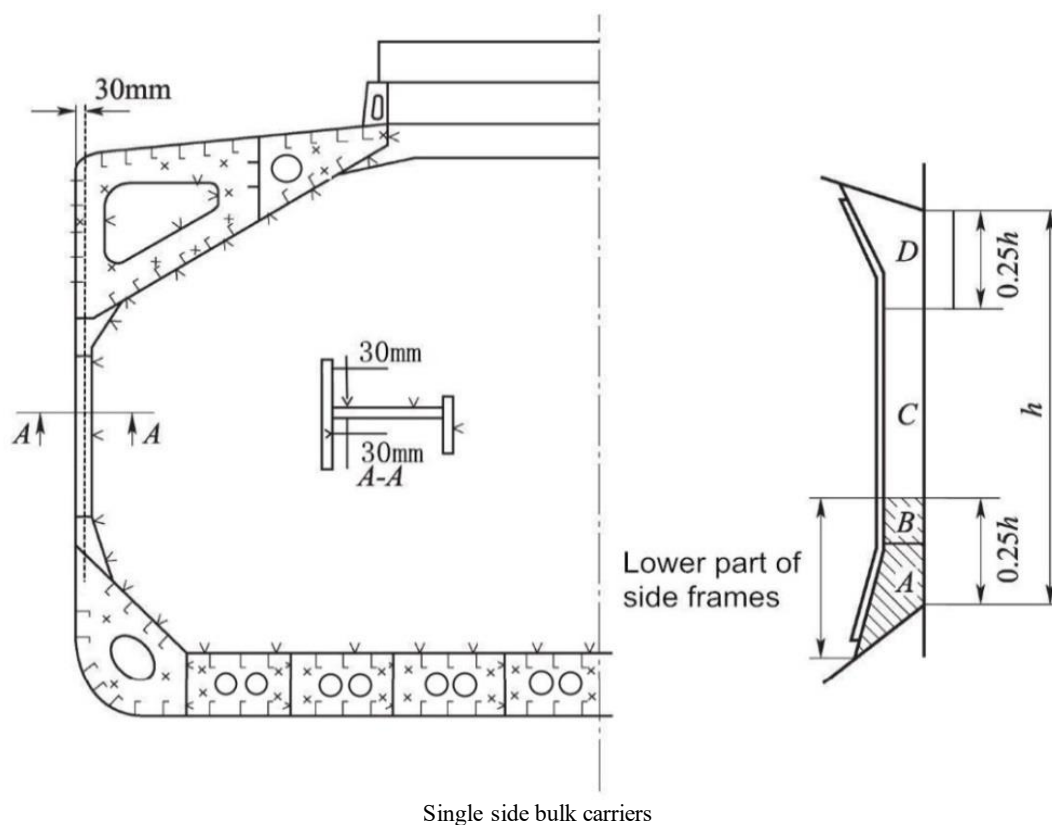
Fig. B5.2 Example of Locations subject to Thickness Measurements on Hatch Covers and Hatch Coamings  
(Bulk Carriers)



Notes:

1. Three sections at  $L/4$ ,  $L/2$ ,  $3L/4$  of hatch cover length, including:
  - one measurement of each hatch cover plate and skirt plate
  - measurements of adjacent beams and stiffeners
  - one measurement of coaming plates and coaming flanges, for each side
2. Measurements of both ends of hatch cover skirt plates, coaming plates and coaming flanges
3. One measurement (two points for web plates and one point for face plates) of one out of three hatch coaming brackets and bars, on both sides and both ends

Fig. B5.3 Example of Locations subject to Thickness Measurements in Cargo Holds and Water Ballast Tanks

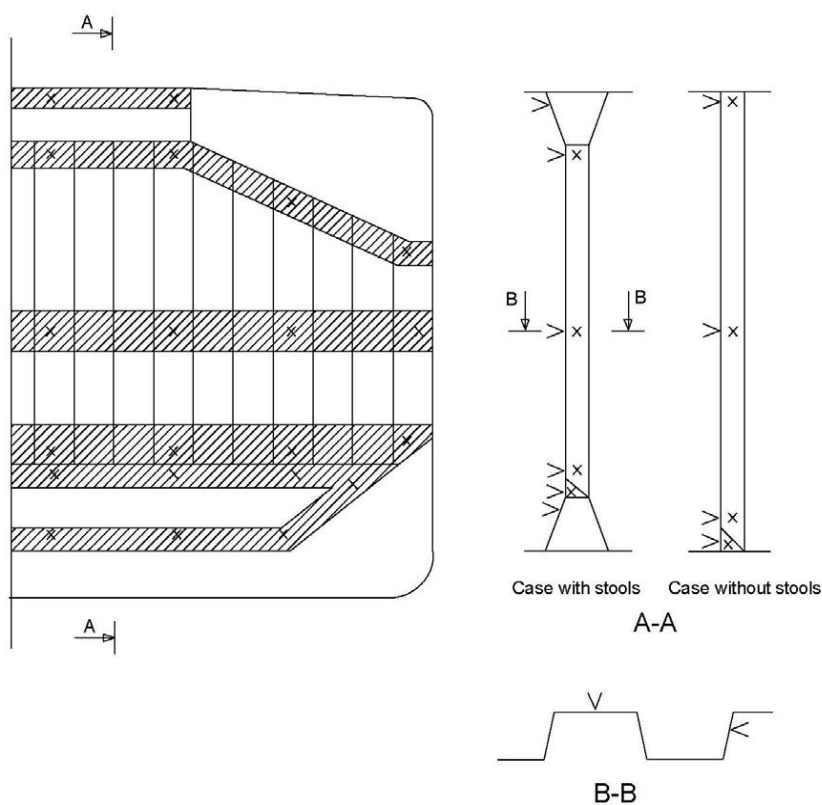


Note:

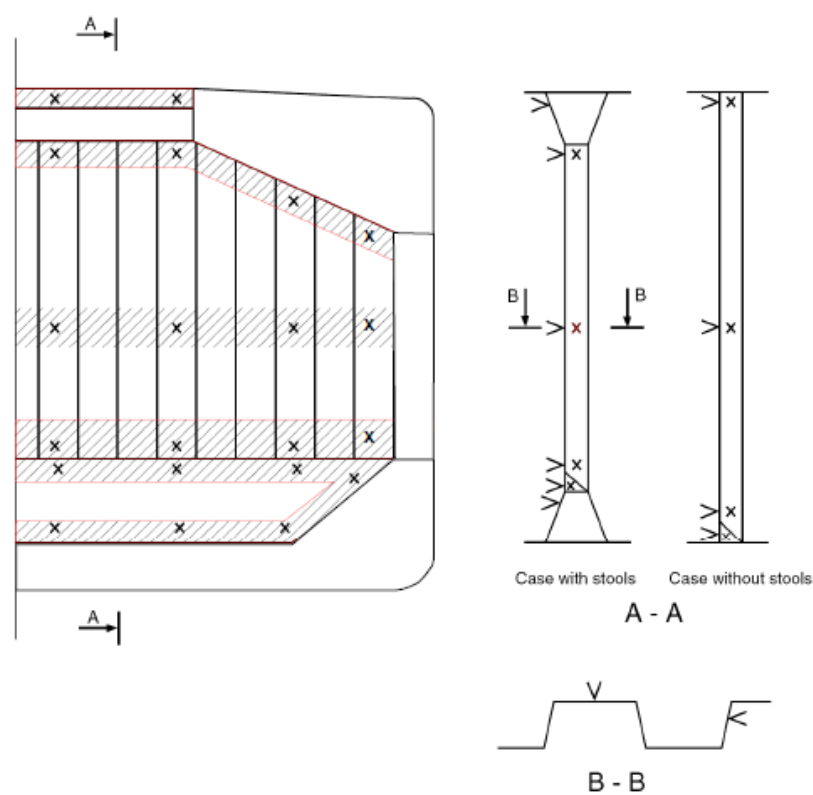
The gauging pattern for web plates is to be a three point pattern for zones A, C and D, and a two point pattern for zone B (see figure). The gauging report is to reflect the average reading. The average reading is to be compared with the allowable thickness. If the web plate has general corrosion then this pattern is to be expanded to a five-point pattern.



Fig. B5.4 Example of Locations subject to Thickness Measurements on Cargo Hold Transverse Bulkheads



### Single side bulk carriers

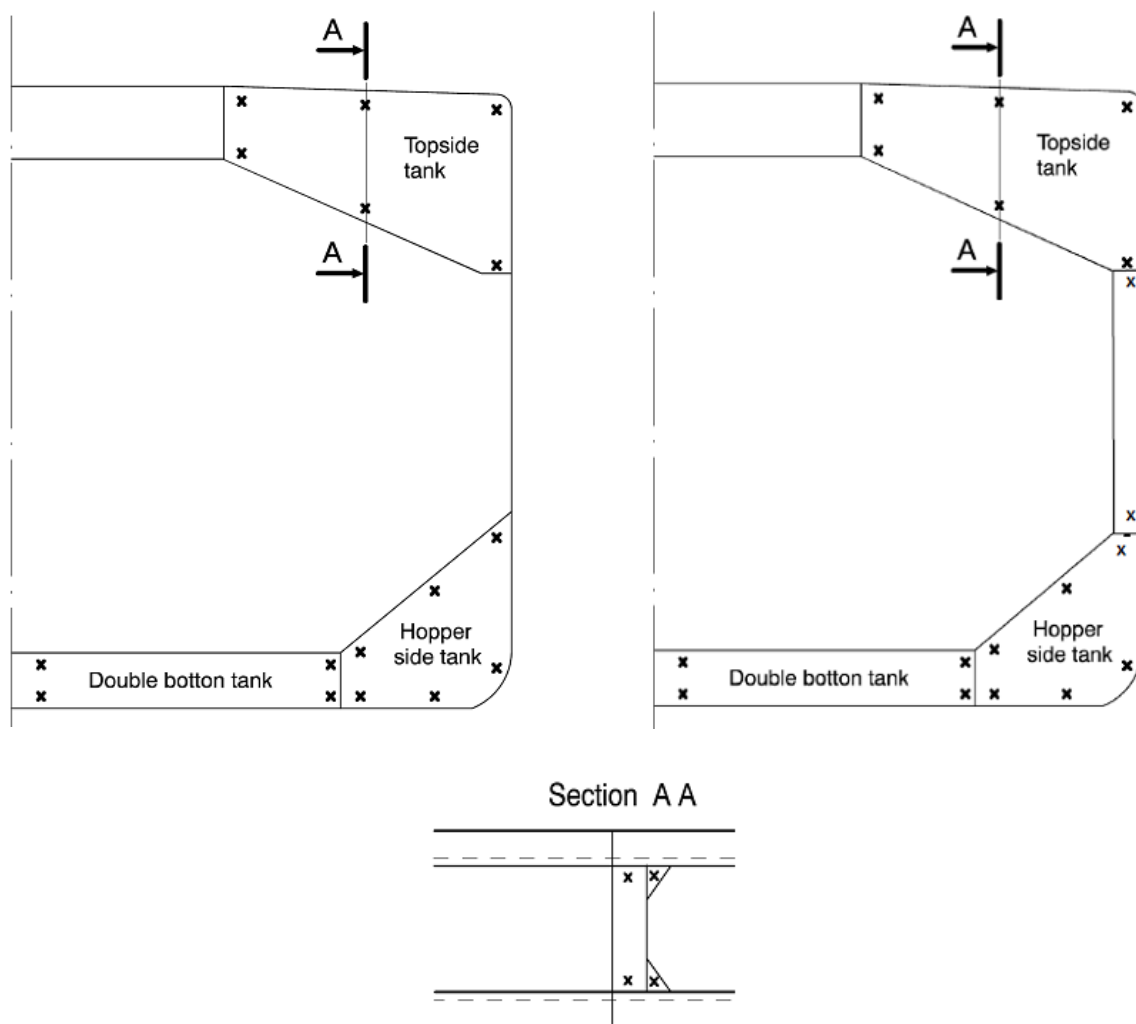


### Double side bulk carriers

Note:

Measurements are to be taken in each shaded area as shown in A-A and B-B

Fig. B5.5 Example of Locations subject to Thickness Measurements on Transverse Bulkheads of Topside, Hopper, Double Hull and Double Bottom Tanks (Bulk Carriers)



Note:

Measurements are to be taken in each shaded area as shown in A-A and B-B

Fig. B5.6 Example of Locations subject to Thickness Measurements on Underdeck Structures (Bulk Carriers)

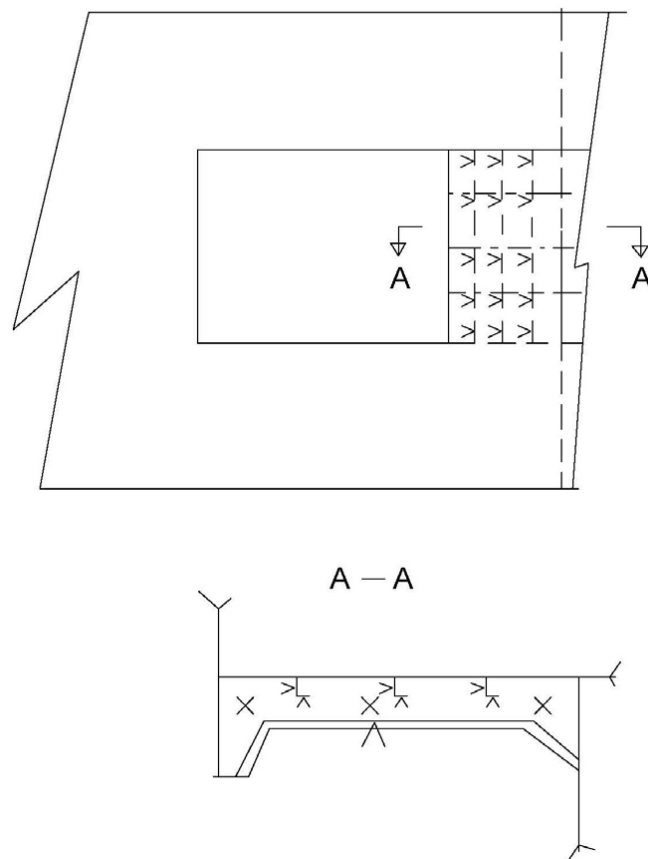


Fig. B5.7 Example of Locations subject to Thickness Measurements in Transverse Sections (Double Hull Oil Tankers)

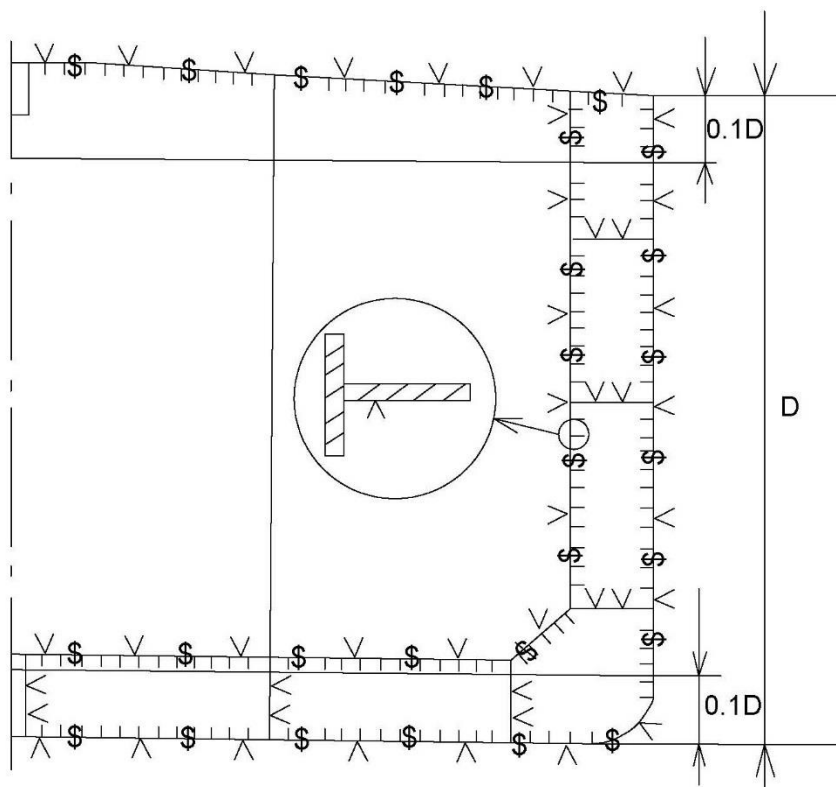


Fig. B5.8 Example of Locations subject to Thickness Measurements on Transverse Rings in Cargo and Ballast Tanks (Double Hull Oil Tankers)

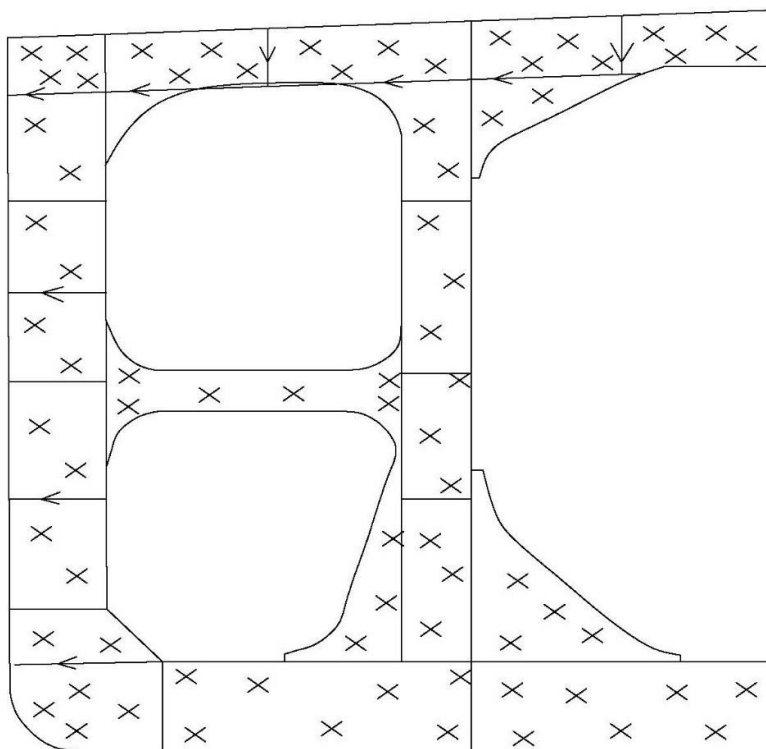


Fig. B5.9 Example of Locations subject to Thickness Measurements on Transverse Bulkheads in Cargo Tanks  
(Double Hull Oil Tankers)

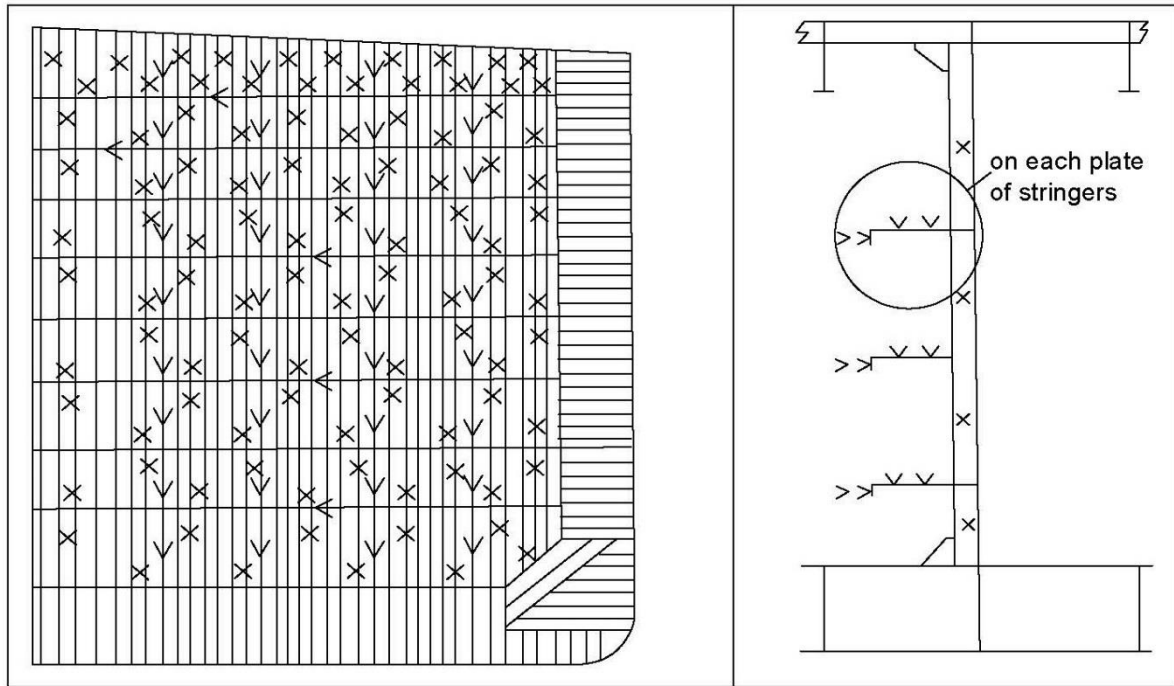
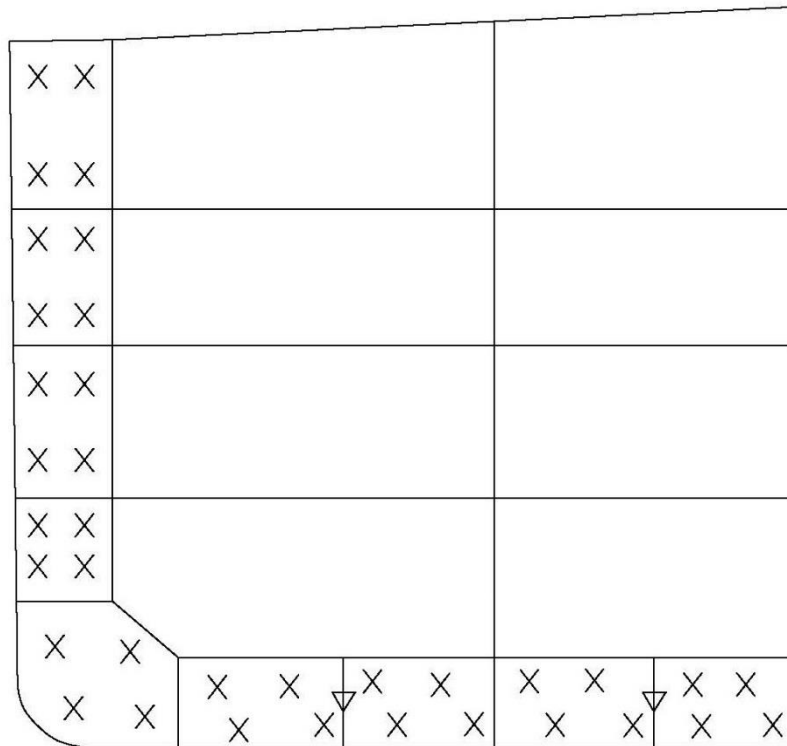


Fig. B5.10 Example of Locations subject to Thickness Measurements on Transverse Bulkhead in Ballast Tanks  
(Double Hull Oil Tankers)



## Chapter 6 DOCKING SURVEYS

### 6.1 Docking Surveys

#### 6.1.1 Surveys in Dry Dock or on Slipway\*

1 At Docking Surveys, examinations listed in **Table B6.1** are to be carried out in the dry dock or on the slipway after cleaning the outer shell.

2 For ships fitted water jet propulsion systems, the surveys are to be carried out in accordance with the following (1) to (3):

- (1) In cases where water-lubricated bearings for waterjet pump units are adopted, bearing wear down is to be measured;
- (2) The mounting of waterjet pump units to hull structures (including flanges and bolts) is to be examined;
- (3) Water intake ducts are to be confirmed to be in good working order.

3 For ships fitted with azimuth thrusters, the surveys are to be carried out in accordance with the following (1) and (2):

- (1) Visual inspections of steering columns, propeller pods and propellers (including bolt locking and other fastening arrangements) are to be carried out;
- (2) Examinations on sealing devices for azimuth steering gears, propeller shafts and propeller blades are to be carried out.

#### 6.1.2 In-water Surveys\*

1 In-water Surveys may be accepted in lieu of Surveys in the dry dock or on the slipway subject to prior approval by the Society. In any case, Surveys in the dry dock or on the slipway to be carried out at the times specified in (1) or (2) are not to be replaced with In-water Surveys.

- (1) Docking Surveys carried out at the times specified in **1.1.3-1(4)(a)** for the general dry cargo ships defined in **1.3.1(15)**, for the ships carrying liquefied gases in bulk defined in **1.3.1(17)** and for ships with the class notation “*Enhanced Survey Programme*” (abbreviated to *ESP*);
- (2) Docking Surveys carried out for ships with the class notation “*Enhanced Survey Programme*” (abbreviated to *ESP*), all of which are 15 years of age and over

2 In applying -1 above, consecutive In-water Surveys are not to be accepted in lieu of Surveys in dry dock or on slipway. However, In-water Surveys may be consecutively carried out in lieu of Surveys in dry docks or on slipways for ships other than these specified in the following (1) to (4) subject to the prior approval of the Society and the Administration:

- (1) Ships with the class notation “*Enhanced Survey Programme*” (abbreviated to *ESP*);
- (2) General dry cargo ships;
- (3) Ships fitted with propulsion thrusters; and
- (4) Ships where the propeller connection to the shaft is by means of a keyed taper.

3 The following plans and documents are to be included as part of a submission to the Society for approval for conducting In-water Surveys, which is to be obtained prior to commencement.

- (1) Plans of shell plating below the waterline showing details of the location and sizes of shell openings, location of bottom plugs, location of bilge keels, location of water- and oil-tight bulkheads, location of welded seams and butts and location of anodes
- (2) Detailed information or drawings of constructions and arrangements indicated in -4 below, together with their colour photographs, and detailed instructions for inspection of such constructions and arrangements
- (3) Documents showing the procedure which enables the Surveyor to confirm the clearance of the rudder bearing or the condition of the stern tube bearing based on a review of the operating history, the onboard testing or analysis of sampled stern lubricating oil or lubricating freshwater.

Where the bearing is found to be satisfactory, special consideration may be given to the requirements in -4(1) or -4(4) below.

- (4) Other data which may serve the inspections

4 Ships intended to be subjected to the In-water Survey are to comply with the following. Where the documents specified in -3(3) above are submitted, special consideration may be given to (1) or (4) below.

- (1) A means of measuring the clearance of the rudder in way of each pintle is provided
- (2) Rope-guard ring plates are of such construction as to facilitate the inspection of the shafting between propeller hubs and stern

frame boss

- (3) For water lubricated stern tube bearings, a means of measuring the clearance between the propeller shafts and their bearings is provided
  - (4) For oil or freshwater lubricated stern tube bearings, a suitable means of ascertaining the performance of the stern tube bearings including oil sealing devices is provided
  - (5) A suitable means of ascertaining the position and identity of each blade of the propellers is provided
  - (6) Means are to be provided to enable the diver to confirm that the sea suction openings are clear (e.g. hinged gratings)
  - (7) Markings indicating the position of longitudinal and transverse bulkheads and the names of interior spaces on the hull below the load water line, so that the diver or Remotely Operated Vehicle is able to orient his/her/its position relative to the ship
- 5 The Surveyor may require internal examinations or dry dock surveys where deemed necessary as a result of the In-water Survey.

### 6.1.3 Other Surveys\*

1 For ships affixed with the notation “PSCM”, the records of the parameters monitored are to be reviewed, in addition to a general examination, so as to ascertain that relevant installations are well maintained.

2 For ships other than those referred to in -1 above with oil lubricated or freshwater lubricated bearings, it is to be checked as to whether lubricating oil analysis or fresh water sample tests are regularly carried out except for the cases specified in the following -3. In cases where lubricating oil analysis or water sample tests are carried out, it is to be checked as to whether the reference standards deemed appropriate by the Society are complied with based upon the lubricating oil analysis or fresh water sample test reports, in addition to a general examination.

3 Ships in which where vibration measurement systems or Fe-density measurement systems are used instead of temperature sensors and temperature recorders, in the case of azimuth thrusters which use roller bearings as the bearings of propeller shaft Kind 1C, are to comply with the requirements specified in the following (1) and (2).

- (1) For the analysis records with the data submitted by the executive management (hereinafter referred to as “management” in -3), it is to be confirmed that the records have been evaluated by Society before the survey and retained on board. In the results, management opinion, such as on the necessity for withdrawing the azimuth thrusters, is to be included.
- (2) It is to be confirmed that the lubricating oil sampling and analysis specified in (1)(a), Item 5, Table B8.1 is be carried out regularly.

Table B6.1 Requirements for Docking Surveys

Items	Examinations
1 Shell plating including keel plate, stern and stern frame	(1) Discontinuous structures, structural parts liable to excessive corrosion and openings in the shell are to be examined carefully. Grillage covers are to be removed where deemed necessary by the Surveyor.
2 Rudder	(1) The rudder is to be lifted or removed and visible parts of the rudder, rudder pintles, gudgeons, rudder stocks and couplings and stern frame are to be examined. Where applicable, a pressure test of the rudder may be required as deemed necessary by the Surveyor. The rudder bearing clearance is to be measured. The rudder may not require lifting or removal provided the Surveyor is satisfied with the condition of the rudder by measurement of the clearance.
3 Scupper, overboard discharges and sea inlets including distance pieces below freeboard deck, and valves and cocks on shell plating, sea chest or distance piece, and side thrusters	<p>(1) The main parts of valves and cocks are to be opened up and examined. The bolts or studs fastening these mountings to the hull are to be examined. The valves and cocks may not require open-up examination at the discretion of the Surveyor provided they were opened up and found to be in good order at the last Docking Survey. In cases where consecutive In-water Surveys in lieu of Docking Surveys conducted in dry dock or on slipway may be applied with Administration approval, the open-up examination of valves and cocks required may be exempted at the discretion of the Society provided they were examined (including visual inspection by diver) and found to be in good order.</p> <p>(2) Side thrusters are to be visually examined for any damage which may affect the hull structure.</p> <p>(3) For ships fitted with exhaust gas cleaning systems, the internal condition of distance pieces of piping systems for washwater used in scrubber chambers is to be examined for damage.</p>
4 Bush of stern tube bearing or shaft bracket bearing	(1) The wear down of the bearing or the clearance between the propeller shaft (Except in the case of azimuth thrusters which use roller bearings as the bearings for propeller shafts) or stern tube shaft and the bearing is to be measured and recorded.
5 Sealing devices for stern tube and shaft bracket bearing	(1) In the case of oil or freshwater lubricated stern tube bearings, the efficiency of the oil or freshwater gland is to be checked.
6 Propeller	(1) Propellers are to be examined. Where a controllable pitch propeller is fitted, the pitch control device is to be examined without dismantling.
7 Anchor, anchor chain, ropes, hose pipe, chain locker and cable clenchers	(1) At the Docking Surveys carried out at the times specified in <b>1.1.3-1(4)(a)</b> , anchor and anchor chains are to be ranged and all chains and chain related equipment are to be verified and externally examined. In cases where In-water Surveys in lieu of Docking Surveys conducted in dry dock or on slipway may be applied at the times specified in <b>1.1.3-1(4)(a)</b> , anchors and anchor chains may not be required to be ranged and examined at the discretion of the Society provided they were examined (including visual inspection by diver) and found to be in good order. In such cases, anchors and anchor chains should be ranged and all chains and chain related equipment should be verified and externally examined at the next Docking Surveys conducted in dry dock or on slipway. At Special Survey No.2 and subsequent Special Surveys, the diameter of the anchor chain is to be measured. If the mean diameter of a link, at its most worn part, is reduced by 12% or more from its required nominal diameter, it is to be renewed.
8 Tanks and spaces	<p>(1) The internal examination, close-up surveys and thickness measurements (if applicable and not already carried out) are to be carried out as stipulated below.</p> <p>(a) At Docking Surveys in the dry dock or on the slipway carried out in conjunction with Special Surveys or at the times specified in <b>4.1.1-2.</b>, at least the portions below the light ballast water line of the cargo holds/tanks and water ballast tanks</p> <p>(b) At Docking Surveys carried out at the times specified in <b>1.1.3-1(2)(b)</b> as far as practicable.</p>
9 Installations for In-water Surveys	(1) With regard to ships having the approval for conducting In-water Surveys based on the requirements in <b>6.1.2</b> , Surveyors are to confirm that the means and installations specified in <b>6.1.2-4</b> are in good condition.



## Chapter 7 BOILER SURVEYS

### 7.1 Boiler Surveys

#### 7.1.1 Surveys of Boilers and Thermal Oil Heaters

At Boiler Surveys, examinations specified in [Table B7.1](#) are to be carried out for boilers and thermal oil heaters.

#### 7.1.2 Surveys of Steam Generators

Steam generators and other pressure vessels with steam accumulated in them are to be handled in accordance with the requirements for boilers.

Table B7.1 Requirements of Boiler Survey

Items	Examinations
1 Pressure parts of boilers	(1) To be internally examined with the manholes, cleaning holes and inspection holes dismantled. Where considered to be necessary for external examination by the Surveyor, the parts are to be examined to the Surveyor's satisfaction with the insulation around the parts removed. <sup>(2)</sup>
2 Superheaters, economizers and exhaust gas economizers	(1) To be examined internally and externally. For exhaust gas economizers of the shell type, all accessible welded joints are to be subject to a visual examination for cracking and non-destructive testing may be requested where deemed necessary by the Surveyor. <sup>(2)</sup>
3 Combustion parts of boilers and thermal oil heaters <sup>(1)</sup>	(1) The furnaces, combustion chambers, combustion gas chambers, etc. are internally examined with their doors opened. <sup>(2)</sup>
4 Valves and cocks	(1) The principal mountings and their fastening bolts or studs are to be opened up and examined.
5 Thickness of plates and tubes and size of stays	(1) To be measured where deemed necessary by the Surveyor.
6 Safety valves and relevant parts of boilers, superheaters and thermal oil heaters <sup>(1)</sup>	(1) The safety valves are to be adjusted under steam to a pressure not more than 103 % the approved working pressure after the open-up examination. The pressure gauge used for this adjustment is to be calibrated properly. The relieving gears of the valves are to be examined and tested to verify satisfactory operation. However, for exhaust gas economizers, if steam cannot be raised at port, the relief valves may be set by the chief engineer at sea, and the results recorded in the logbook for review by the Surveyor. (2) The general conditions of relief pipes for thermal oil heaters are to be examined. The popping pressure of safety valves fitted on thermal oil heaters is to be ascertained.
7 Safety devices, alarm devices and automatic combustion control devices	(1) These devices are to be tested in order to ascertain that they are in good working conditions after the above examinations.
8 Review of the records of the logbook	(1) Review of the following records since last boiler survey is to be carried out. (a) Operation (b) Maintenance (c) Repair history (d) Quality control of the feed water or thermal oil

Notes:

- (1) Only applies to thermal oil heaters heated by fire, combustion gas or exhaust gas from machinery.
- (2) When direct visual internal inspection is not feasible due to the limited size of the internal spaces, such as for small boilers and/or narrow internal spaces, this may be replaced by a hydrostatic pressure test or by alternative verifications as deemed appropriate by the Society.

## Chapter 8 PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS

### 8.1 General

#### 8.1.1 Terms

The terms which appear in this chapter are defined as follows.

- (1) “Shafts” mean propeller shafts and stern tube shafts as specified in the following (2) and (3) but does not include intermediate shafts which are considered to be part of the propulsion shafting inside the ships.
- (2) “Propeller shaft” is the part of the propulsion shaft to which the propeller is fitted.
- (3) “Stern tube shaft” is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.
- (4) “Shaft Kind 1” is a propeller shaft which is effectively protected against corrosion by sea water, outboard fresh water and inboard fresh water with a means approved by the Society or which is made of corrosion resistant materials approved by the Society.
- (5) “Shaft Kind 1A” is “Shaft Kind 1” with water lubricated stern tube bearing.
- (6) “Shaft Kind 1B” is “Shaft Kind 1” with oil lubricated stern tube bearing.
- (7) “Shaft Kind 1C” is “Shaft Kind 1B” satisfying the requirements in [6.2.11, Part D](#).
- (8) “Shaft Kind 1W” is “Shaft Kind 1” with fresh water lubricated stern tube bearing.
- (9) “Shaft Kind 2” is a propeller shaft other than “Shaft Kind 1”.
- (10) “Stern tube shaft” is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.
- (11) “Stern tube” is a tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), through which passes the stern tube shaft or aftermost section of the propeller shaft.
- (12) “Stern tube sealing system” means the sealing system installed for the following (a) or (b), depending on the kind of shaft. The sealing system for the inboard extremity of the stern tube prevents any the possible leakage of the lubricant media into the ship internal. The sealing system for the outboard extremity of stern tube prevents any possible sea water ingress or the leakage of the lubricant media.
  - (a) “Shaft Kind 1A” or “Shaft Kind 2” : Inboard extremity of stern tube
  - (b) “Shaft Kind 1B”, “Shaft Kind 1C” or “Shaft Kind 1W” : Inboard and outboard extremity of stern tube
- (13) “Oil lubricated” means closed loop oil lubricating systems which use oil to lubricate the bearings and are sealed against the environment by adequate sealing devices.
- (14) “Water lubricated” means open water lubricating systems where bearings are lubricated by water (sea water or outboard fresh water) and cooled.
- (15) “Fresh water lubricated” means closed loop water lubricating systems which use fresh water to lubricate the bearings and are sealed against the environment by adequate sealing devices.
- (16) “Service records” are regularly recorded data showing in-service conditions of the shafts and stern tube include the following (as applicable): service conditions of lubricating water pumps (for “Shaft Kind 1A” or “Shaft Kind 2”), lubricating oil temperature, bearing temperature and oil consumption records (for “Shaft Kind 1B” or “Shaft Kind 1C”) or water flow, water temperature, salinity, pH, make-up water and pressure of lubricating fresh water pumps (for “Shaft Kind 1W”).
- (17) “Oil sample examination” is a visual examination of the stern tube lubricating oil taken in the presence of a surveyor with a focus on water contamination.
- (18) “Lubricating oil analysis” is the analysis to be carried out in accordance with the following (a) to (c):
  - (a) The lubricating oil analysis is to be carried out at regular intervals not exceeding 6 months.
  - (b) The documentation on lubricating oil analysis is to be available on board.
  - (c) Oil samples to be submitted for the analysis are to be taken in accordance with following i) to ii):
    - i) The sample is to be taken from the same identified position in the system under service conditions.

- ii) The sample, unless supervised by a surveyor, is to be collected under the direct supervision of the Chief Engineer and to be identified.
- (19) “Fresh water sample test” is the test to be carried out in accordance with the following (a) to (d):
- (a) The fresh water sample test is to be carried out at regular intervals not exceeding 6 months.
  - (b) Fresh water samples are to be taken in accordance with the following i) to iv):
    - i) The sample is to be taken under service conditions (i.e. with a rotating shaft and the system at service temperature) and are to be representative of the water circulating within the stern tube.
    - ii) The sample is to be taken from the same agreed position in the system, before the filters, if any fitted in the fresh water lubrication system, which is to be positively identified.
    - iii) At time of survey the sample for the test is to be taken in the presence of a surveyor.
    - iv) The sample, unless supervised by a surveyor, is to be collected under the direct supervision of the chief engineer.
  - (c) Analysis results are to be retained on board and made available to the surveyor.
  - (d) The fresh water sample test is to include the following i) to iii) parameters:
    - i) chlorides content;
    - ii) pH value; and
    - iii) presence of bearing particles or other particles (only for laboratory analysis, and not required for tests carried out in the presence of at surveyor).
- (20) “Keyless connection” is the forced coupling methodology between the shaft and the propeller without a key achieved through the interference fit of the propeller boss on the shaft tapered end.
- (21) “Keyed connection” is the forced coupling methodology between the shaft and the propeller with a key and keyway achieved through the interference fit of the propeller boss on the shaft tapered end.
- (22) “Flanged connection” is the coupling methodology, between the shaft and the propeller, achieved by a flange, built in at the shaft aft end, bolted to the propeller boss
- (23) “*Propeller Shaft Condition Monitoring System*” (abbreviated as *PSCM*) is notation affixed to the classification characters of ships provided with shaft Kind 1B or shaft Kind 1C and whose preventive maintenance systems are approved in accordance with the requirements of 8.1.2-1.
- (24) “*Propeller Shaft Condition Monitoring System of Shaft Kind 1A*” (abbreviated as *PSCM-1A*) is notation affixed to the classification characters of ships provided with shaft Kind 1A and whose preventive maintenance systems are approved in accordance with the requirements of 8.1.2-2.
- (25) “Alternative means” means shafting arrangements such as an approved condition monitoring scheme or other reliable approved means for assessing and monitoring the condition of the shafts, sealing devices and the stern tube lubricant system capable to assure the condition of the propeller shaft assembly with an equivalent level of safety as obtained by survey methods specified in this part.

### 8.1.2 Preventive Maintenance System of Shafts

1 The notation *PSCM* is affixed to the classification characters of ships equipped with following (1) to (3) and whose preventive maintenance system are approved in accordance with the procedures specified in Table B8.1-1.

- (1) Oil lubricated stern tube bearing
- (2) Stern tube sealing devices can be repaired or replaced without drawing out the shafts
- (3) One or more temperature sensors embedded into the metal at the aft end bottoms of stern tube

2 The notation *PSCM-1A* is affixed to the classification characters of ships equipped with the following (1) to (10) and whose preventive maintenance systems are approved in accordance with the procedures specified in Table B8.1-2.

- (1) Water lubricated stern tube bearings
- (2) Inspection methods by means of inspection hole and borescope camera that enable a detailed checking of the surface of the shaft (including the sleeve) and bearings while the shaft is fixed without withdrawal of the shafts, or other inspection methods deemed appropriate by the Society.
- (3) Stern tube sealing devices can be repaired or replaced without drawing out the shafts
- (4) At least two independent lubricating water pumps are to be provided that are capable of continuously supplying lubricating water to the stern tube while the ship is anchoring or mooring. In addition, pump operation is to be capable of automatically

switching from one pump to another when either of the following **(a)** or **(b)** is applicable.

- (a) A pump in operation stops.
  - (b) The differential pressure between the suction and discharge or flow rate of lubricating water drops below a preset value.
- (5) Filtration systems capable of continuously filtering lubricating water that conform to requirements specified by bearing manufacturers.
  - (6) Interlock devices that prevent shafts from starting to rotate when the flow rate of lubricating water is not sufficiently established.
  - (7) Remote monitoring devices for wear down of shafts deemed appropriate by the Society that are capable of the onboard monitoring of such wear down and have redundancy.
  - (8) Monitoring devices for lubricating water supply systems that activate the alarms listed in **Table B8.1-3** at main control stations (as defined in **18.1.2(3)** of **Part D**). However, when there is no main control station, alarms may be activated at locations easily accessible to the crew.
  - (9) Grounding devices and grounding condition monitoring devices for shafts
  - (10) Inspection procedures approved by the Society which include following items:
    - (a) Procedures for checking the surfaces of shafts (including sleeves) and bearings which include following **i)** to **iv)**.
      - i) Areas and extent to be checked
      - ii) Methods and criteria for evaluating the condition of shafts
      - iii) Arrangement of inspection holes
      - iv) Specifications of borescope camera
    - (b) Recommended test procedures to verify the function of the equipment specified in **(4)** to **(9)** above.

Table B8.1-1 Approval Procedure of Preventive Maintenance System for Oil Lubricated Propeller Shafts (*PSCM*)

Item	Procedures
1 General	(1) These procedures apply to ships intended for the preventative maintenance of propeller shafts. This system permits shipowners to maintain the shafts using preventive measures such as by regularly carrying out lubricating oil analysis and diagnosing the lubricating condition of the shaft based on the results.
2 Application	<p>(1) The executive management (hereinafter referred to as “management”) responsible for adopting the preventive maintenance system according to the procedures is to submit to the Society three copies of the maintenance manual specifying at least the following (a) to (f) together with the application form (<b>Form PSCM-1</b>).</p> <ul style="list-style-type: none"> <li>(a) Management’s policy for implementing the preventive maintenance system</li> <li>(b) Procedures and personnel responsible for sampling oil, monitoring parameters such as oil analysis results and recording the necessary data</li> <li>(c) Procedures and personnel responsible for selecting and controlling the analytical testing machines (or testing laboratory) and the measuring devices for monitoring parameters</li> <li>(d) Procedures and personnel responsible for review of each parameter monitored and diagnosing the lubricating condition thereby</li> <li>(e) Procedures and personnel responsible for handling any abnormalities found (including those for reporting to the Society)</li> <li>(f) Procedures and personnel responsible for ensuring that proper maintenance is carried out according to the maintenance manual</li> </ul> <p>(2) The Society returns two copies of the documents to the applicant after review and approval. Management is to keep one copy of the approved documents on board the ship and the other copy of the approved documents either on hand or at the shipowner’s office.</p> <p>(3) The application is to be submitted within <i>6 months</i> from the date of completion of the Classification Survey or the previous Ordinary Survey of the propeller shaft. However, this <i>6 months</i> period may be waived in cases where supplementary documentation confirming the soundness of the propeller shafting system is submitted.</p>
3 Approval and Notation	(1) The Society examines the documents submitted and bases its approval on items such as the management system, the maintenance procedures and the criteria for parameters (including the criteria for alarm and abnormal conditions) of oil analysis results. The Society assigns approved ships with the notation ( <i>PSCM</i> ) as classification characters.
4 Approval Conditions	<p>(1) Management system</p> <ul style="list-style-type: none"> <li>(a) Management is to state clearly that it will take responsibility for proper implementation of the preventive maintenance of the related parts according to the manual and familiarize the crew concerned with the procedures.</li> <li>(b) Management is to verify that parameters such as oil analysis results are all within their limits and to take suitable measures as necessary. The management is to report to the Society immediately where any abnormality is found.</li> <li>(c) Management is to verify that suitable maintenance is carried out according to the manual.</li> <li>(d) The items monitored or reviewed according to the manual are to be recorded.</li> </ul> <p>(2) Maintenance procedures</p> <ul style="list-style-type: none"> <li>(a) Oil sampling for analytical testing is to be carried out regularly at the intervals of at least <i>6 months</i> and the procedures are in accordance with the following. <ul style="list-style-type: none"> <li>i) Sampling is to be carried out at sea as much as possible. The sampling oil quantity is about <i>200 ml</i> and it is to be always from a fixed place after fully draining. For example, the air purge pipe at the pump exit or oil sample cock; places where the sampled oil can be representative of the system.</li> <li>ii) Where the sampling can only be conducted at port, the sampling is to be carried out after sufficient circulation of the oil with an oil pump if one is available, and according to the method in <b>i)</b> above. Otherwise, the oil is to be sampled from a few points at different levels and all the samples are mixed together as the testing sample.</li> </ul> </li> <li>(b) Monitoring and recording of each parameter is to be properly carried out and the following data is to be recorded at each sampling. <ul style="list-style-type: none"> <li>i) Temperature of the circulation oil</li> <li>ii) Temperature of the aft stern tube bearing</li> <li>iii) Sampling date, service oil name, service hours, total oil quantity and oil consumption rate (<i>l/day</i>)</li> </ul> </li> <li>(c) The testing machines and measuring devices for monitoring the parameters are to have their accuracy</li> </ul> <p>(3) Criteria for parameters</p> <p>Management is to determine the criteria for each parameter for the ship based on the reference standards below and by taking into account its experience and knowledge.</p>

Item	Procedures		
	(a) Analytical items and methods: i) Analytical items and methods: Refer to <b>Table 1</b> as a standard. However, alternative analytical items and methods can be adopted instead when deemed appropriate by the Society. ii) Standard criteria: To be within the max. values specified in <b>Table 1</b> counting from the values of the new oil iii) Alarm values: To be less than double the standard criteria (where any parameter exceeds the alarm value, the testing oil is to be re-sampled and re-analysis for all the items is to be carried out immediately) (b) Lubricating oil consumption rate: 2 <i>l/day</i> or less (c) Temperature at aft. stern tube bearing: 55°C or less (d) Wear down for oil lubricated bearing: 0.3 <i>mm</i> or less		
	Standard criteria (Reference)		
	analytical items	max. values	analytical methods
	Fe ( <i>ppm</i> )	50	ICP (SOAP)
	Sn ( <i>ppm</i> )	20	ICP (SOAP)
	Pb ( <i>ppm</i> )	20	ICP (SOAP)
	Na ( <i>ppm</i> )	80	ICP (SOAP)
IR Oxidation @ 5.85 $\mu\text{m}$ (Abs. <i>unit/cm</i> )	10	FT-IR	
Separated Water (%)	1.0	Visual (24 settling hours)	
5 After Approval	(1) The parameters at least following <b>(a)</b> to <b>(e)</b> are to be monitored and recorded onboard the ship in accordance with the approved manual, and the lubricating condition of the propeller shafts is to be diagnosed thereby. (a) Lubricating oil sampling and analysis is to be carried out regularly at intervals not exceeding 6 <i>months</i> , with at least the following <b>i)</b> to <b>iv)</b> being analyzed each time: i) water content; ii) salinity (sodium); iii) content of shaft metal and bearing metal particles; and iv) oxidation of oil. (b) The monthly onboard checking of lubricating oil water content. (c) Lubricating oil consumption rate (d) Bearing temperature*1 (e) Weardown of the propeller shaft at the stern tube bearing (2) Where any abnormality is found, management is to report it to the Society as soon as possible and withdraw the shaft for a thorough examination or carry out maintenance to the shaft as necessary. (3) Management is to maintain onboard records of the analysis data in <b>4.(2)(b)</b> above after every analysis of the sample oil. In the documents, management’s opinion, such as on the necessity for withdrawing the shaft, is to be included. (4) The Society will carry out general examinations on the related shafting parts and review each record of parameters monitored at the ship’s periodical surveys to verify that appropriate maintenance is carried out in compliance with the approved manual, and notify the ship’s management of any necessary maintenance. Where any abnormality or improper maintenance is found out through the examination, management is required to apply for an Ordinary Survey of the shaft.		
6 Cancellation of Approval	(1) Where the following <b>(a)</b> to <b>(c)</b> are applicable, the Society may cancel the ship’s approval to adopt the preventive maintenance system for propeller shafts. In such cases, the Society is to notify the ship’s management of the cancellation, and the ship is to carry out an Ordinary Survey immediately in accordance with <b>Table B8.3</b> . (a) Where any improper conduct is found regarding entries in the records such as those for oil analysis results. (b) Where it is regarded by the Society that proper maintenance is not carried out according to the approved manual. (c) Where the shipowner or ship management company has changed, or cancellation of the approval to adopt the preventive maintenance system has been requested by the ship’s management.		

#### Notes

\*1 : In the cases of azimuth thrusters which use roller bearings as the bearings for propeller shafts, however, the vibrations of the power transmission systems in the propulsion systems or the Fe-density of the lubricating oil in the azimuth thruster

casings may be acceptable. In such cases, the instruments specified in (1) or (2) are used, the data and the result of the analysis are to be evaluated prior to the survey and are to be retained on board at all times. However, the following requirements specified in (3) are to be satisfied.

- (1) A vibration measurement system to measure vibration of power transmission system in the azimuth thrusters complying with the following (a) to (c). Where the system is fixed type, the environmental tests specified in 18.7.1(1), Part D are to be carried out.
  - (a) The measurement is to be carried out regularly at intervals not exceeding 3 *months*.
  - (b) Measurement points and the relevant data are to be in accordance with those described in the guidance for measurement in the management manual concerning the vibration measurement system.
  - (c) A trend display and frequency analysis of the measurement data is to be provided.
- (2) A Fe-density measurement system of lubricating oil in the azimuth thrusters casings complying with the following (a) to (c). Where the system is fixed type, the environmental tests specified in 18.7.1(1), Part D are to be carried out.
  - (a) Sampling is to be carried out regularly at intervals not exceeding 3 *months*.
  - (b) The measurement data is to be the amount of Fe per hour, considering the change of new lubricating oil. A trend display of the data is to be provided.
  - (c) Sampling is to be carried out when the azimuth thrusters are operating at sea as far as possible. When the sampling can only be conducted at port, the sampling is to be carried out within 30 *minutes* after said thrusters stop.
- (3) Measurement data
  - (a) The executive management (hereinafter referred to as “management”) is to determine the criteria for each parameter (including the criteria for alarm and abnormal conditions) for the ship taking into account its experience and knowledge.
  - (b) Management is to submit the analysis records with the data after every analysis of the sample oil. In this document, the management’s opinion, such as on the necessity for withdrawing the azimuth thrusters, is to be included.

Table B8.1-2 Approval Procedure of Preventive Maintenance System for Water Lubricated Propeller Shafts (*PSCM-1A*)

Item	Procedures
1 General	(1) These procedures apply to ships intended for the preventative maintenance of propeller shafts. This system permits shipowners to maintain shafts using preventive measures such as the monitoring of the wear down of shafts, water lubricating systems, grounding conditions between shafts and the hull as well as additionally diagnosing the lubricating conditions of shafts based on monitoring results.
2 Application	<p>(1) The executive management (hereinafter referred to as “management”) responsible for adopting the preventive maintenance system according to the procedures is to submit to the Society three copies of a maintenance manual specifying at least the following (a) to (g).</p> <p>(a) Management policy for implementing the preventive maintenance system</p> <p>(b) Procedures for monitoring parameters such as the following and recording necessary data</p> <p>i) Wear down of shafts by remote monitoring devices</p> <p>ii) At least the flow rates and the differential pressures specified in <a href="#">Table B8.1-3</a> related to the water lubricating systems.</p> <p>iii) Grounding conditions between shafts and the hull, including the monitoring of values for voltage, current, or resistance.</p> <p>(c) Procedures and personnel responsible for controlling the items specified in (b) above</p> <p>(d) Procedures and personnel responsible for review and evaluating the monitored values specified in (b) above. In addition, the criteria for each parameter mentioned in <a href="#">4(3)</a> is to be specified.</p> <p>(e) Procedures and personnel responsible for handling any abnormalities found (including procedures for reporting to the Society) in the monitored values specified in (b) above</p> <p>(f) Procedures and personnel responsible for ensuring that proper maintenance is carried out according to the maintenance manual</p> <p>(g) Plans and documents for equipment or systems related to water lubrication.</p> <p>(2) The Society returns two copies of the documents to the applicant after review and approval. Management is to keep one copy of the approved documents on board the ship and the other copy of the approved documents either on hand or at the shipowner’s office.</p> <p>(3) The application is to be submitted within 6 months from the date of completion of the Classification Survey or the previous Ordinary Survey of the propeller shaft. However, this 6-month period may be waived in cases where supplementary documentation confirming the soundness of the propeller shafting system is submitted.</p>
3 Approval and Notation	(1) The Society examines the documents submitted and bases its approval on items such as the management system, the maintenance procedures and the criteria for parameters (including the criteria for alarm and abnormal conditions). The Society assigns approved ships with the notation ( <i>PSCM-1A</i> ) as classification characters.
4 Approval Conditions	<p>(1) Management system</p> <p>(a) Management is to state clearly that it will take responsibility for proper implementation of the preventive maintenance of the related parts according to the manual and familiarise the crew concerned with the procedures.</p> <p>(b) Management is to verify that parameters are all within their limits and to take suitable measures as necessary. In addition, management is to report to the Society immediately where any abnormality is found.</p> <p>(c) Management is to verify that suitable maintenance is carried out according to the manual.</p> <p>(d) The items monitored or reviewed according to the manual are to be recorded.</p> <p>(2) Maintenance procedures</p> <p>(a) Wear down measurement is to be carried out regularly at the intervals of 3 months or less and the procedures are to be in accordance with the following.</p> <p>i) In principle, the measurement is to be carried out with the condition that shaft is fixed and the</p>



Item	Procedures
	<p>load of the propeller fully on the stern tube bearing at the draft specified by the bearing manufacturer.</p> <p>ii) At least three measurements are to be carried out and the average value is to be treated as the measured value.</p> <p>iii) The estimated remaining operating time to reach the maximum allowable wear down specified by the bearing manufacturer is to be calculated from the measured value.</p> <p>iv) The measured values and estimated values in <b>ii)</b> and <b>iii)</b> above are to be properly recorded and controlled.</p> <p>(b) In principle, lubricating water pumps are to be operated even when the vessel is anchoring or mooring so as to supply the lubrication water to the stern tube at all times. However, in case where the supply of lubricating water is stopped due to unavoidable reasons, the duration of such times is to be recorded.</p> <p>(c) At least the flow rates and the differential pressures specified in <b>Table B8.1-3</b> related to the lubricating water supply system are to be continuously monitored, periodically measured, recorded and controlled (at least monthly).</p> <p>(d) The grounding condition between shafts and hull is to be continuously monitored, periodically measured, recorded and controlled (at least monthly).</p> <p>(3) Criteria for parameters Management is to determine the criteria for each parameter for the ship based on reference standards specified by the bearing manufacturer of the maximum allowable wear down, the flow rates and the differential pressures specified in <b>Table B8.1-3</b>, and the grounding condition between shafts and hull in consideration of management's experience and knowledge.</p>
5 After Approval	<p>(1) Monitoring, measuring and recording are to be performed in accordance with the preventive maintenance system approved by the Society.</p> <p>(2) Records of measurements are to be kept on board so they can be presented to the surveyor at the time of inspection.</p> <p>(3) Arrangement is to be made to replace worn parts such as sleeves and stern tube bearings at an appropriate time before the measured wear down reaches the criteria for the parameters (maximum allowable wear down). The history of these replacements is to be recorded and kept on board so they can be presented to the surveyor at the time of inspection.</p> <p>(4) Where any abnormality or improper maintenance is found through examination, management is required to apply for an Ordinary Survey of the shaft.</p>
6 Cancellation of Approval	<p>(1) Where one of the following <b>(a)</b> to <b>(c)</b> is applicable, the Society may cancel the ship's approval to adopt the preventive maintenance system for propeller shafts. In such cases, the Society is to notify the ship's management of the cancellation, and the ship is to undergo an Ordinary Survey immediately in accordance with <b>Table B8.2</b>.</p> <p>(a) Where any improper conduct is found regarding entries in the records.</p> <p>(b) Where it is regarded by the Society that proper maintenance is not carried out according to the approved manual.</p> <p>(c) Where the shipowner or ship management company has changed, or cancellation of the approval to adopt the preventive maintenance system has been requested by the ship's management.</p>

Table B8.1-3 Lubricating Water Supply System Alarms

Item to be monitored	Alarm type
Flow rate (lubricating water)	Low
Differential pressure (filtration systems) <sup>(1)</sup>	High
Abnormality (lubricating water pumps)	Abnormal

Note

- (1) The items to be monitored for non-filter methods are those deemed appropriate by the Society.

## 8.2 Surveys of Water Lubricated Shafts

### 8.2.1 Surveys of Shafts Kind 1A

1 Surveys of shafts Kind 1A are to be the Ordinary Surveys specified in [Table B8.2](#) and are to be carried out within 5 *years* from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 In addition to -1 above, surveys of shafts Kind 1A which are used corrosion resistant materials specified in [6.2.7-1.\(3\), Part D](#) are to be the Partial Surveys specified in [Table B8.2](#) and are to be carried out within 36 *months* from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey specified in -1 above. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.2](#) is to be carried out.

3 For the surveys referred to -1 and -2 above completed within 3 *months* prior to the survey due date, the next period is to start from the survey due date.

4 The survey due date may be extended in cases where a survey is carried out in accordance with following (1) to (4) and the shafts condition is confirmed to be satisfactory. The interval of the Ordinary Survey specified in [Table B8.2](#) is not to exceed 6 *years*.

- (1) The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in [Table B8.2](#) is carried out. No further extension survey may be carried out.
- (2) The survey due date may be extended for up to 3 *months* in cases where the 3Month Extension Survey specified in [Table B8.2](#) is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in [Table B8.2](#) is carried out.
- (3) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 *month* prior to the survey due date.
- (4) The period of extension counts from the date on which the extension survey is carried out in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.

### 8.2.2 Surveys of Shafts Kind 2

1 Surveys of shafts Kind 2 are to be the Ordinary Surveys specified in [Table B8.2](#) and are to be carried out in accordance the following (1) and (2) periods (survey due dates).

- (1) Concurrently with Special Surveys, ; and
- (2) Within 36 *months* from the date of completion of the Classification Survey or the previous Ordinary Survey.

2 For the surveys referred to -1 above that are completed within 3 *months* prior to the survey due date, the next period is to start from the survey due date.

### 8.2.3 Surveys of Shafts of ships whose classification characters are affixed with the notation *PSCM-1A*

1 Notwithstanding [8.2.1](#) above, survey of shafts of ships whose classification characters are affixed with the notation *PSCM-1A* are subject to this paragraph.

2 The surveys are to be the Alternative Ordinary Surveys specified in [Table B8.2](#) and are to be completed within 5 *years* from the date of completion (survey due date) of the Classification Survey or the previous Alternative Ordinary Survey. In cases where the Alternative Ordinary Survey is carried out and the result is not satisfactory, the Ordinary Survey specified in [Table B8.2](#) is to be carried out.

3 Notwithstanding -2 above, the interval of the Ordinary Survey specified in Table B8.2 above is not to exceed 15 years. This interval may be extended for up to 3 months. No further extension may be granted.

4 For the surveys referred to -2 or -3 above completed within 3 months prior to the survey due date, the next period is to start from the survey due date.

5 The survey due date may be extended in cases where a survey is carried out in accordance with the following (1) to (4). The interval of the Survey specified in -2 above is not to exceed 6 years.

- (1) The survey due date may be extended for up to 1 year in cases where the 1Year Extension Survey specified in Table B8.2 is carried out. No further extension survey may be carried out.
- (2) The survey due date may be extended for up to 3 months in cases where the 3Month Extension Survey specified in Table B8.2 is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 year in cases where the 1Year Extension Survey is carried out.
- (3) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 month prior to the survey due date.
- (4) The period of extension counts from the date on which the extension survey is carried out in cases where the extension survey is carried out more than 1 month prior to the survey due date.

Table B8.2 Surveys of Water Lubricated Shafts – Shafts Kind 1A, Kind 2 and Shafts of Ships Whose Classification Characters Are Affixed with the Notation *PSCM-1A*

Items	Examinations	Ordinary Survey	Partial Survey	Alternative Ordinary Survey	Extension Survey	
					1 Year	3 Month
1 Drawing out of the shafts						
-1 Entirely drawing out	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings.	○				
-2 Partially drawing out	(1) Drawing the propeller shaft to confirm the contacting parts to stern tube bearing. The propeller shaft may be withdrawn with the condition fitting propeller to propeller shaft.		○			
-3 Alternative drawing out	(1) In accordance with the inspection procedures specified in 8.1.2-2(10), shafts (including seals, liners, corrosion protection system and stress reducing features, where provided.) and bearing surfaces are to be inspected after they have been cleaned to the extent feasible and found to be free from defects without drawing the propeller shafts or stern tube shafts. In the case of shafts with split-sleeve structures (wrapped with rubber, synthetic resin, etc.), the joints between dissimilar materials are to be inspected all the way around.			○		
2 Propeller connections						
-1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner.)	○		○		
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. For shafts provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner. (3) Notwithstanding (2) above, with the interval not to exceed 15 years, performing a non-destructive examination ( <i>NDE</i> ) to whole cone parts of shaft including the forward portion of the taper section with the method deemed appropriate by a surveyor.	○		○		

Items	Examinations	Ordinary Survey	Partial Survey	Alternative Ordinary Survey	Extension Survey	
					1 Year	3 Month
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination ( <i>NDE</i> ) to the coupling bolts and flange radius with the method deemed appropriate by the surveyor.	○		○		
3 Clearance between bush of the stern tube bearing and propeller shaft	(1) Checking and recording the clearance between bush of the stern tube and propeller shaft. (2) Confirm the clearance does not exceed following value. (a) Shaft diameter no more than 230 mm: 6 mm (b) Shaft diameter more than 230 mm but no more than 305 mm: 8 mm (c) Shaft diameter more than 305 mm: 9.5 mm	○	○	○	○	
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (2) For ordinary surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in <a href="#">7.3.1-1, Part D</a> .	○	○	○	○	○
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard seals during the re-installation of the shaft and propeller. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.)	○	○	○	○	○
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For extension survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination ( <i>NDE</i> ) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary. In addition, anti-corrosion covers are to be removed for shafts Kind 2.	○	○	○	○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○		○*1		
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○		○		

Items	Examinations	Ordinary Survey	Partial Survey	Alternative Ordinary Survey	Extension Survey	
					1 Year	3Month
9 Controllable pitch propeller connections (Only applies to shafts with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination (NDE) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	<input type="radio"/>		<input type="radio"/>		
10 Water lubrication lines	(1) Examination of water lubrication lines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 Monitoring devices etc. -1 Remote monitoring device for wear-down of shaft	(1) Confirm that the values of the wear-down obtained from the remote monitoring device is consistent with the measured clearance between bush of the stern tube bearing and propeller shaft as referred in 3 above. (2) Confirm that the functions of the device operate normally in accordance with the inspection procedures specified in 8.1.2-2(10).			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-2 Others	(1) Confirm that the functions of each equipment operate normally in accordance with the inspection procedures specified in 8.1.2-2(10).			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12 Review of records etc.	(1) Review of following (a) to (d). (a) Previous clearance recording (b) Service records (c) No report to repairs by grinding or welding of shafts or propellers (d) The information of the shafting arrangement is in good working condition by the chief engineer (2) For shafts subjected to Alternative Ordinary Survey, review documents and records of following (a) to (d). (a) Inspection procedures specified in 8.1.2-2(10) (b) Measurement records of each monitoring parameter specified in Table B8.1-2 and the estimated remaining operating time to reach the maximum allowable wear-down (c) Records of cleaning of the filtration systems of lubrication water (d) Video records of previous borescope camera inspections			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Note

\*1 : It is acceptable by confirmation of the result of Section 1-3 of the table.

### 8.3 Surveys of Oil Lubricated Shafts

#### 8.3.1 Surveys of Shaft Kind 1B and Kind 1C

1 Surveys of shafts Kind 1B and shaft Kind 1C are to be the Ordinary Surveys specified in [Table B8.3](#) and are to be carried out within 5 years from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 Notwithstanding -1 above, for shafts subject to the lubricating oil analysis specified in [8.1.1\(18\)](#), the Partial Survey specified in [Table B8.3](#) may be carried out instead of an Ordinary Survey. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.3](#) is to be carried out.

3 Notwithstanding -1 and -2 above, for shafts with keyless or flanged connections and which are subject to the lubricating oil analysis specified in [8.1.1\(18\)](#), the Simplified Partial Survey specified in [Table B8.3](#) may be carried out instead of an Ordinary Survey or Partial Survey. In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.3](#) is to be carried out.

4 Notwithstanding -2 and -3 above, for shafts Kind 1B and shafts Kind 1C, the interval of the Ordinary Survey specified in [Table B8.3](#) above is not to exceed 15 years. This interval may be extended for up to 3 months. No further extension may be granted.

5 For the surveys referred to -1 to -4 above completed with 3 months prior to the survey due date, the next period will start from the survey due date.

6 For shafts which are subject to the lubricating oil analysis specified in [8.1.1\(18\)](#), the survey due date may be extended in cases where the survey is carried out in accordance with the following (1) to (5).

- (1) The survey due date may be extended for up to 2.5 years in cases where the 2.5Year Extension Survey specified in [Table B8.3](#) is carried out. No further extension survey may be carried out.
- (2) The survey due date may be extended for up to 1 year in cases where the 1Year Extension Survey specified in [Table B8.3](#) is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 years in cases where the 2.5Year Extension Survey specified in [Table B8.3](#) is carried out.
- (3) The survey due date may be extended for up to 3 months in cases where 3 Months Extension Survey specified in [Table B8.3](#) is carried out. No further 3 Months Extension Survey can be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 year or 2.5 years in cases where a 1Year Extension Survey or 2.5Year Extension Survey specified in [Table B8.3](#) is carried out.
- (4) The period of extension counts from the survey due date in cases where the extension survey is carried out prior to 1 month within the survey due date.
- (5) The period of extension counts from the date on which the extension survey is carried out in cases where the extension survey is carried out more than 1 month prior to the survey due date.

#### 8.3.2 Surveys of Shafts of ships whose classification characters are affixed with the notation PSCM

1 Notwithstanding [8.3.1](#) above, survey of shafts of the ships whose classification characters are affixed with the notation PSCM are subject to this paragraph.

2 The surveys are to be the Ordinary Surveys or Partial Surveys specified in [Table B8.3](#) and are to be completed within 5 years from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey. In cases where a Partial Survey is carried out and the result is not satisfactory, the Ordinary Survey specified in [Table B8.3](#) is to be carried out.

3 Notwithstanding -2 above, for shafts with keyless or flanged connections, the Simplified Partial Survey specified in [Table B8.3](#) may be carried out instead of an Ordinary Survey or Partial Survey. In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.3](#) is to be carried out.

4 Notwithstanding -3 above, for shafts with keyless connections, the interval of the Ordinary Survey or Partial Survey specified in [Table B8.3](#) above is not to exceed 15 years. This interval may be extended for up to 3 months. No further extension may be granted. In cases where a Partial Survey is carried out and the result is not satisfactory, the Ordinary Survey specified in [Table B8.3](#) is to be carried out.

5 For the surveys referred to -2 to -4 above completed within 3 months prior to the survey due date, the next period is to start

from the survey due date.

- 6** The survey due date may be extended in cases where a survey is carried out in accordance with the following **(1)** to **(5)**.
- (1)** The survey due date may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out. No further extension survey may be carried out.
  - (2)** The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.3** is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out.
  - (3)** The survey due date may be extended for up to 3 *months* in cases where the 3Month Extension Survey specified in **Table B8.3** is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* or 2.5 *years* in cases where the 1Year Extension Survey or 2.5 Year Extension Survey specified in **Table B8.3** is carried out.
  - (4)** The period of extension counts from the survey due date in cases where the extension survey is carried out prior to 1 *month* within the survey due date.
  - (5)** The period of extension counts from the date on which the extension survey is carried out in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.



Table B8.3 Surveys of Oil Lubricated Shafts – Shafts Kind 1B, 1C or Shafts of Ships Affixed with Notation *PSCM*

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1 Year	3Month
1 Drawing out of the shafts	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shafts, seals system and bearings. (2) Checking and recording the bearing clearances between the bush and the shafts.	○					
2 Propeller connections -1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner.)	○	○				
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. (When shafts provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner)	○	○				
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination ( <i>NDE</i> ) to the flange radius and coupling bolts with the method deemed appropriate by the surveyor.	○	○				
3 Wear down of shaft at the stern tube bearing	(1) Checking and recording the wear down. (For extension surveys, the checking and recording are to be carried out as far as practicable.) (2) Confirm the wear down value does not exceed 0.3 mm (0.3 mm is the standard value). In addition, factors such as the characteristics of the lubricating oil, the temperature fluctuation history of the lubricating oil or bearing material are to be taken into account.	○	○	○	○		
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (2) For ordinary surveys and partial surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in <b>7.3.1-1, Part D</b> .	○	○	○	○	○	
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard and outboard seals. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.) For 3Month Extension Survey, verification of inboard seals may be accepted. (2) Confirmation that the seal liner is placed in a satisfactory condition. For extension, this examination is not applied.	○	○	○	○	○	○

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For the surveys except Ordinary Survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination ( <i>NDE</i> ) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary.	○	○	○	○	○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○					
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○					
9 Controllable pitch propeller connections (Only applies to shafts with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination ( <i>NDE</i> ) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	○	○				
10 Low oil level alarms of the lubricating oil tanks, lubricating oil temperature measuring devices, oil lubricating lines and lubricating oil circulating pumps, etc.	(1) Examination of the systems for verifying whether stern tube bearings are being maintained in good working condition.	○	○	○	○	○	○

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
11 Review of records etc.	<p>(1) Examinations are to be carried out in accordance with the following (a) to (g).</p> <p>(a) Service records are to be reviewed.</p> <p>(b) Review of test records of the lubricating oil analysis is to be carried out to confirm that the reference standards specified in following i) and ii) are complied with.</p> <p>i) Metal particles (upper limit) *1 :</p> <p>1) Iron (Fe): 50 ppm</p> <p>2) Tin (Sn): 20 ppm</p> <p>3) Lead (Pb): 20 ppm</p> <p>4) Sodium (Na): 80 ppm</p> <p>ii) IR oxidation and separated water (Upper limit) *2 :</p> <p>1) IR oxidation @ 5.85μm: 10 (Abs.unit/cm)</p> <p>2) Separated water: 1.0 %</p> <p>(c) Oil sample examination is to be carried out.</p> <p>(d) Verification of no reported repairs by grinding or welding of shafts and/or propellers is to be carried out.</p> <p>(e) Examination of the lubricating oil record book.</p> <p>(f) For 1 year and 3 months extension surveys, review of the previous clearance recordings is to be carried out.</p> <p>(g) Confirmation from the chief engineer that the shafting arrangement is in good working condition is to be obtained.</p>						

#### Notes

\*1 : If the test results of the oil analysis suggest that the sample oil does not represent the lubricating oil in the stern tube and is suspected to be invalid (e.g. when only iron (Fe) exceeds the upper limit of (b)i), item 11, it is suspected that rust in the lubricating oil tank is the cause.), the surveyor is to instruct the shipowner (or the ship management company) to promptly re-perform the oil analysis and to be verified the test results of the oil analysis by the time of the first periodical survey (excluding those specified in 1.1.3-1(5), Part B) on or after the day 3 months after the day of receiving the said instruction.

\*2 : Notwithstanding (b)ii), item 11, in the case of environmentally acceptable lubricants (EAL), observation of any trends (such as TAN (total acid number), viscosity and change in colour etc.) based on periodical oil analysis may be made. In such cases, observations of TAN trends are to be made based on sequential analysis in conjunction with limits for continued use in service defined by oil makers.

## 8.4 Surveys of Fresh Water Lubricated Shafts

### 8.4.1 Surveys of Shafts Kind 1W

1 Surveys of shafts Kind 1W are to be the Ordinary Surveys specified in [Table B8.4](#) and are to be carried out within 5 years from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 Notwithstanding -1 above, for shafts which are subject to the fresh water sample test specified in [8.1.1\(19\)](#), Partial Survey specified in [Table B8.4](#) may be carried out instead of an Ordinary Survey. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.4](#) is to be carried out.

3 Notwithstanding -1 and -2 above, for shafts with keyless or flanged connections and which are subject to the fresh water sample test specified in [8.1.1\(19\)](#), the Simplified Partial Survey specified in [Table B8.4](#) may be carried out instead of an Ordinary Survey or Partial Survey. In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in [Table B8.4](#) is to be carried out.

4 Notwithstanding -2 and -3 above, the interval of the Ordinary Survey specified in [Table B8.4](#) above is not to exceed 15 years. This interval may be extended for up to 3 months. No further extension may be granted.

5 For the surveys referred to -1 to -4 above completed with 3 months prior to the survey due date, the next period is to start from the survey due date.

6 For shafts which are carried out lubricating fresh water analysis specified in [8.1.1\(19\)](#), the survey due date may be extended in cases where a survey is carried out in accordance with following (1) to (5).

- (1) The survey due date may be extended for up to 2.5 years in cases where the 2.5Year Extension Survey specified in [Table B8.4](#) is carried out. No further extension survey may be carried out.
- (2) The survey due date may be extended for up to 1 year in cases where the 1Year Extension Survey specified in [Table B8.4](#) is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 years in cases where the 2.5Year Extension Survey specified in [Table B8.4](#) is carried out.
- (3) The survey due date may be extended for up to 3 months in cases where the 3Month Extension Survey specified in [Table B8.4](#) is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 year or 2.5 years in cases where the 1Year Extension Survey or 2.5Year Extension Survey specified in [Table B8.4](#) is carried out.
- (4) The period of extension counts from the survey due date in cases where the extension survey is carried out prior to 1 month within the survey due date.
- (5) The period of extension counts from the date on which the extension survey is carried out in cases where the extension survey is carried out more than 1 month prior to the survey due date.

Table B8.4 Surveys of Fresh Water Lubricated Shafts – Shafts Kind 1*W*

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1 Year	3Month
1 Drawing out of the shafts	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shafts, seals system and bearings. (2) Checking and recording the bearing clearances between the bush and the shafts.	○					
2 Propeller connections -1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner.)	○	○				
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination ( <i>NDE</i> ) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the <i>NDE</i> is to be extended to the after edge of the liner)	○	○				
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination ( <i>NDE</i> ) to the flange radius and coupling bolts with the method deemed appropriate by the surveyor.	○	○				
3 Wear down of shaft at the stern tube bearing	(1) Checking and recording the wear down (For extension surveys, the checking and recording are to be carried out as far as practicable.) (2) Confirm the wear down value does not exceed the value used as reference for repairs specified by the manufacturer.	○	○	○	○		
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (2) For ordinary surveys and partial surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in <b>7.3.1-1, Part D</b> .	○	○	○	○	○	
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard and outboard seals. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.) For 3Month Extension Survey, verification of inboard seals may be accepted. (2) Confirmation that the seal liner is placed in a satisfactory condition. For extension, this examination is not applied.	○	○	○	○	○	○

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For the surveys except Ordinary Survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination ( <i>NDE</i> ) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary.	○	○	○	○	○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○					
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○					
9 Controllable pitch propeller connections (Only applies to shaft with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination ( <i>NDE</i> ) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	○	○				
10 Low level alarms of the lubricating fresh water tanks, lubricating fresh water temperature measuring devices, fresh water lubricating lines and lubricating fresh water circulating pumps, etc.	(1) Examination of the systems for verifying whether stern tube bearings are being maintained in good working condition.	○	○	○	○	○	○

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
11 Review of records etc.	<p>(1) Examinations are to be carried out in accordance with the following (a) to (g).</p> <p>(a) Service records are to be reviewed.</p> <p>(b) Review of test records of the fresh water analysis is to be carried out to confirm that the reference standards specified in following i) and ii) are complied with.</p> <p>i) Chloride content and sodium content (upper limit):</p> <p>1) Chloride: 60 ppm</p> <p>2) Sodium (Na): 70 ppm</p> <p>ii) pH :</p> <p>Lower limit values determined based upon characteristics of the correction inhibitors used, but not to be less than 11</p> <p>iii) Metal particles (upper limit):</p> <p>1) Iron (Fe): 25 ppm</p> <p>2) Chromium (Cr): 5 ppm</p> <p>3) Nickel (Ni): 5 ppm</p> <p>4) Copper (Cu): 40 ppm</p> <p>5) Silicon (Si): 30 ppm</p> <p>iv) Bearing particles (non-metallic content) :</p> <p>No polymer resins are to be found by micro-filter or microscopic testing</p> <p>(c) Fresh water sample test is to be carried out.</p> <p>(d) Verification of no reported repairs by grinding or welding of shafts or propellers is to be carried out.</p> <p>(e) Examination of the lubricating fresh water record book.</p> <p>(f) For 1year and 3month extension surveys, review of the previous clearance recordings is to be carried out.</p> <p>(g) Confirmation from the chief engineer that the shafting arrangement is in good working condition is to be obtained.</p>						
			○	○	○	○	○

## Chapter 9 PLANNED MACHINERY SURVEYS

### 9.1 Planned Machinery Surveys

#### 9.1.1 Application\*

In a Planned Machinery Survey, surveys in accordance with the applicable requirements prescribed in 9.1.2 to 9.1.4 are to be carried out. In cases where 9.1.3 or 9.1.4 is adopted, the survey items to be covered by the scheme are to be determined according to the shipowner's (or the ship management company's) application, while the rest of the items are to apply 9.1.2.

#### 9.1.2 Continuous Machinery Surveys (CMS)\*

In a Continuous Machinery Survey (hereinafter referred to as "CMS" in this Chapter), every item specified in Table B9.1 is to be surveyed in accordance with the following (1) to (3):

- (1) The above items are to be surveyed systematically, continuously and sequentially in accordance with the survey schedule table approved by the Society so that each survey interval for all CMS items does not exceed 5 years.
- (2) During the CMS, when any defect or damage is found, similar machinery and equipment, or a part of them, may be required to be opened up for further examination as deemed necessary by the Surveyor, and all the defective items or failures found are to be repaired to the Surveyor's satisfaction.
- (3) Survey items deemed appropriate by the Society may be delegated to overhaul inspections by the shipowner (or the ship management company). In this case, the records of the overhaul inspections of the machinery and equipment concerned are to be ascertained as soon as possible. When it is regarded that satisfactory maintenance has not been carried out, an open-up examination in the presence of the Surveyor may be required.

#### 9.1.3 Planned Machinery Maintenance Scheme (PMS)\*

1 A shipowner (or ship management company) that has an established maintenance system may apply to adopt the planned maintenance method in which the shipowner is permitted to carry out planned overhaul inspections and maintenance as specified in (1) to (4) in place of the open-up surveys specified in Table B9.1.

- (1) The planned maintenance method is to be implemented in accordance with the machinery maintenance scheme approved by the Society.
- (2) The Society will perform a general examination yearly on every item including review of the maintenance records in order to ascertain that the machinery and equipment covered are placed in good order.
- (3) Where it is regarded that satisfactory maintenance has not been carried out for any of the machinery and equipment, an open-up examination of the item in the presence of the Surveyor may be required.
- (4) For machinery and equipment deemed necessary by the Society, open-up examinations in the presence of the Surveyor are to be performed according to the survey schedule table based on the machinery maintenance scheme.

2 The survey of machinery for which condition monitoring and maintenance is carried out according to a machinery maintenance scheme approved by the Society on or before 31 December 2019 is to be in accordance with requirements specified otherwise by the Society.

3 PMS management software is to be approved by the Society in accordance with Annex 9.1.3 "Procedures for approval of PMS/CBM Management Software".

#### 9.1.4 Condition Based Maintenance Scheme (CBM)\*

1 A shipowner (or ship management company) that has an established maintenance system may apply to adopt the method in which maintenance of machinery is carried out according to the results of condition monitoring and diagnosis, as specified in the following (1) to (6), in place of the open-up surveys specified in Table B9.1.

- (1) The condition based maintenance method is to be implemented in accordance with a machinery maintenance scheme for CBM approved by the Society.
- (2) In cases where no abnormality is found in the results of condition monitoring and diagnosis, a general examination may be carried out as an alternative to the open-up examinations specified in Table B9.1 based upon manufacturer recommendations regarding maintenance. In cases where an abnormality is found, the shipowner (or ship management company) is to request an



examination in the presence of the Surveyor as soon as possible in accordance with the survey schedule table based on the machinery maintenance scheme for CBM.

- (3) The condition monitoring system is to be approved by the Society.
- (4) The condition monitoring and diagnosis is not to replace routine surveillance or the chief engineer's responsibility for making decisions in accordance with his judgement.
- (5) The Society confirms on a yearly basis that the condition monitoring system works effectively and is in good condition; this includes inspection of condition monitoring records and machinery maintenance records subject to the scheme so as to confirm said machinery is in good condition, and that maintenance was carried out in cases where monitoring parameter of the machinery exceeded its limiting value.
- (6) Where it is regarded that satisfactory maintenance has not been carried out for any of the machinery and equipment, an open-up examination of the item in the presence of the Surveyor may be required.

2 CBM management software is to be approved by the Society in accordance with [Annex 9.1.3 "Procedures for approval of PMS/CBM Management Software"](#).

#### **9.1.5 Periodical Surveys\***

In place of the Planned Machinery Surveys prescribed in [9.1.2](#) to [9.1.4](#), the surveys specified in [Table B9.1](#) may be carried out at Special Surveys prescribed in [1.1.3](#) to ascertain that all the machinery is placed in good order. However, at Special Surveys of ships equipped with two or more propeller shafting systems driven by identical main engines, surveys of the main engine components that were examined in accordance with the requirements for Special Surveys after the Classification Surveys or the previous Special Survey may be omitted where deemed appropriate by the Surveyor, considering the time the engines were examined, the service history of the engines, the present condition and whether or not they were subject to a Classification Survey during Construction. Gas turbines may be replaced in rotation with spare sets that are to be overhauled and stored on shore in place of undergoing open-up examinations provided that the survey schedule table (including the overhaul procedures and storing method of the spare sets on shore) is submitted for Society approval in advance.

Table B9.1 Open-up Surveys of Machinery and Equipment

Items	Examinations
1 Reciprocating internal combustion engines (main engine)	(1) Cylinder covers, cylinder liners, pistons (including piston pins and piston rods), crosshead pins and bearings, connecting rods, crank pins and their bearings, crank journals and their bearings, camshafts and their driving gears, turbo chargers, scavenge air pumps or blowers, air intercoolers, attached essential pumps (bilge, lubricating oil, fuel oil, cooling water) are to be opened up.
2 Steam turbines (main engine)	(1) Turbine rotors together with bearings, turbine casings, turbine and reduction gear couplings, nozzle valves and manoeuvring valves are to be opened up.
3 Gas turbines (main engine)	(1) The essential parts of gas turbines together with their associated equipment are to be opened up and examined.
4 Power transmission systems and shafting systems (except for those for which item 7 is applicable)	(1) Reduction gears, reversing gears and clutch gears are to be opened up to the Surveyor's satisfaction, and the gears, shafts, bearings and couplings are to be examined. (2) The essential parts of flexible couplings are to be opened up. (3) The thrust shafts, intermediate shafts and their bearings (excluding the stern tube bearings, the shaft bracket bearings and the main bearings of waterjet propulsion systems) are to be examined by removing the upper bearing halves or their bearing metals and thrust pads and turning the shaft. (4) The essential parts of other power transmission gears are to be subjected to open-up examinations to the Surveyor's satisfaction.
5 Auxiliary engines	(1) Auxiliary engines driving generators (including emergency generators), auxiliary machinery essential for main propulsion and auxiliary machinery for manoeuvring and personnel safety are to be handled in accordance with the requirements applicable to main engines.
6 Water jet propulsion systems	(1) Hydraulic pumps for steering actuating systems are to be opened up. (2) Lubricating oil pumps are to be opened up. (3) Coolers are to be opened up. (4) Other items considered to be necessary by the Society are to be opened up.
7 Azimuth thrusters	(1) For gears, gear shafts, shaft couplings, bearings and clutches for propulsion, these items are to be opened up as deemed necessary by the Surveyor so that they can be inspected. However, this may be carried out concurrently with the surveys specified in <b>Chapter 8</b> . (2) For gears, gear shafts, shaft couplings and bearings for steering, these items are to be opened up as deemed necessary by the Surveyor so that they can be inspected. However, this may be carried out concurrently with the surveys specified in <b>Chapter 8</b> . (3) Hydraulic pumps and hydraulic motors for azimuth steering gears are to be opened up. (4) Lubricating oil pumps are to be opened up. (5) Coolers are to be opened up. (6) Other items considered to be necessary by the Society are to be opened up.

Items	Examinations
8 Auxiliary machinery (except for those for which item 6 or 7 is applicable)	<p>(1) The essential parts of the following auxiliary machinery are to be subjected to open-up examinations.</p> <ul style="list-style-type: none"> <li>(a) Air compressors, blowers</li> <li>(b) Cooling pumps</li> <li>(c) Fuel oil pumps</li> <li>(d) Lubricating oil pumps</li> <li>(e) Feed pumps, condensing pumps, drain pumps</li> <li>(f) Bilge pumps, ballast pumps, fire pumps (excluding those for emergency use)</li> <li>(g) Condensers, feed water heaters</li> <li>(h) Coolers</li> <li>(i) Oil heaters</li> <li>(j) Fuel oil tanks</li> <li>(k) Air reservoirs (including those for main, auxiliary, control, general service and emergency use)</li> <li>(l) Cargo piping systems (including bulk liquid cargo handling appliances as necessary)</li> <li>(m) Deck machinery</li> <li>(n) Distilling plants (for boilers used for driving steam turbines)</li> <li>(o) Other items considered to be applicable under the Planned Machinery Survey by the Society</li> </ul>

## Chapter 10 SURVEYS FOR STEEL BARGES

### 10.1 General

#### 10.1.1 Scope

Surveys requirements specified in this Chapter are to apply to steel barges (hereinafter referred to as “barges”), notwithstanding the requirements specified in other chapters of this Part.

#### 10.1.2 General Requirements on Surveys

1 The general requirements on Classification Survey during Construction, Periodical Surveys, etc. are to follow the requirements specified in **Chapter 1**.

2 Notwithstanding the requirement in **-1** above, Periodical Surveys for barges not engaged in international voyages or those less than 24 *metres* in length are to comply with the following.

- (1) Annual Surveys specified in **1.1.2-2(1)(a)** are not required to be carried out.
- (2) Intermediate Surveys specified in **1.1.2-2(1)(b)** are to be carried out within three *months* (before or after) of the second or third anniversary date.
- (3) Surveys other than Annual Surveys and Intermediate Surveys are to be carried out in accordance with the requirements in **1.1.2-2(1)(c)** through (e), (2), (3) and (4).

### 10.2 Classification Survey during Construction

#### 10.2.1 General

In the Classification Survey during Construction, it is to be confirmed that hull structure, hull equipment, machinery, fire protection, fire extinguishing systems, electrical installations, computer-based systems, stability and load lines of the barge comply with the relevant requirements specified in **Part Q**.

#### 10.2.2 Submission of Plans and Documents

1 For barges subjected to Classification Survey during Construction, the plans and documents listed in **2.1.3** which are related to the hull structure and equipment of the barge are to be submitted to the Society as plans and documents for approval.

2 In addition to plans and documents specified in **-1** above, the following plans and documents, (1) to (3) as plans and documents for approval and (4) to (6) as other plans and documents, are to be submitted to the Society.

- (1) Skeg construction
- (2) Construction of the joint between push boat and barge
- (3) For barges required to have a loading manual in accordance with the requirements of **12.1.3 of Part Q**: the loading manual including the conditions for loading and other necessary information
- (4) Manuals for towing or pusher
- (5) Calculation sheets of torsional vibration for generation shafting with a capacity not less than 30 *kw*
- (6) Calculation sheets of battery capacity for navigation light

3 Submission of plans and documents other than those specified in **-1** and **-2** may be required where deemed necessary by the Society.

#### 10.2.3 Survey\*

1 For barge hull construction and equipment, relevant items in **2.1.7, Part B** and **20.16, Part Q** are to be implemented.

2 Notwithstanding **-1** above, sea trials specified in **2.1.7-6** may be dispensed with. For barges with unusual construction or navigation system may be required to carry out sea trials by the Society.

3 Submission of the test data specified in **20.16.1-2, -4** and **-5, Part Q** may be required where deemed necessary by the Surveyor.

4 To implement surveys of items specified in **20.16.1-1, -3** and **-7, Part Q**, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate in the following cases.

**10.2.4 Alteration of Registration Items**

Alterations to registration items are to be surveyed in accordance with the requirements specified in [2.3.1](#).

**10.3 Classification Survey of Barges Not Built under Survey****10.3.1 General**

1 In the Classification Survey of barges not built under the Society's survey, the actual scantlings of main structures of the barge are to be measured in addition to such examinations of the hull and equipment, machinery, fire protection and detection, means of escape, fire extinction, electrical installations, computer-based systems, stability and load lines as required for Special Surveys corresponding to the barge's age in order to ascertain that they meet the relevant requirements in the Rules

2 For barges subject to the Classification Survey specified in [-1](#), plans and documents specified in [10.2.2](#) are to be submitted to the Society as per barges subject to the Classification Survey during Construction.

3 Hydrostatic tests, watertight tests, and other relevant tests are to be carried out in accordance with the requirements specified in [2.2.2](#).

4 Sea trials, stability experiments and loading tests may be dispensed with, where sufficient data on these tests are available, no alterations affecting the tests results have been made, and it is deemed appropriate by the Society.

**10.4 Annual Survey****10.4.1 General**

1 For survey items deemed necessary by the Society or the Surveyor, surveys equivalent to Special Surveys may be carried out.

2 Annual Surveys for machinery are not carried out.

**10.4.2 Annual Survey for Hull, Equipment, Computer-based Systems and Fire Extinction\***

At Annual Surveys for hull, equipment and fire extinction, surveys applicable to the barge's construction, equipment and fire extinction are to be conducted according to the requirements specified in [3.2](#).

**10.5 Intermediate Survey****10.5.1 General**

For survey items deemed necessary by the Society or the Surveyor, surveys equivalent to Special Surveys may be carried out.

**10.5.2 Intermediate Survey for Hull, Equipment, Computer-based Systems and Fire Extinction\***

At Intermediate Surveys for hull, equipment and fire extinction, surveys applicable to the barge's construction, equipment and fire extinction are to be conducted according to the requirements specified in [4.2](#).

**10.5.3 Intermediate Survey for Machinery**

1 In the Intermediate Survey for machinery, open-up inspections of auxiliary generator engines, auxiliary machinery, heat exchangers and air tanks that are used as parts of important systems are to be carried out. These open-up inspections may be dispensed with, however, where it is verified that this machinery is in satisfactory condition as a result of a general examination and investigation of the maintenance records by the Surveyor.

2 Where the machinery specified in [-1](#) consists of duplicate systems, surveys for either of the machinery may be carried out.

**10.6 Special Surveys****10.6.1 General**

Commencement and completion date of the Special Survey is to be in accordance with the requirements specified in [5.1.1](#).

**10.6.2 Special Survey for Hull, Equipment, Computer-based Systems and Fire Extinction\***

Special Surveys for hull, equipment and fire extinction are to be in accordance with the relevant requirements specified in [5.2](#) (except [5.2.3-2\(8\)](#)) corresponding to the barge's structure, equipment and fire extinction.

### **10.6.3 Special Survey for Machinery**

At Special Surveys for machinery, open-up inspections of auxiliary generator engines, auxiliary machinery, heat exchangers and air tanks that are used as parts of important systems are to be carried out. These open-up inspections may be dispensed with, however, where it is verified that this machinery is in satisfactory condition as a result of a general examination and investigation of the maintenance records by the Surveyor.

## **10.7 Docking Survey**

### **10.7.1 General**

For Docking Surveys of the barge, Docking Survey items related to barges in the requirements of [Chapter 6](#) are to be carried out.

## **10.8 Boiler Survey**

### **10.8.1 General**

Boiler Surveys are to be carried out in accordance with [Table B7.1](#).

## Chapter 11 SURVEYS OF SUBMERSIBLES

### 11.1 General

#### 11.1.1 Scope

The Class survey of submersibles specified in **Part T** are subject to the requirements in this Chapter, notwithstanding the requirements specified in other chapters of this Part.

#### 11.1.2 General Requirements on Surveys\*

**1** Class Maintenance Surveys of submersibles are to be in accordance with the requirements specified in **Chapter 1** except the items specified in **-2** through **-4 below**.

#### **2** Class Maintenance Surveys

Submersibles which have been registered with a Classification are to undergo Class Maintenance Surveys by the Surveyor in accordance with the requirements in this Chapter. The Class Maintenance Surveys consist of Periodical Surveys and Occasional Surveys, as specified in **(1)** and **(2)** below. At each survey, necessary examinations and tests are to be carried out to the satisfaction of the Surveyor.

##### **(1)** Periodical Surveys

###### **(a)** Intermediate Surveys

###### **(b)** Special Surveys

##### **(2)** Occasional Survey

Occasional Surveys are surveys that confirm general condition, damage, or alteration of hull, machinery and equipment, and are carried out at a separate time to the surveys specified in **(1)**.

#### **3** Due date of Periodical Surveys

##### **(1)** Intermediate Surveys

Intermediate surveys are to be carried out within three *months* of the anniversary date.

##### **(2)** Special Surveys

Special Surveys are to be carried out on the due date required by **1.1.3-1(3)**.

#### **4** Periodical Surveys carried out in advance

**(1)** Special Surveys may be carried out in advance of the due dates upon application by the Owner of the submersibles.

**(2)** Intermediate Surveys may be carried out in advance of the due dates upon application by the Owner of the submersibles. However, one or more additional Intermediate Surveys may be required in accordance with the provisions specified otherwise by the Society.

**(3)** Where a Special Survey is carried out in advance at the due time of the Intermediate Survey, the Intermediate Survey may be dispensed with.

**5** Unless otherwise specified, third parties engaged in thickness measurements, in-water surveys by divers or remote operated vehicles, or tightness testing of closing appliances such as hatches, doors, etc., with ultrasonic equipment are to be firms deemed appropriate by the Society.

**6** Unless otherwise specified, third parties engaged in inspections and maintenance of portable fire extinguishers are to be firms deemed appropriate by the Society.

### 11.2 Classification Survey during Construction

#### 11.2.1 General

In the Classification Survey during Construction, construction, materials, scantling and workmanship of hulls and various apparatus of submersibles are to be examined in detail and verified that they comply with the relevant requirements of **Part T**.

#### 11.2.2 Submission of Plans and Documents

**1** Plans and documents to be submitted for approval

With respect to submersibles intended for Classification Survey during Construction, the following plans and documents are to be submitted to the Society for approval prior to the commencement of work:

- (1) General
  - (a) General arrangement
  - (b) Midship section
  - (c) Arrangements of machinery and equipment (including those installed outside pressure hull)
  - (d) Arrangements of manoeuvring station and accommodation space
  - (e) Particulars of manoeuvring systems and other machinery and equipment
  - (f) Specifications of materials of important parts
  - (g) Welding procedures of important parts
  - (h) Plans and procedures of tests
- (2) Hull
  - (a) Construction of pressure hulls and pressure enclosures (including details of structural components)
  - (b) Construction and arrangement of protections and guards for pressure hulls and pressure enclosures
  - (c) Construction of hatch covers for access openings
  - (d) Construction of view port windows
  - (e) Construction and arrangements of penetrations
  - (f) Construction and arrangements of lifting lugs
  - (g) Construction and arrangements of mooring equipment
  - (h) Construction of buoyancy tanks, ballast tanks and trim tanks
  - (i) Arrangements of embarkation deck
  - (j) Construction of partition bulkheads and decks inside pressure hulls
- (3) Manoeuvring Systems and Relevant Systems
  - (a) Construction of buoyancy control systems (including pumps when provided)
  - (b) Construction of trim control systems (including pumps when provided)
  - (c) Construction and arrangements of drop weights system and solid ballast system
  - (d) Construction of propelling systems
  - (e) Construction of manoeuvring systems (including hydraulic pumps, motors and cylinders when provided)
  - (f) Construction of emergency releasing means specified in **4.1.6, Part T**
  - (g) Pressure equalising means specified in **4.2.5, Part T**
  - (h) Construction of pressure vessels
  - (i) Piping diagrams of ballast, trim, bilge, hydraulic, compressed air and life support and environmental control systems, etc.
  - (j) Control systems
- (4) Electrical installations
  - (a) Arrangements of main and reserve sources of electric power
  - (b) Switch boards
  - (c) Wiring diagrams
  - (d) Charging and discharging boards

- (5) Other plans and documents considered necessary by the Society

## 2 Plans and documents to be submitted for reference

With respect to submersibles intended for Classification Survey during Construction, the following plans and documents are to be submitted for reference in addition to those specified in **-1**:

- (1) General
  - (a) Specifications for design and manufacture
  - (b) List of manufacturers of materials of important parts, machinery and equipment
  - (c) Calculation of weight and centre of gravity
  - (d) Calculation of buoyancy and centre of buoyancy
  - (e) Lines and dimensions of the hull



- (f) Hydrostatic curves
- (g) Calculation of stability
- (h) Calculation of trim
- (i) Calculation of propelling and manoeuvring characteristics
- (j) Calculation of submerging and surfacing rates
- (k) Operation manuals including the items specified in [1.1.5-1\(1\)](#), (3), (4), (5), (6), (11), (12), (13), (15) and (16), [Part T](#)
- (l) Maintenance manuals
- (2) Hull
  - (a) Calculation of strength of pressure hulls and pressure enclosures, hatch covers, view port windows, penetrations and lifting lugs
  - (b) Protections for surfaces of view port windows
- (3) Manoeuvring Systems
  - (a) Specifications of indication devices specified in [4.1.2-2\(3\)](#) and [4.1.3\(3\)](#), [Part T](#)
  - (b) Specifications of depth gauges specified in [4.1.5](#), [Part T](#)
  - (c) Specifications of pingers and/or transponders specified in [4.2.7](#), [Part T](#)
  - (d) Specifications of underwater communication systems specified in [4.2.8](#), [Part T](#)
  - (e) Specifications of high pressure vessels
  - (f) Specifications of pipes, valves and pipe fittings
  - (g) Calculation of strength of tanks, pumps and pressure vessels or bottles used under a high pressure
- (4) Electrical installations
  - (a) Specifications of accumulator batteries
  - (b) Specifications of cables
  - (c) Specifications of motors
  - (d) Specifications of lightings
  - (e) Specifications of cable penetration connectors
  - (f) Specifications of H<sub>2</sub> detectors
  - (g) Power consumption table
  - (h) Calculation of short circuit
- (5) Facilities for accommodation
  - (a) Specifications of interior fittings
  - (b) Specifications of life support and environmental control systems including instruments and monitoring devices
  - (c) Calculation of capacity of life support and environmental control systems
- (6) Support systems
  - (a) Specifications of devices to detect position of the submersible
  - (b) Specifications of underwater communication systems
  - (c) Construction and strength calculation of towing systems, launch and recovery systems and cranes when provided
- (7) Fire extinguishing apparatus
  - Specifications of fire extinguishers
- (8) Other plans and documents considered necessary by the Society

### 11.2.3 Presence of the Surveyor

The presence of the Surveyor is required at the following stages. To implement surveys of the items specified otherwise by the Society, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate in the following cases.

- (1) When the tests on materials specified in [Part K](#) are carried out.
- (2) When the materials or parts manufactured at another location are assembled at the yard constructing the submersible.
- (3) During shop work, sub-assembly or when designated by the Society.
- (4) When each part of the hull is completed.
- (5) When the principal dimensions of the hull are measured.

- (6) When the tests specified in 7.2.1, 7.2.2, 7.2.4 and 7.2.5, Part T are carried out.
- (7) With respect to the pressure vessels, when the tests specified in Chapter 10, Part D are carried out.
- (8) When the support systems are assembled at the mother ship or support ship.
- (9) When considered necessary by the Society.

### 11.3 Classification Survey of Submersibles Not Built under Survey

#### 11.3.1 General

1 The surveys equivalent to Special Surveys are to be carried out for the Classification Survey of submersibles not built under survey. However, where deemed appropriate by the Society as a result of examination of operation records, the diving depth for the test dive may be modified.

2 With respect to submersibles intended for the Classification Survey specified in -1, the plans and documents considered necessary are to be submitted as per the submersibles subject to the Classification Survey during Construction.

### 11.4 Periodical Surveys

#### 11.4.1 Intermediate Surveys

1 At each Intermediate Survey, it is to be verified that the submersible is in good order after undergoing the following tests and inspections in dry dock.

- (1) Inspections of the actual condition of pressure hulls and pressure enclosures, view port windows and hatch covers
- (2) Inspections of the actual condition of machinery, equipment and piping (including life support and environmental control systems) and inspections of internal corrosion on sea water piping where deemed necessary
- (3) With respect to view port windows, hatch covers and penetrations of the pressure hull or the pressure enclosure and to pipes and valves subjected to external pressure, overhaul inspections on their watertight packing and valves
- (4) Operation or performance tests on the following
  - (a) Buoyancy control systems
  - (b) Trim control systems
  - (c) Manoeuvring systems
  - (d) Devices indicating open or close of hatch covers and valves
  - (e) Accumulator batteries
  - (f) Lighting
  - (g) Depth gauges specified in 4.1.5, Part T
  - (h) Protective devices and emergency cut-off devices specified in 4.3.4, Part T
  - (i) Means for pressure equalising specified in 4.2.5, Part T
  - (j) Life support and environmental control systems
- (5) Adjustment tests of the pressure indicating devices for high pressure bottles, the liquid level indicating devices for ballast tanks, O<sub>2</sub> content meters, CO<sub>2</sub> content meters, H<sub>2</sub> content meters, depth gauges and pressure gauges for interior atmosphere
- (6) Inspections of the actual condition of fire extinguishing apparatus and life saving appliances
- (7) Underwater operation tests at the depth considered appropriate by the Society
- (8) Insulation resistance tests of electrical installations
- (9) General examination of support facilities provided on the mother ship or the support ship

2 At the Intermediate Survey, open-up inspections of the watertight packing specified in -1(3) and tests and inspections specified in -1(4)(c), (f), (h) and (j) may be dispensed with at the discretion of the Surveyor by examining the maintenance records and operation records.

#### 11.4.2 Special Surveys

1 At each Special Survey, it is to be verified that the submersible is in good order after undergoing the following tests and inspections in dry dock.

- (1) Inspections of the actual condition of pressure hulls and pressure enclosures, view port windows and hatch covers

- (2) Internal inspections of tanks including buoyancy tanks
- (3) Measurements of the thickness of pressure hulls and lateral buckling of ring stiffeners, where deemed necessary
- (4) Inspections of the actual condition of machinery, equipment and piping (including life support and environmental control systems) and inspections of internal corrosion on sea water piping where deemed necessary
- (5) Overhaul inspections of essential machinery where considered necessary by the Society such as manoeuvring systems, ballast pumps, trim pumps, etc.
- (6) With respect to view port windows, hatch covers and penetrations of the pressure hull or the pressure enclosure and to pipes and valves subjected to external pressure, overhaul inspections on their watertight packing and hydrostatic test (where it is difficult to carry out this test, the test may be substituted by other tests and inspections subject to approval by the Society) specified in **7.2.1(3), 7.2.2-4 or -6(7), Part T**
- (7) Operation or performance tests on the following
  - (a) Buoyancy control systems
  - (b) Trim control systems
  - (c) Manoeuvring systems
  - (d) Devices indicating open or close of hatch covers and valves
  - (e) Accumulator batteries
  - (f) Lighting
  - (g) Depth gauges specified in **4.1.5, Part T**
  - (h) Emergency releasing means specified in **4.1.6, Part T**
  - (i) Means for pressure equalising specified in **4.2.5, Part T**
  - (j) Pingers and/or transponders specified in **4.2.7, Part T**
  - (k) Underwater communication system specified in **4.2.8, Part T**
  - (l) Protective devices and emergency cut-off devices specified in **4.3.4, Part T**
  - (m) Life support and environmental control systems
- (8) Adjustment tests of the pressure indicating devices for high pressure bottles, the liquid level indicating devices for ballast tanks, O<sub>2</sub> content meters, CO<sub>2</sub> content meters, H<sub>2</sub> content meters, depth gauges and pressure gauges for interior atmosphere
- (9) Inspections of the actual condition of fire extinguishing apparatus and life saving appliances
- (10) Underwater operation tests at the depth considered appropriate by the Society
- (11) A test dive at the maximum diving depth or an external hydrostatic test equivalent thereto
- (12) Insulation resistance tests of electrical installations
- (13) Inspections of the actual condition and performance tests of support facilities provided on the mother ship or the support ship, and open-up inspections on launch and recovery systems or cranes for lifting the submersible if necessary
- (14) Other inspections or tests considered necessary by the Society

**2** At the Special Survey, detailed inspections may be dispensed with at the discretion of the Surveyor with respect to the items inspected in accordance with **-1** at or after the previous Intermediate Survey.

## Chapter 12 SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES

### 12.1 General

#### 12.1.1 Application\*

1 Class Surveys of the mobile offshore drilling units, storage units and barges of special purpose specified in **Part P** (hereinafter referred to as “the units” in this Chapter), are to be in accordance with the requirements of this Chapter, notwithstanding the requirements specified in other chapters of this Part.

2 The requirements of this chapter apply to each unit of an integrated system where the units comply with **Part P** and are integrated with others of identical make and onshore installations.

3 When conducting surveys, particular attention should be paid to the requirements of National Regulations of coastal states in addition to the requirements specified in this Chapter.

#### 12.1.2 General Requirements on Surveys\*

1 General requirements of the Classification Survey, Class Maintenance Survey, and other relevant surveys not specified in this Chapter are to follow the requirements specified in **Chapter 1**. At Classification Surveys and Class Maintenance Surveys, it is to be verified that the units are in good conditions through examinations, tests and investigations carried out to the satisfaction of the Surveyor.

2 Notwithstanding the requirements specified in **-1**, units complying with **12.1.1-3** above and units to which it is considered impracticable to apply the survey items required by this Chapter due to their configuration or purpose may be subject to the requirements specified in **Chapter 13**.

3 An applicant is to submit a Survey Programme that details survey items as part of the preparation for the Special Survey and Continuous Survey stipulated in **12.5.1-2** for mobile offshore drilling units.

4 The interval between Special Surveys may be reduced in cases where deemed necessary by the Society.

#### 12.1.3 Postponement of Periodical Surveys\*

For propeller shafts of mobile offshore drilling units fitted with oil lubricated stern tube bearings that have low running hours, the following examinations may be conducted as an alternative survey to the Ordinary Survey (specified in **8.3.1-1**). If the units are found in good condition, the Ordinary Survey may be postponed for not more than a *year* from the date of completion of the alternative survey. However, this postponement is not to be granted to shafts which operated over 7,000 *hours* from the date of completion of the Classification Survey or the previous Ordinary Survey.

((1) to (4) are omitted.)

- (1) External examination of stern bearing and outboard seal area including wear-down check as far as is possible.
- (2) Internal examination of the shaft area (inboard seals) in propulsion machinery rooms.
- (3) Confirmation of lubricating oil records (oil loss rate, contamination).
- (4) Examination/Replacement of shaft seal elements in accordance with seal manufacturer's recommendations.

### 12.2 Classification Survey during Construction

#### 12.2.1 General\*

1 In the Classification Survey during Construction, surveys are to be carried out on hull construction, equipment, machinery, construction of fire protection, means of escape, fire extinguishing systems, electrical installations, computer-based systems, stability and load lines in order to ascertain that they meet the relevant requirements of **Part P**.

2 In the Classification Survey, surveys on materials, hull construction, equipment, machinery, etc. are to be carried out in accordance with the requirements specified in **12.2.2** to **12.2.7** in addition to the relevant requirements specified in **Chapter 2**.

#### 12.2.2 Submission of Plans and Documents\*

1 With respect to the Classification Survey during Construction, the following plans and documents are to be submitted as plans and documents for approval before the work is commenced.

(1) Hull

- (a) Cross sections (showing the maximum load line and load line during towing)
- (b) Longitudinal sections
- (c) Details of inspection facilities
- (d) Details of welding procedures
- (e) Details of painting and corrosion control procedures
- (f) Temporary mooring arrangements, towing arrangements
- (g) Arrangements and construction of mooring systems
- (h) Summary of distributions of fixed and variable weights
- (i) Plan indicating design loads for all decks
- (j) Stability information booklet
- (k) Loading manual, where the loading manual is to be provided in accordance with the requirements of **7.6.1-2, Part P**
- (l) Details of maintenance and inspection procedures and docking plan and in-water inspection procedures
- (m) For self-elevating units, construction of all legs, leg connections to bottom mats or spud cans, leg tanks and leg jacking or other elevating systems
- (n) For column-stabilized units, construction of all columns, lower hull, upper hull, bracing, footings
- (o) For large storage units, rupture hatches arrangements
- (p) For mobile offshore drilling units, the following plans and documents:
  - i) Arrangement of drilling derricks, details of drilling derrick constructions and relevant documents
  - ii) Arrangement of equipment installed on drill floors
  - iii) Details of drill floors and substructure constructions
  - iv) Plans and documents indicating and specifying arrangements, specifications (including type, capacity, etc.), and the number, etc. of the breathing devices specified in **15.2.12, Part P**
- (q) Other plans and/or documents deemed necessary by the Society.

(2) Machinery

- (a) For Machinery installations relating to the safety of the unit and installations or systems related to the propulsion of the unit (only applicable to unit's with main propulsion machinery): plans and documents required in the relevant Chapters in **Part D**.
- (b) For machinery installations used solely for operation that is the purpose of the unit, plans and documents specified in **Chapters 9 and 10, Part D**
- (c) For self-elevating units, the plans and documents specified in **11.1.14-1(1), Part P**
- (d) For units with a dynamic positioning system, the following plans.
  - i) Arrangement and configuration of the dynamic positioning system
  - ii) Construction and control diagrams of the dynamic positioning system
- (e) For units complying with **12.1.1-3**, testing procedures for machinery and electrical provisions or installations
- (f) Other plans and/or documents deemed necessary by the Society

(3) Operations

- (a) Operating manual specified in **18.1, Part P**
- (b) Other plans or documents deemed necessary by the Society.

**2** With respect to the Classification Survey during Construction, the following plans and documents are to be submitted as other plans and documents in addition to the plans and documents specified in **-1** above.

- (1) Method and calculation sheets of structural analysis for relevant loading condition
- (2) Data or documents on environmental parameters used for determination of design loads (including data such as past measurement data, the effect of wave breakers, and towing routes) and calculation methods of total external forces and moments due to wind, waves, tidal currents, reactions to mooring or positioning systems and other loads
- (3) Documents on the effects of icing or snow on loading, stability and projected area
- (4) Calculation sheets for intact and damage stability in all conditions
- (5) Documents relating to requirements **(2)** to **(4)**, where the loads and stability are determined using appropriate model tests or

computing methods

- (6) Calculation of significant operational loads from the drilling derricks and other equipment on the supporting structure
- (7) For self-elevating units, the following plans and documents.
  - (a) Calculations substantiating adequacy of the structure to transmit forces between legs and hull through the jacking or other elevating systems.
  - (b) Calculations of the ship's ability to resist overturning.
  - (c) The plans and documents specified in **11.1.14-1(2), Part P**.
- (8) For units which rest on the sea bottom, calculation of the unit's ability to resist overturning
- (9) Lines
- (10) Cross curves for stability
- (11) Curves for righting moments and wind heeling moments
- (12) Capacity plans and sounding tables for tanks
- (13) Methods and locations of non-destructive inspections, and procedures for thickness measurements;
- (14) Plans indicating arrangements of watertight compartments, openings, and their respective closing appliances, etc. necessary for calculation of stability
- (15) For machinery installations relating to the safety of the unit, and installations or systems related to the propulsion of the unit (only applicable to unit's with main propulsion machinery): plans and documents required in the relevant chapters of **Part D**
- (16) For machinery installations used solely for operations that are the purpose of the unit: plans and documents indicating safety devices of machinery installations and those specified in **Chapters 9 and 10, Part D**
- (17) For large storage units, hydraulic test procedures for hull, evaluation sheets for rupture hatches, and periodical inspection procedures including self-checking of rupture hatches
- (18) Procedures of sea trials and stability experiments
- (19) Calculation sheets for mooring systems
- (20) For units with a dynamic positioning system, the following plans and documents.
  - (a) Calculation sheets for the dynamic positioning system
  - (b) Procedures of testing the dynamic positioning systems (including test items of Periodical Surveys, test procedures, criteria, etc.)
  - (c) For units with a Class 2 or Class 3 dynamic positioning system, reports of Failure Modes and Effects Analysis (*FMEA*), and the testing procedures of demonstration tests
- (21) Other plans or documents deemed necessary by the Society.

### **12.2.3 Survey\***

**1** During the Classification Survey, the items specified in following **(1) to (7)** are to be implemented. To implement surveys of items specified otherwise by the Society, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate in the following cases.

- (1) The survey items specified in **2.1.7, 12.2.4 and 12.2.6**
- (2) For machinery and electrical installations, the tests, examinations or inspections specified in **11.1.3 and 12.1.3, Part P**
- (3) For column-stabilized units, the draught scales are fitted
- (4) For large storage units, the operation test of rupture hatches at a pressure below the design operational pressure
- (5) For units requiring the mooring system specified in **Chapter 10, Part P**, confirmation survey for system installation on the unit
- (6) For units with a dynamic positioning system specified in **Chapter 10, Part P**, the following **(1) to (3)**.
  - (a) Confirmation survey for components of the dynamic positioning system installation on the unit
  - (b) Tests are carried out in accordance with the testing procedures.
  - (c) For units with a Class 2 or Class 3 dynamic positioning system, tests for Failure Modes and Effects Analysis (*FMEA*) in accordance with testing procedures of demonstration tests.
- (7) For mobile offshore drilling units, confirmation survey the completion of each part of drilling derricks and substructures including supporting structures of drilling derricks and installation of drilling derricks and substructures on board.

**2** The requirements specified in **-1** may be modified with regard to the actual status of facilities, technical abilities and quality control at the place of manufacture, except in the case of sea trials and stability experiments.

**12.2.4 Hydrostatic Tests, Watertight Tests, and Relevant Tests\***

1 Hydrostatic tests, watertight tests, and other relevant tests in the Classification Survey during Construction are to be in accordance with the requirements in item10, **Table B.2.7**.

2 Notwithstanding the requirements in **-1**, these tests may be altered as specified by the Society.

3 For large storage units, a pressure test of rupture hatches is to be carried out at a minimum pressure of 1.2 times the setting pressure of vacuum relief valves provided with the storage unit.

**12.2.5 Documents to be Maintained On Board**

At the completion of a classification survey, the applicable documents specified in **2.1.4** and the following drawings, plans, manuals, lists, etc, are to be provided on board the unit.

- (1) Stability information booklets
- (2) Loading manual, for units which require one according to the requirements in **7.6.1-2, Part P**
- (3) Operating manual specified in **18.1, Part P**
- (4) For units with a dynamic positioning system, the following documents.
  - (a) Testing procedures for dynamic positioning systems and the corresponding test results
  - (b) For units with a Class 2 or Class 3 dynamic positioning system, reports of Failure Modes and Effects Analysis (*FMEA*), the testing procedures of demonstration tests, and the corresponding test results in addition to the results required by (a) above
- (5) Access Manual specified in **9.6.5, Part P**
- (6) For mobile offshore drilling units, the maintenance plan specified in **15.2.16-4(2), Part P**
- (7) For mobile offshore drilling units, a copy of the Construction Portfolio containing the items specified in (a) through (d)
  - (a) The location and extent of application of the grades and strengths of materials
  - (b) A description of the materials and welding procedures employed
  - (c) Any other relevant construction information
  - (d) Restrictions or prohibitions regarding repairs or modifications

**12.2.6 Sea Trials and Stability Experiments\***

1 For units that have main propulsion machinery, the following tests corresponding to the unit type are to be carried out in addition to the sea trials required in **2.1.7-7**:

- (1) For self-elevating units, elevating and lowering tests of legs and decks and function tests of their safety devices; and where legs are not provided with bottom mats, pre-loading tests on each leg to a load as near as possible to that of the strength calculation specified in **7.4.1** and **7.4.2, Part P**
- (2) For column-stabilized units, a function test of the ballast system
- (3) For large storage units, the Society may require a demonstration test in still water after the completion of the hull construction work, where the unit is operating under the severest loading condition in order to verify the adequacy of the theoretical calculations and to confirm the safety factor during operation

**2 Stability Experiments**

- (1) In the Classification Survey, stability experiments are to be carried out upon completion of the unit. In addition, a stability information booklet prepared on the basis of the particulars of stability determined by the results of stability experiments is to be approved by the Society and provided on board. For mobile offshore drilling units, the results of the stability experiments are to be indicated in the operating manual.
- (2) The stability experiments of an individual unit may be dispensed with, provided that reliable stability data can be obtained from the stability experiments of a similar unit and approval is given by the Society. However, the stability experiments for a column-stabilized unit are to be carried out even though the stability data is available from a similar unit.
- (3) Where a computer for stability calculation is on board the units as a supplement to the stability information booklet, an operation manual for the computer is to be provided on board. After the computer is installed on board, a functional test to ensure that it is working correctly is to be carried out.

**12.2.7 Classification Survey of Units Not Built under Survey\***

1 In the Classification Survey of units not built under the Society's survey, the actual scantlings of main parts of the units are to be measured in addition to such examination of the hull, equipment, machinery, fire protection, means of escape, fire fighting system,

electrical installations, computer-based systems, stability and load lines as required for the Special Survey corresponding to the units' age in order to ascertain that they meet the relevant requirements in **Part P**.

2 For the units intended for the Classification Survey specified in **-1**, the plans and documents specified in **12.2.2** for the Classification Survey during Construction are to be submitted for approval by the Society.

3 Hydrostatic and watertight tests are to be carried out in accordance with the requirements in **2.2.2**.

4 Sea trials and stability experiments are to be carried out in accordance with the requirements in **12.2.6**. However, the sea trials and stability experiments may be dispensed with provided that sufficient information based on previous tests is available and neither alternation nor repair affecting the sea trials has been made. However, the stability experiments for a column-stabilized unit may be required where deemed necessary by the Society even though the stability data is available from a similar unit.

### 12.3 Annual Surveys

#### 12.3.1 General

At Annual Surveys, surveys specified in **12.3.2** and **12.3.3** are to be carried out. Where deemed necessary by the Society or Surveyor or when an application has been made by the Owner, the surveys may be carried out in accordance with the requirements of the Special Survey.

#### 12.3.2 Annual Surveys for Hull, Equipment, Fire Extinguishing Systems, Computer-based Systems, and Fittings\*

1 It is to be verified that the following documents and booklets are kept on board and readily available.

- (1) The approved stability booklet
- (2) Loading manual, for units which require one according to the requirements in **7.6.1-2, Part P**
- (3) Operating manual specified in **18.1, Part P**
- (4) Relevant items listed **Table B3.1** corresponding to the unit's hull structure and purpose

2 Annual Surveys for hulls, equipment, fire extinguishing systems, computer-based systems, and fittings

At Annual Surveys, the following surveys are to be carried out as far as practicable, in addition to the relevant survey items specified in **3.2.2** through **3.2.7** corresponding to hull structure, equipment, purpose, etc. Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor. In such cases, the close-up surveys using RIT is to be carried out under the direction, and in the presence, of the surveyor.

- (1) It is to be confirmed that no material alterations have been made to the unit, its structural arrangements, subdivisions, superstructure, fittings and closing appliances.
- (2) Suspect areas identified at previous surveys are to be examined. Thickness measurements are to be taken at areas of substantial corrosion in accordance with **Table B5.9**.
- (3) The following items are to be examined:
  - (a) Exposed parts of hulls, decks, deck houses, structures attached to decks, derrick substructures (including supporting structures and accessible internal spaces);
  - (b) Accessible hatchways, manholes and other openings;
  - (c) Machinery casings and covers, companionways, and deck houses protecting openings;
  - (d) Portlights together with deadcovers, cargo ports and similar openings in hull sides, ends or in enclosed superstructures;
  - (e) Ventilators, tank vent pipes together with flame screens, and overboard discharges from enclosed spaces;
  - (f) Watertight bulkheads and end bulkheads of enclosed superstructures;
  - (g) Closing appliances, hatch covers and doors for the items specified in **(b)** to **(f)** above, together with their respective securing devices (including dogs), sills, coamings and supports;
  - (h) Freeing ports together with bars, shutters and hinges;
  - (i) Protective equipment for the crew, guard rails, lifelines, and deck houses;
  - (j) The mooring systems specified in **Chapter 10, Part P**, their fittings (including windlasses and attachments for anchor racks and anchor cables) as well as adjacent hull constructions; and
  - (k) Drilling derricks.

3 For self-elevating units, general examinations of the following items are to be carried out in addition to **-1** and **-2**, as far as practicable, down to the waterline:



- (1) Leg structures;
- (2) Jack-house structures and attachments to upper hulls or platforms; and
- (3) Plating and supporting structures in way of leg wells.

4 For column-stabilized units, general examinations of the upper hull, columns and bracing together with their connections are to be carried out in addition to -1 and -2 as far as practicable down to the waterline.

5 For ship-type units and barge-type units, general examinations of the hull and deck structure around the moon pool and in the vicinity of any other structural changes in sections, slots, steps, or openings in the deck or hull as well as the back-up structure in way of structural members or sponsons connecting to the hull are to be carried out in addition to -1 and -2 as far as practicable down to the waterline.

6 For mobile offshore drilling units, a general examination of the breathing devices specified in 15.2.12, Part P is to be carried out.

### 12.3.3 Annual Surveys for Machinery and Electrical Installations

1 At Annual Surveys for machinery and electrical installations, general examinations of relevant machinery and electrical installations specified in 3.3 are to be carried out in addition to the following surveys.

- (1) General conditions of electrical installations in hazardous areas are to be examined. For units of ten years of age and over, insulation resistance of these installations is to be measured. This measurement, however, may be dispensed with where proper measurement records have been kept on board and are found to be satisfactory by the Surveyor.
- (2) For self-elevating units, the condition of the jacking or elevating systems and the leg guides is to be examined.
- (3) For units with a dynamic positioning system, a general examination of its components and a performance test for all important systems and components in accordance with the testing procedure for dynamic positioning systems is to be carried out.

2 For units with a dynamic positioning system, it is to be verified that the following documents are kept on board and readily available.

- (1) Testing procedures for dynamic positioning systems and the corresponding test results
- (2) Details of tests conducted at occasional surveys and the corresponding test results
- (3) For units with a Class 2 or Class 3 dynamic positioning system, reports of Failure Modes and Effects Analysis (*FMEA*), the testing procedures of demonstration tests, and the corresponding test results in addition to the results required by (1) and (2) above

## 12.4 Intermediate Surveys

### 12.4.1 General

At Intermediate Surveys, surveys specified in 12.4.2 and 12.4.3 are to be carried out. Where deemed necessary by the Society or Surveyor, or when an application has been made by the Owner, the surveys may be carried out in accordance with the requirements of the Special Survey.

### 12.4.2 Intermediate Surveys for Hull, Equipment, Fire Extinguishing Systems, Computer-based Systems, and Fittings\*

#### 1 Verification of documents and booklets

At Intermediate Surveys, it is to be verified that the documents and booklets specified in 12.3.2-1 have been kept on board and are readily available.

#### 2 Surveys for hull, equipment, fire extinguishing systems and fittings

At Intermediate surveys, the following surveys are to be carried out as far as practicable, in addition to the relevant survey items specified in 4.2.2 through 4.2.7 corresponding to the unit's structure, equipment, etc. and a general examination of hull, equipment, fire extinguishing systems and fittings specified in 12.3.2-2 through -6 is to be carried out. Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor. In such cases, the close-up surveys using RIT is to be carried out under the direction, and in the presence, of the surveyor.

- (1) General examination of external sides of hull structure and platform, especially machinery room and representative cofferdam, water tanks such as ballast water tanks, and oil tanks such as fuel oil tanks
- (2) General examination of openings such as side scuttles, doors, etc. that are required to have water-tightness or weather-tightness, their closing appliances, and inspection of fittings. In addition, a performance test of the closing appliances is to be carried out.

**3** For self-elevating units, the following surveys are to be carried out in addition to the survey items specified in **-1** and **-2**.

- (1) For units over 5 *years* of age, an internal examination and thickness measurements of representative ballast tanks and at least two pre-load tanks are to be conducted.
- (2) Where the effectiveness of the corrosion protection of those tanks is verified as a result of the internal examination specified in **(1)**, thickness measurements may be dispensed with.

**4** For column-stabilized units, the following surveys are to be carried out in addition to the survey items specified in **-1** and **-2**.

- (1) For units over 5 *years* of age, an internal examination and thickness measurements of representative ballast tanks in footings and lower hulls and at least two ballast tanks in columns, if accessible, are to be conducted.
- (2) Where the effectiveness of the corrosion protection of those tanks is verified as a result of the internal examination specified in **(1)**, thickness measurements may be dispensed with.

**5** For ship-type units and barge-type units, the following surveys are to be carried out in addition to the survey items specified in **-1** and **-2**.

- (1) For units over 5 *years* of age, an internal examination and thickness measurements of one aft or fore peak tank and at least two ballast tanks except for aft and fore peak tanks are to be conducted.
- (2) Where the effectiveness of the corrosion protection of those tanks is verified as a result of the internal examination specified in **(1)**, thickness measurements may be dispensed with.

**6** Examination of tanks mentioned in **-3** through **-5** that were examined during the Docking Survey specified in **12.6**, may be dispensed with.

#### **12.4.3 Intermediate Surveys for Machinery and Electrical Installations**

At the Intermediate Survey, machinery and electrical installations are to be examined as specified in **12.3.3** and **4.3** according to its type. Also, overhaul examinations of the jack up systems are to be carried out, if deemed necessary by the Surveyor.

### **12.5 Special Surveys**

#### **12.5.1 General**

**1** Commencement and completion of the Special Survey is to follow the requirements specified in this **12.5.1** in addition to the requirements specified in **5.1.1**.

**2** At the request of the owner, and upon receiving Society approval of the proposed arrangements, a system of Continuous Survey may be undertaken whereby Special Survey requirements are carried out in a regular rotation to complete all the requirements of the particular Special Survey within a five year period.

#### **12.5.2 Special Surveys for Hull, Equipment, Fire Extinguishing Systems, Computer-based Systems, and Fittings\***

**1** Verification of documents and booklets

At Special Surveys, it is to be verified that the documents and booklets specified in **12.3.2-1** have been kept on board and are readily available.

**2** Surveys for hull, equipment, fire extinguishing systems and fittings

At Special surveys, the following surveys are to be carried out, in addition to the relevant survey items specified in **5.2.2** through **5.2.7** corresponding to the unit's structure, equipment, etc. The hull, equipment, fire fighting systems and fittings specified in **12.4.2-2** are to be examined thoroughly. Close-up surveys using remote inspection techniques (RIT) may be accepted subject to prior special consideration by the surveyor. In such cases, the close-up surveys using RIT is to be carried out under the direction, and in the presence, of the surveyor.

(1) The following items are to be examined:

- (a) The interiors and exteriors of hull or platform structures including tanks, watertight bulkheads and decks, cofferdams, void spaces, sponsons, chain lockers, duct keels, helicopter decks and their supporting structures, machinery spaces, peak spaces, steering gear spaces, and all other internal spaces. In addition, thickness measurements of plating and framing may be required where wastage is evident or suspected;
- (b) The interiors and exteriors of all tanks, compartments and free-flooding spaces throughout the drilling unit. In addition, internal examinations of spud cans and mats may be dispensed with when deemed appropriate by the Society;
- (c) The watertight integrity of tanks, bulkheads, hulls, decks and other compartment boundaries (it is to be verified by visual

inspection);

- (d) Suspect areas and critical structural areas. In addition, tests for tightness, non-destructive tests or thickness measurements may be requested as deemed necessary by the Surveyor;
  - (e) Structures such as derrick substructures and their supporting structures, jack-houses, deck houses, superstructures, helicopter landing areas, raw water towers (sea water intakes) and their respective attachments to decks or hulls;
  - (f) Foundations and supporting headers, brackets, and stiffeners for drilling related apparatuses where attached to hulls, decks, superstructures or deck houses; and
  - (g) Drilling derricks.
- (2) All special portions of structural members and primary structural members defined in **6.2.1, Part P** and identified critical structural areas are to be subjected to close up surveys.
  - (3) Thickness measurements are to be carried out where wastage is evident or suspected.
  - (4) The conditions of corrosion prevention systems of ballast tanks, where provided, are to be examined. Tanks with the conditions indicated in (a) to (c) require internal examinations be carried out at frequencies determined by the Society.
    - (a) A hard protective coating is found to be in poor condition and has not been renewed.
    - (b) A soft or semi-hard coating has been applied.
    - (c) A hard protective coating has not been applied since time of construction
  - (5) Tanks are to be tested at the highest conceivable pressure or the highest design pressure; however, these tests may be omitted, provided that the Surveyor is satisfied with the condition of the tanks as a result of an external and internal examination.
  - (6) For mooring systems (including windlasses and attachments for anchor racks and anchor cables) specified in **Chapter 10, Part P**, the following examinations are to be carried out.
    - (a) For anchor mooring systems or tension mooring systems, thorough examinations of anchor chains or tension mooring lines and measurements of dimensions of chains or lines.
    - (b) General examination and operating test of equipment used for mooring systems.
    - (c) For tension mooring systems, a thorough examination and thickness measurements of pipes, where steel pipes are used for mooring lines.
    - (d) For dolphin mooring systems, general examinations of fenders, hull structures around fenders and their fittings are to be examined.

**3** For self-elevating units, following surveys are to be carried out, in addition to the survey items specified in **-1** and **-2**. However, where the unit is examined while floating, examinations deemed appropriate by the Society are to be conducted.

- (1) The following items are to be examined:
  - (a) All legs including chords, bracing, gussets, racks, joints together with leg guides. Tubular or similar type legs are to be examined externally and internally together with internal stiffeners.
  - (b) The structure in, around and under jack-houses and leg wells. Parts designated by the Society as being concentrations of stress may require non-destructive tests.
  - (c) Leg connections to bottom mats or spud cans. Non-destructive tests of leg connections to mats or spud cans are to be carried out.
  - (d) Jetting piping systems or other external piping, particularly where penetrating mats or spud cans
  - (e) Spud cans or mats. Where the spud cans or mats are partly or entirely obscured below the mud line, the Society may allow the examination to be postponed until the unit is moved.
- (2) At Special Surveys, thickness measurements are to be carried out for the structural members listed in **Table B12.1**. Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with **Table B5.9**.

**4** For column-stabilized units, following surveys are to be carried out, in addition to the survey items specified in **-1** and **-2**. However, where the unit is examined while floating, examinations deemed appropriate by the Society are to be conducted.

- (1) Connections of columns and bracings to upper hulls, structures or platforms and lower hulls, structures or pontoons as well as the joints of supporting structures are to be examined. However, parts designated by the Society as having a concentration of stress may require non-destructive tests.
- (2) At Special Surveys, thickness measurements are to be carried out for the structural members listed in **Table B12.2**. Where

substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with [Table B5.9](#).

- (3) A lightweight survey is to be carried out in accordance with the following (a) and (b).

- (a) At the first special survey

A lightweight survey or inclining test is to be conducted at the first special survey and the results are to be indicated in the operating manual. If a lightweight survey is conducted and it indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, the following i) or ii) is to be conducted.

- i) An inclining test
- ii) The difference in weight is to be placed in an indisputably conservative vertical centre of gravity and approved by the Society.

- (b) At succeeding special surveys

Where the following i) and ii) are complied with, light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based upon draught readings exceed 1% of the operating displacement, a lightweight survey is to be completed in accordance with (a) above.

- i) The survey or test at the first special surveys demonstrated that the unit was maintaining an effective weight control program.
- ii) At succeeding special surveys this is confirmed by the records of all changes to machinery, structure, outfitting and equipment that affect the light ship data maintained in light ship data alterations log.

5 For ship-type units and barge-type units, the following surveys are to be carried out, in addition to the survey items specified in -1 through -3. However, where the unit is examined while floating, examinations deemed appropriate by the Society are to be conducted.

- (1) The following items are to be examined:

- (a) Structural appendages and ducts for positioning systems;
- (b) The hull structure around openings such as moon pools; and
- (c) The parts specified in (a) and (b) above designated by the Society as being concentrations of stress may require non-destructive tests

- (2) At Special Surveys, thickness measurements are to be carried out for the structural members listed in [Table B12.3](#). Where substantial corrosion is found as a result of such thickness measurements, additional thickness measurements are to be taken in accordance with [Table B5.9](#).

### 12.5.3 Special Surveys for Machinery and Electrical Installations\*

At Special Surveys for machinery and electrical installations, examinations specified in [12.3.3](#) and [5.3](#) corresponding to the type of machinery and electrical installations are to be carried out in addition to the following surveys.

- (1) For self-elevating units, a general examination of the jack up system is to be carried out. Where deemed necessary by the Surveyor, an overhaul examination of the jack up system is also to be carried out.
- (2) For units with a dynamic positioning system, performance tests for all systems and components are to be carried out in accordance with the testing procedures for dynamic positioning systems. For units with a Class 2 or Class 3 dynamic positioning system, additional tests for Failure Modes and Effects Analysis (FMEA) are to be carried out in accordance with the testing procedures of demonstration tests.

## 12.6 Docking Surveys

### 12.6.1 General\*

1 At Docking Surveys, the unit is to be placed on blocks having sufficient height in a dry dock or on a slip way.

2 Notwithstanding the requirement in -1, where the in-water survey is requested by the Owner and accepted by the Society, the in-water survey may be substituted for a survey in a dry dock or on a slip way. In which case, examinations considered appropriate by the Society are to be carried out.

3 In addition to the requirements specified in [Chapter 6](#) and [12.6.2](#), examinations as comprehensive as Special Surveys may be required for items considered necessary by the Surveyor or requested by the Owner on the occasion of Docking Surveys.

**12.6.2 Docking Surveys\*****1 General**

- (1) At Docking Surveys, examinations specified in **Table B6.1** corresponding to the type of the unit's structure and fittings are to be carried out.
- (2) The effectiveness of the corrosion control system in ballast tanks, free flooding area and locations subject to sea water from both sides is to be confirmed for all units.
- (3) For mooring systems specified in **Chapter 10, Part P**, the following examinations are to be carried out.
  - (a) For anchor mooring system and tension mooring system, thorough examination and dimension measurement of mooring chains or tension lines
  - (b) General examinations and performance test of installation used as mooring systems
  - (c) Where steel pipe are used to tension mooring line for tension mooring system, thorough examinations and thickness measurement of steel pipes
  - (d) For dolphin mooring system, general examination of fender systems, hull structure around them and their fittings.
- (4) For units with a dynamic positioning system, a general examination of components comprising dynamic positioning systems.

**2 Self-elevating units**

The following parts are to be cleaned and examined:

- (1) External surface of upper structure or platform
- (2) External surface of spud cans, mats, under water areas of legs and their connections
- (3) The Surveyor may request non-destructive tests of important parts or suspect areas of substantial corrosion as a result of the examinations.
- (4) For units over 10 *years* of age, the condition of the internal structure of the mat or spud cans is to be examined.

**3 Column-stabilized units**

The following parts are to be cleaned and examined:

- (1) External surface of upper hull or platform
- (2) Footings, pontoons or lower hulls, underwater areas of columns, bracing and their connections
- (3) Sea chests, propulsion system
- (4) The Surveyor may request non-destructive tests of important parts or suspect areas of substantial corrosion as a result of the examinations.

**4** For units over 5 *years* of age, internal examinations and thickness measurements of the following ballast spaces are to be carried out. However, where corrosion control arrangements of these ballast spaces are considered satisfactory, thickness measurements may be dispensed with.

- (1) For self-elevating units  
Representative ballast tanks or free-flooding compartments in bottom mats or spud cans, if accessible, and at least two representative pre-load tanks
- (2) For column-stabilized units  
Representative ballast tanks in footings, lower hulls or free-flooding compartments as accessible, and at least two ballast tanks in columns or upper hull, if accessible
- (3) For ship-type and barge-type units  
One peak tank and at least two other representative ballast tanks between the peak bulkheads used primary for water ballast

**12.7 Boiler and Thermal Oil Heater Surveys****12.7.1 General**

Boiler and Thermal Oil Heater Surveys are to be carried out in accordance with **Chapter 7**.

**12.8 Propeller Shafts and Stern Tube Shaft Surveys****12.8.1 General**

For units with main propulsion machinery, Propeller Shafts and Stern Tube Shaft Surveys are to be carried out in accordance with [Chapter 8](#).

**12.9 Planned Machinery Surveys****12.9.1 General**

Planned Machinery Surveys are to be carried out in accordance with [Chapter 9](#).

Table B12.1 Requirements for Thickness Measurements for Self-elevating Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 years of age (Special Survey No.1)	(1) Suspect areas throughout the unit (particular attention is to be paid to the legs in way of the splash zone).
2 Special Survey for units over 5 years and up to 10 years of age (Special Survey No.2)	(1) Suspect areas throughout the unit. (2) Legs in way of the splash zone. (3) Special portions of structural members and primary structural members where wastage is evident. (4) Representative locations of the upper hull deck and bottom plating. (5) Representative locations of the interior of one preload (ballast) tank.
3 Special Survey for units over 10 years and up to 15 years of age (Special Survey No.3)	(1) Suspect areas throughout the unit. (2) Legs in way of the splash zone. (3) Representative locations, throughout, of special portions of structural members and primary structural members. (4) Leg well structure. (5) Representative locations of deck, bottom and side shell plating of hull and mat. (6) Interiors of at least two preload (ballast) tanks.
4 Special Survey for units over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) Suspect areas throughout the unit. (2) Legs in way of the splash zone. (3) Special portions of structural members and primary structural members. (4) Leg well structure. (5) Representative locations of deck, bottom and side shell plating of hull and mat. (6) Substructure of derrick (as deemed necessary by the Surveyor). (7) Representative locations of interior of all preload (ballast) tanks.

Note:

The definitions of special portions of structural members and primary structural members are according to **6.2.1, Part P**.

Table B12.2 Requirements for Thickness Measurements for Column-Stabilized Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 years of age (Special Survey No.1)	(1) Suspect areas throughout the unit. (2) Columns and bracings where wastage is evident in the splash zone.
2 Special Survey for units over 5 years and up to 10 years of age (Special Survey No.2)	(1) Suspect areas throughout the unit. (2) The following locations: (a) Representative locations of columns and bracings in the splash zone; and (b) Representative locations of interiors of the columns and bracings specified in (a) above. (3) Special portions of structural members and primary structural members where wastage is evident.
3 Special Survey for units over 10 years and up to 15 years of age (Special Survey No.3)	(1) Suspect areas throughout the unit. (2) Representative locations, throughout, of special portions of structural members and primary structural members. (3) The following locations: (a) One transverse section (girth belt) of each of 2 columns and 2 bracings in the splash zone; and (b) The interiors of the columns and bracings specified in (a). (4) Lower hulls in way of mooring lines where wastage is evident. (5) One transverse section (girth belt) of each lower hull between one set of columns.
4 Special Survey for units over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) Suspect areas throughout the unit. (2) Special portions of structural members and primary structural members. (3) The following locations: (a) One transverse section (girth belt) of each of one-half of the columns and bracings in the splash zone; and (b) Interiors of the columns and bracings specified in (a) (as deemed necessary by the Surveyor). (4) Lower hulls in way of mooring lines where wastage is evident. (5) One transverse section (girth belt) of each lower hull between one set of columns. (6) Representative locations of the substructures of drilling derricks.

Notes:

- (1) The definitions of special portions of structural members and primary structural members are according to **6.2.1, Part P**.
- (2) A transverse section (girth belt) includes all continuous longitudinal members such as plating, longitudinals and girders at a given section of the unit.

Table B12.3 Requirements for Thickness Measurements for Ship-type and Barge-type Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 years of age (Special Survey No.1)	(1) Suspect areas throughout the unit.
2 Special Survey for units over 5 years and up to 10 years of age (Special Survey No.2)	(1) Suspect areas throughout the unit. (2) The following locations: (a) One transverse section of deck plating abreast the moon pool opening within amidships $0.6L$ ; (b) Interiors of the deck plating specified in (a) (as deemed necessary by the Surveyor); and (c) In addition to (a) and (b) above, where the unit is configured with side ballast tanks, the plating and internals of the tanks are also to be gauged in way of the section chosen. (3) Moon pool boundary bulkhead plating.
3 Special Survey for units over 10 years and up to 15 years of age (Special Survey No.3)	(1) Suspect areas throughout the unit. (2) The following locations: (a) Two transverse sections (girth belts) of deck, bottom and side plating abreast the moon pool and one hatch opening within amidships $0.6L$ ; (b) Interiors of the transverse sections specified in (a) (as deemed necessary by the Surveyor); and (c) In addition to (a) and (b) above, where the unit is configured with side ballast tanks, the plating and interiors of the tanks to be gauged in way of the required belts. Remaining internals are to be gauged as necessary by the Surveyor. (3) Moon pool boundary bulkhead plating. (4) Interiors of forepeak and after peak tanks as deemed necessary by the Surveyor.
4 Special Survey for units over 15 years of age (Special Survey No.4 and subsequent Special Surveys)	(1) Suspect areas throughout the unit. (2) A minimum of three transverse sections (girth belts) of deck, bottom, side and longitudinal bulkhead plating in way of the moon pool and other areas within amidships $0.6L$ together with the interiors in way (including within perimeter ballast tanks, where fitted in way of belts). (3) Moon pool boundary bulkhead plating. (4) Interiors of forepeak and after peak tanks as deemed necessary by the Surveyor. (5) Lowest strake of all transverse bulkheads in hold spaces. Remaining bulkhead plating to be gauged as deemed necessary by the Surveyor. (6) All plates in two wind and water strakes, port and starboard, full length. (7) All exposed main deck plating (full length) and all exposed first tier superstructure deck plating (poop, bridge and forecastle decks). (8) All keel plating (full length) plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces. (9) Duct keel or pipe tunnel plating and interiors (as deemed by the Surveyor). (10) Plating of sea chests. Shell plating in way of overboard discharges as deemed necessary by the Surveyor.

## Notes:

- (1) For units less than 100 m in length, the number of transverse sections required at Special Survey No. 3 may be reduced to one, and the number of transverse sections required at subsequent Special Surveys may be reduced to two.
- (2) For units more than 100 m in length, thickness measurements of exposed deck plating within amidship  $0.5L$  may be required at Special Survey No.3.



## Chapter 13 SPECIAL REQUIREMENTS OF PERIODICAL SURVEYS FOR OFFSHORE STRUCTURES

### 13.1 General

#### 13.1.1 Application

1 The requirements in this Chapter apply to Periodical Surveys for offshore structures (hereinafter referred to as “units”) and comply with the requirements in [12.1.2-2](#).

2 The Owners (managing company) of the units complying with this Chapter are required to have managing systems that include an established maintenance system.

3 The units complying with the requirements in this Chapter are required to have monitoring systems (anemometers, wave height meters, etc.) that are capable of monitoring external environmental forces (mainly winds, waves, currents, etc.) acting on the units. However, where environmental data on sea areas in the vicinity of the units are available, the monitoring systems onboard the units may be dispensed with.

#### 13.1.2 Equivalency

Notwithstanding the requirements in this Chapter, the Society may approve inspection plans, methods, procedures, etc. differing from those specified in this Chapter if they are considered to be able to attain equivalent results. Relevant data is to be submitted to the Society, and the proposal’s equivalence is to be demonstrated in the presence of the Surveyor.

#### 13.1.3 Terminology

Terms defined in this Chapter are as follows. Terms not defined in this Chapter are subject to the provisions of [1.3](#).

##### (1) Inspection Plans

These are documents specifying inspection times, the times when the Surveyor is present, the objects and the methods of inspections for Periodical Surveys, which are approved by the Society. For units complying with [12.1.1-3](#), inspection plans are to include documents applicable to all units.

##### (2) Documents on Inspection Procedures

These are documents based on the inspection plan, specifying detailed inspection procedures (inspection instruments, inspection companies, managing system of inspection, inspection procedures, etc.) and acceptance criteria for periodical surveys which are approved by the Society.

##### (3) Representative Unit

This is one unit so selected from among the multiple units complying with [12.1.1-3](#), where complete inspections of all structural members of that unit is completed within a period of five *years*. A new representative unit is selected every five *years* until all the units have had a turn as the representative unit.

##### (4) Rest Unit

This is a unit other than the representative unit.

#### 13.1.4 Inspection Level of Structural Members\*

For the purpose of application of Periodical Surveys specified in this Chapter, inspection levels for hull structures are classified into the following three levels depending on the extent of preparations for inspections and the degree of inspections.

##### (1) Level I inspection

This level of inspection implies a visual inspection to detect apparent structural or functional defects such as those to corrosion control systems, painting, etc. This level of inspection does not require the target structural members to be cleaned.

##### (2) Level II inspection

This level of inspection implies close-up visual inspections of the target structural members and monitoring important areas through thickness measurements and/or measurement of electrical potential differences of corrosion control systems of selected structural members. This inspection is for detecting structural or functional defects which are difficult to be detected by the level I inspection. This level of inspection requires target structural members to be cleaned. However, structural members from which only measurements of electrical potential difference for corrosion control systems or thickness measurements are taken

need only be cleaned if required by the measurement method.

(3) Level III inspection

This level of inspection implies an inspection that assesses the state of deterioration in detail (non-destructive tests, coating diagnosis, etc.) and verifies the structural integrity and function of the unit (hydrostatic test (air test), hose test, etc.), on top of the Level II inspection. This inspection is for detecting initial defects or failures that are difficult to find visually and for obtaining information necessary to predict the remaining performance life of structural members. This level of inspection requires target structural members and their vicinity to be thoroughly cleaned. Inspections carried out in a dry dock or on a slipway may be regarded as Level III inspections.

### 13.1.5 Categories of Structural Members

For the purpose of applying Periodical Surveys specified in this Chapter, structural members are categorized into the following three categories based on the degrees of importance and consequence, and the inspections relevant to each category is carried out. The degree of importance refers to the possibility of a structural member being affected by deterioration or failure as compared with other members. The degree of consequence refers to the amount of impact that a structural member has upon other members when they fail.

- (1) Category A: Structural members with an insignificant degree of importance or low degree of consequence
- (2) Category B: Structural members with an intermediate degree of importance or medium degree of consequence
- (3) Category C: Structural members with a significant degree of importance or high degree of consequence

It is preferred that structural members of Category C are structured to allow easy inspection.

## 13.2 Preparation of Surveys and Inspections

### 13.2.1 General

1 The Owners of the units subject to the Periodical Surveys specified in this Chapter are required to submit the Inspection plans and Inspection procedures to the Society for approval prior to the Periodical Surveys being carried out.

2 Before surveys are commenced at each Periodical Survey, Inspection plans and procedures, as well as survey records and maintenance reports until the last Periodical Survey which include photographs and records (thickness measurements, test results, etc.) are to be presented to the Surveyor.

3 Records on the maximum environmental conditions experienced by the unit from the last Periodical Survey up until the date of application for inspection are to be presented to the Surveyor.

4 Calibration records of inspection tools are to be presented to the Surveyor.

5 Areas subject to inspection are to be made safe (by cleaning, removing gases, etc.) according to the level of inspection being applied.

### 13.2.2 Inspection Companies Carrying Out Inspections, Measurements and Maintenance\*

1 Unless otherwise specified, third parties engaged in thickness measurements, in-water surveys by divers or remote operated vehicles, or tightness testing of closing appliances such as hatches, doors, etc. with ultrasonic equipment are to be firms deemed appropriate by the Society.

2 Unless otherwise specified, third parties engaged in inspections and maintenance of fixed fire extinguishing systems, portable fire extinguishers, self contained breathing apparatuses, emergency escape breathing devices or fire detection and alarm systems are to be firms deemed appropriate by the Society.

## 13.3 Selection of Structural Members to be Inspected

### 13.3.1 General

1 The provisions in [13.3](#) apply to the selection of structural members of the unit to be inspected.

2 The structural members for inspection are structural members of the unit particularly designated by the Society. They are important structural members which are determined in accordance with the requirements of [13.3.2](#) to [13.3.4](#), taking into consideration the results from the design stage (structural strength analysis), Classification Survey during Construction, and Periodical Surveys; the purpose of the unit, and personnel safety (e.g. supporting structures of anchor racks, supports of thrusters of the dynamic positioning system etc.).

**13.3.2 Categorization of Structural Members to be Inspected at Design Stage\***

Each structural member is to be subjected to examinations and analyses of the following items in (1) and (2) at the design stage, and from the results of these tests, the member that fits the severest category is to be taken as the member to be inspected.

- (1) Possible causes of failure of structural members
  - (a) Stress
  - (b) Fatigue strength
  - (c) Wear
- (2) Effects to surrounding members when a structural member fails
  - (a) Cracking of structural members
  - (b) Significant deformation of structural members
  - (c) Wear of structural members

**13.3.3 Review of Categories of Structural Members at Construction Stage\***

At the construction stage, the categories of structural members determined by the requirements in 13.3.2 may be reviewed according to the recommendations made by the Surveyor on fabrication methods, welding procedures, fabrication accuracy, ease of inspection, etc., and the results of in-house inspections at the shipyard. The Owners are to consult with the shipyard and the Surveyors upon completion of construction of the units in order to review the inspection plan and inspection procedures made at the design stage. If changes are made to the inspection plans and inspection procedures as a result of the consultations, the Owners are to submit an application for the changes including details of the changes to the Society for approval.

**13.3.4 Review of Categories of Structural Members Based on Results of Periodical Surveys\***

1 Based upon the results of a Periodical Survey, the Owners of the units are to review the categories of structural members to be inspected at subsequent Periodical Surveys.

2 Where categories of structural members to be inspected specified in the approved inspection plan and inspection procedures are changed or modified based on the results of the review specified in -1, the Owners are to submit an application for changes including details of the changes and amendments to the Society for approval.

3 Where any anomalies are found at the Periodical Surveys required in 13.4 or at the Owners request, the extent of structural members to be inspected is to be reviewed or a higher level inspection is to be applied.

**13.3.5 Occasional Surveys**

1 When the units encounter external forces which are beyond the environment conditions assumed at the design stage, the Owner is to carry out an occasional inspection of structural members and report the results to the Society, or is to apply for an occasional survey to the Society.

2 To take into account the external forces specified in -1, the Society may require an increase in the number of structural members to be inspected, and a review of the categories of structural members described in the inspection plan.

**13.4 Periodical Surveys for Hull Structure****13.4.1 General\***

1 The time of inspection and the structural members to be inspected are to follow the inspection plan.

2 Where the units are constructed with many similar structural members or compartments, and are found to be in satisfactory condition by the Surveyor, the number of structural members to be inspected may be reduced or a lower inspection level may be applied notwithstanding the requirements is 13.4.2 and 13.4.3.

3 Among structural members categorized as category B or C, those members designated by the Society are to be monitored by appropriate methods in order to assess the condition of the units.

**13.4.2 Periodical Surveys of Hull Structure of Units Not Applicable to Requirements in 12.1.1-3**

1 The following inspections are to be carried out so that they are completed at the time of the Annual Survey specified in 1.1.3.

(1) Level I inspections are to be carried out for structural members of Category C.

2 The following inspections are to be carried out so that they are completed at the time of the Intermediate Survey specified in 1.1.3.

(1) Level II inspections are to be applied to structural members of Category C.

(2) Level I inspections are to be applied to structural members of Category B.

**3** The following inspections are to be carried out so that they are completed at the time of the Special Survey specified in [1.1.3](#).

(1) Level III inspections are to be applied to structural members of Category C.

(2) Level II inspections are to be applied to structural members of Category B.

(3) Level I inspections are to be applied to structural members of Category A.

#### **13.4.3 Periodical Surveys of Hull Structure of Units Applicable to Requirements in [12.1.1-3](#)**

**1** The following inspections are to be carried out so that they are completed at the time of the Annual Survey specified in [1.1.3](#).

(1) Representative unit

(a) Level I inspections are to be applied to structural members Category C.

(b) Level II inspections are to be applied to structural members of Category C that are easily accessible.

(c) Level I inspections are to be applied to structural members of Category B that are easily accessible.

(2) Rest units

(a) Level I inspections are to be applied to structural members of Category C that are easily accessible.

**2** The following inspections are to be carried out so that they are completed at the time of the Intermediate Survey specified in [1.1.3](#).

(1) Representative unit

(a) Level II inspections are to be applied to structural members of Category C.

(b) Level III inspections are to be applied to structural members of Category C that are easily accessible.

(c) Level I inspections are to be applied to structural members of Category B.

(d) Level II inspections are to be applied to structural members of Category B that are easily accessible.

(e) Level I inspections are to be applied to structural members of Category A that are easily accessible.

(2) Rest units

(a) Level I inspections are to be applied to structural members of Category C.

(b) Level II inspections are to be applied to structural members of Category C that are easily accessible.

(c) Level I inspections are to be applied to structural members of Category B that are easily accessible.

**3** The following inspections are to be carried out so that they are completed at the time of the Special Survey specified in [1.1.3](#).

(1) Representative unit

(a) Level III inspections are to be applied to structural members of Category C.

(b) Level II inspections are to be applied to structural members of Category B.

(c) Level III inspections are to be applied to structural members of Category B that are easily accessible.

(d) Level I inspections are to be applied to structural members of Category A.

(e) Level II inspections are to be applied to structural members of Category A that are easily accessible.

(2) Rest units

(a) Level II inspections are to be applied to structural members of Category C.

(b) Level III inspections are to be applied to structural members of Category C that are easily accessible.

(c) Level I inspections are to be applied to structural members of Category B.

(d) Level II inspections are to be applied to structural members of Category B that are easily accessible.

(e) Level I inspections are to be applied to structural members of Category A that are easily accessible.

#### **13.4.4 Inspection of Hull Structure in a Dry Dock or Slipway\***

**1** Where inspections of the hull structure are carried out in a dry dock or a slipway, the inspections are to be carried out in accordance with the relevant requirements specified in [Chapter 5](#), [Chapter 6](#), [12.5](#) and [12.6](#) taking into consideration characteristics such as hull construction and purpose of the unit.

**2** Notwithstanding the requirements in [-1](#), inspections in a dry dock or slipway of the hull structure of units complying with the requirements in [12.1.1-3](#) are to be as deemed appropriate by the Society.

## **13.5 Periodical Surveys for Equipment, Machinery Installations and Fire Extinguishing Systems**

### **13.5.1 General\***

**1** The Periodical Surveys for equipment, machinery installations and fire extinguish arrangement are to be carried out so that they are completed at the time specified in [1.1.3](#).

**2** The Periodical Surveys for equipment, machinery installations and fire extinguish arrangement are to be carried out in accordance with the relevant requirements specified in [Chapter 3](#) through [Chapter 12](#) taking into account the hull construction and purpose of the units as well as the equipment and fittings mounted on the units.

## **13.6 Periodical Review of the Inspection Plan and Inspection Procedure**

### **13.6.1 General**

**1** The structural members to be inspected and the inspection level applicable thereto are to be reviewed at intervals not less than 5 years taking into consideration factors such as the results of Periodical Surveys and abnormal environmental conditions having occurred.

**2** When any changes or additions to the inspection plans and inspection procedures are made as a consequence of the review mentioned in [-1](#) above, the inspection plans and inspection procedures including the changes and additions are to be submitted to the Society for approval.

## Chapter 14 SURVEY FOR FLOATING OFFSHORE FACILITIES FOR CRUDE OIL/PETROLEUM GAS PRODUCTION, STORAGE AND OFFLOADING

### 14.1 General

#### 14.1.1 Application

1 The surveys of floating offshore facilities for oil crude/petroleum gas production, storage and offloading (hereinafter referred to as “Floating Offshore Facility” in this Chapter) specified in **Part PS** are to be in accordance with the requirements given in this Chapter.

2 In the case of items not specified in this Chapter, the requirements specified in **Chapter 12** and **Chapter 13** are to be applied.

### 14.2 Classification Surveys

#### 14.2.1 General

At Classification Surveys during construction, the hull, equipment, fire protection and detection means, means of escape, fire extinction means, machinery, electrical installations, computer-based systems etc. are to be examined in detail in order to ascertain that they meet the relevant requirements given in **Part PS**.

#### 14.2.2 Submission of Plans and Documents

1 At the Classification Surveys during construction of Floating Offshore Facilities, the following plans and documents are to be submitted as plans and documents for approval before the work is commenced.

##### (1) Hull

- (a) General arrangement
- (b) Cross section
- (c) Longitudinal section
- (d) Details of inspection facilities
- (e) Details of welding procedures
- (f) Information regarding corrosion control procedures adopted for each part of the Floating Offshore Facility
- (g) Arrangement and construction of positioning system (including related equipment, such as windlasses, etc.)
- (h) Summary of the distributions of fixed and variable weights
- (i) Plan indicating the design loads for all decks
- (j) Stability information booklet (including information for towing)
- (k) Loading manual
- (l) Details of maintenance and inspection procedures and docking plans and in-water inspection procedures
- (m) In the case of column-stabilized Floating Offshore Facilities, construction of all columns, lower hulls, footings, bracing, etc.
- (n) Pumping arrangements (indicating the capacity of each tank, water or oil)
- (o) Construction for fire protection (indicating the details of fire protection)
- (p) Plans showing the means of escape (escape routes including their details, such as the widths of passages, etc.)
- (q) Plans showing fire extinction arrangements (arrangement, type, capacity, etc., of fire extinguishers and fire detectors, etc.)
- (r) Other plans and/or documents deemed necessary by the Society

##### (2) Machinery

- (a) Machinery arrangement in machinery spaces, diagrams for internal communication systems
- (b) Piping diagram (both for machinery spaces and the entire Floating Offshore Facility, including protection against any spraying of fuel/lubrication oil, etc.)
- (c) Prime movers including attached auxiliaries (plans and data specified in **2.1.3**, **3.1.2** and **4.1.2, Part D** corresponding to the kind of prime mover)

- (d) Power transmission gears, shaftings and propellers (plans and data specified in [5.1.2](#), [6.1.2](#), [7.1.2](#) and [8.1.2, Part D](#))
- (e) Boilers, etc., incinerators and pressure vessels (plans and data specified in [9.1.3](#), [9.13.2](#) and [10.1.4, Part D](#))
- (f) Storage and off loading systems (their arrangement and plans/data specified in [14.1.2](#) and [14.5.2, Part D](#))
- (g) General arrangement and diagram of production systems (plans and data specified in [9.3.2, Part PS](#))
- (h) Automatic and remote controls (plans and data specified in [18.1.3, Part D](#))
- (i) Electrical installations (plans and data specified in [1.1.6, Part H](#))
- (j) Other plans and/or documents deemed necessary by the Society

**2** In the Classification Surveys during construction of Floating Offshore Facilities, the following plans and documents are to be submitted as other plans and documents in addition to those specified in **-1** above.

- (1) Methods and calculation sheets of structural analysis for relevant loading condition
- (2) Data or documents on environmental conditions used for the determination of design loads, which indicate in detail the past measurement data of the service area such as wind, waves, current, etc., and the calculation method of the total external force and moment due to winds, waves, currents and tidal currents, reaction of positioning systems and other loads
- (3) Documents on the effects of loading, stability and the projected area due to icing or snowing, if any
- (4) Calculation sheets for intact and damage stability at all conditions
- (5) Relating to above **(2)** to **(4)**, documents concerning model tests or computing methods in cases where loads and stability are determined using appropriate model tests or computing methods
- (6) Lines of hulls
- (7) Cross curves of stability
- (8) Curves of righting moments and wind heeling moments
- (9) Capacity plans and sounding tables of tanks
- (10) Method and location of the non-destructive inspections and procedures of thickness measurements
- (11) Plans indicating the arrangement of watertight compartments, openings, their closing appliances, etc. necessary for stability calculations
- (12) In the case of machinery installations used for the safety of Floating Offshore Facilities or for positioning systems, plans and documents required in the relevant Chapters given in [Part D](#)
- (13) In the case of machinery installations used solely for the specific purpose of Floating Offshore Facilities (including production systems, etc.), plans and documents indicating the safety devices of machinery installations and those specified in [Chapter 9](#) and [Chapter 10, Part D](#)
- (14) Operating booklets and emergency operation manuals which are defined in [1.2.9](#) and [1.2.10, Part PS](#)
- (15) Plans and documents indicating an outline of the construction work schedule (including the work to be completed, or equipment to be installed onboard Floating Offshore Facilities at the building shipyard or engineering companies where the midway stage of construction work is made prior to the installation of Floating Offshore Facilities at their site of operation)
- (16) Towing methods and strength calculation sheets during towing
- (17) Procedures for onboard testing (including testing in cases where equipment is installed on Floating Offshore Facilities and any testing before and during the installation of Floating Offshore Facilities at their site of operation, etc.) and stability experiments
- (18) Calculation sheets on positioning systems
- (19) Installation procedures of positioning systems and production systems, etc., and the installation work procedures of Floating Offshore Facilities at their site of operation
- (20) Plans and documents specified in each Chapter of [Part PS](#)
- (21) Other plans and/or documents deemed necessary by the Society

**3** The installation work procedures specified in **-2(19)** above are to include the following as applicable. The work process of each item is to include a method of confirming the adequacy of completed work as well as relevant judgment criteria.

- (1) A general outline of all of the systems of a Floating Offshore Facility and its periphery facilities, including such items as positioning systems, risers, sub-sea pipelines, pipeline end manifolds (PLEM), etc.
- (2) Documents indicating the condition of the seabed at the site of operation where a Floating Offshore Facility is installed
- (3) The installation procedures of seabed mooring points including things such as sinkers and piles and the procedures of connecting mooring lines to seabed mooring points including at least the following:

- (a) Necessary preparations and processes for the installation of the Floating Offshore Facility (including information about the rigging arrangements for piles, chaser piles and driving hammers as well as information about the work barges used, etc.)
- (b) Procedures for positioning and orientation of seabed mooring points (including the criteria for allowable deviations in positioning and orientation)
- (c) Item list to be confirmed before the completion of work and their criteria for acceptance (driven depth of the piles, sank depth of the sinker, etc.) corresponding to the type of seabed mooring points (sinker, piles, etc.) used
- (d) Procedures for connecting mooring lines to seabed mooring points including precautions to prevent the twisting of moorings
- (4) Procedures for the tensioning tests of mooring lines
  - (a) Rigging arrangements for the tensioning tests of mooring lines and seabed mooring points
  - (b) Work ship (barge) set up to carry out such tests
  - (c) Detailed tensioning procedures
  - (d) Mooring line retrieval and abandoning procedures
- (5) Procedures for hooking up mooring lines to Floating Offshore Facilities
  - (a) Rigging and towing procedures of Floating Offshore Facilities for hooking them up to mooring lines
  - (b) Preferred ballast condition of Floating Offshore Facilities prior to the hook up
  - (c) Procedures for the sequential hook up of mooring lines, the repositioning of Floating Offshore Facilities and the tensioning of the lines
  - (d) Method of determining the correct tension of chains and acceptable design tolerances
  - (e) In the case of Floating Offshore Facilities that employ single point mooring systems, procedures for determining the positioning of the Floating Offshore Facility relative to PLEM or wellhead and the acceptable design tolerances for such position
  - (f) In the case of turret mooring, the method of securing turrets against movement and the overall safety precautions for the entire hook-up installation
  - (g) Procedures for tensioning by the ballasting of Floating Offshore Facilities (if applicable in the case of tension mooring systems, etc.)
- (6) Procedures for hooking up flow line systems to the receiving sides of Floating Offshore Facilities (import systems), and flow line systems to the offloading side of Floating Offshore Facilities (export systems)
  - (a) Procedures for the hook up of import systems
    - i) Handling and rigging of flexible risers during installation,
    - ii) Positioning of work vessels for various purposes during installation,
    - iii) Procedures for the installation of buoyancy tanks, supports, clump weights, if applicable, etc. (including precautions against damage); and,
    - iv) Tie-in rigging methods for the hook up of both ends of risers.
  - (b) Procedures for the installation of export systems
    - i) Rigging, handling, make-up of export systems and precautions against damage during installation
    - ii) Fitting of all the necessary accessories and navigation aids
    - iii) Procedures for paying out the hose string into the sea
    - iv) Procedures for the pressure tests of hoses (including testing pressure and duration)

#### **14.2.3 Presence of Surveyors**

1 At Classification Surveys during construction, the relevant items specified in 2.1.7 and the items specified in following 14.2.4 to 14.2.8 are to be implemented. In cases where the submitted plans and documents regarding tests, examinations or inspections specified in 14.2.2 are verified by the Society. To implement surveys of items specified otherwise by the Society, in lieu of traditional ordinary surveys where a surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate.

#### **14.2.4 Hydrostatic and Watertight Tests**

1 Hydrostatic and watertight tests conducted during Classification Surveys during construction are to be in accordance with item 10, Table B2.7.



2 In the case of machinery and electrical installations related to production systems and the pipes and hoses installed on Floating Offshore Facilities during offloading, hydrostatic, leakage or airtight tests are to be carried out as specified in each Chapter of **Part D** and **Part PS** corresponding to the kind of machinery.

#### 14.2.5 Survey during Construction for the Hulls of Floating Offshore Facilities

1 Surveys at shipbuilding yards, etc. where the hulls of Floating Offshore Facilities are constructed, are to be carried out in accordance with **Chapter 2** for those survey items that are considered to be in common with those of ordinary ships.

2 In cases where production systems are installed on board Floating Offshore Facilities at works different from the shipbuilding yards where hull structures are constructed (including the sea areas of the site of operation), surveys necessary in order to tow the hull structures of Floating Offshore Facilities to their site of operation are to be carried out.

3 For those cases specified in **-2** above, the tests, examinations or inspections for the support structures of installations are to be carried out at suitable places/occasions before the final inspection at the site of operation.

#### 14.2.6 Survey for Storage Facilities

In the case of the equipment found in storage facilities (piping systems for crude oil, crude oil pumps, venting systems, inert gas systems, etc.), tests and surveys are to be carried out in accordance with the requirements for the cargo oil systems of tankers specified in **14.6, Part D** as applicable.

#### 14.2.7 Surveys for Production and Off Loading Systems

1 The following surveys are to be carried out during the fitting out of production and off loading systems:

- (1) It is to be verified that all piping is adequately and firmly fixed. Piping which is used for flammable liquids such as crude oil, etc., is to be subjected to leakage tests at test pressures of 1.25 times design working pressure after fitting work has been completed.
- (2) It is to be verified that all electrical installations are adequately and firmly fixed. Insulation resistance tests are to be carried out after fitting work has been completed.
- (3) It is to be verified that all machinery is adequately and firmly fixed. Performance tests are to be carried out after fitting work has been completed.
- (4) Production systems are to be examined and verified that they do not endanger the Floating Offshore Facility or its crew under operating conditions.

2 It is to be verified that the offloading systems for Floating Offshore Facilities (export systems) which are permanently and exclusively equipped for such Floating Offshore Facilities are fitted out as designed. In such cases, the hose string bend radii, hose flange gaskets, the positioning of navigation aids, the correct locations of break-away couplings, the tightening of the flange bolts are also verified for compliance with the procedures.

#### 14.2.8 Surveys during the Installation of Floating Offshore Facilities at their Site of Operation

1 During the installation of positioning systems, the following items are to be verified and surveyed by the attending surveyor:

- (1) The components of positioning systems are to be examined for abnormalities before installation.
- (2) Certificates are to be confirmed for those components which are required to be tested at manufacturer facilities.
- (3) The area around the seabed mooring points is to be examined and reported on by divers or remotely operated vehicles (ROVs) before installation to ensure that there is no obstruction.
- (4) During the installation of Floating Offshore Facilities to their seabed mooring points, the following is to be verified:
  - (a) Proper locking of all connecting shackles from mooring lines to seabed mooring points, and from mooring lines to mooring lines.
  - (b) Sealing of all kenter shackle locking pins
  - (c) Correct size and length of all the components of mooring lines
  - (d) Whether seabed mooring points are installed in their designed positions and are orientated within allowable design tolerance
- (5) Mooring lines are to be confirmed to be paid out as designed and in accordance with predetermined procedures.
- (6) After mooring systems are deployed at their site of operation, the following tensioning tests are required for each mooring line:
  - (a) During tests, each mooring line is to be pulled to its maximum design load determined by dynamic analysis for the intact design condition and held at that load for 30 *minutes*. The integrity of the entire mooring line from the seabed mooring point to the connecting end at the hull structure of the Floating Offshore Facility as well as movement of the seabed

mooring point is to be verified.

- (b) Notwithstanding (a) above, the test load for soft clay may be modified as deemed appropriate by the Society. Even in such cases, however, test loads cannot be reduced less than 80% of the maximum intact design loads.
- (c) Notwithstanding (a) and (b) above, the tensioning tests of mooring lines may be waived in cases where detailed investigation reports are submitted to the Society and deemed appropriate. In such cases, however, preloading each seabed mooring point is required. The load of this preloading is not to be less than the mean intact design tension, and such that the integrity and proper alignment of mooring lines can be verified.
- (7) Mooring lines are to be verified for firm and adequate connections to chain stoppers.
- (8) It is to be verified that the relative position of the single point mooring centre of single point mooring systems to PLEMs is in compliance with design specifications and tolerances.
- (9) Catenary angles of mooring lines are to be measured and verified for compliance with design specifications and tolerances.
- (10) During installation, it is to be verified that the risers and other supporting facilities of Floating Offshore Facilities are not deformed or damaged, buoyancy tanks, etc. are in their correct position, and flow lines are firmly and adequately connected.
- (11) Upon completion of installation, the connection of Floating Offshore Facilities to their periphery facilities is to be verified for compliance with design specifications. Divers or ROVs are to be arranged as necessary for the survey of any underwater parts deemed necessary by Surveyors.

#### **14.2.9 Onboard Testing and Stability Experiments**

**1** During the onboard testing of Floating Offshore Facilities, the following items are to be verified and surveyed by the attending surveyor.

- (1) Performance tests of positioning systems (performance tests of windlasses, etc.)
- (2) Performance tests of such systems that are necessary for adjusting the draught, inclination, etc. of Floating Offshore Facilities, like ballasting systems
- (3) Running tests of machinery and electrical installations, etc. (during their operation, no abnormalities in the condition of Floating Offshore Facilities are found)
- (4) The accumulation tests of boilers
- (5) Confirmation of safety systems (fire/gas detection systems, fire fighting systems, Emergency Shutdown Systems)
- (6) Function tests of communication systems
- (7) Emergency procedures against oil spills, fires, etc.
- (8) Confirmation of fire fighting systems
  - (a) Fire pumps
  - (b) Fixed fire-extinguishing systems
  - (c) Portable fire extinguishers
- (9) Function tests of detection and alarm systems
  - (a) Fire detection systems
  - (b) Gas detection systems
  - (c) Control panels of fire/gas detection systems
  - (d) ESD systems
- (10) Confirmation that all systems of Floating Offshore Facility systems are functioning normally
- (11) Confirmation of production systems (controlling system, emergency shutdown, etc.)
- (12) Confirmation of purging capability.
- (13) Confirmation of flare systems

However, if the items specified above are verified by simulating installed conditions at shipbuilding yards, such tests may be dispensed with after installation.

**2** The results of onboard tests are to be submitted to the Society as Onboard Testing Records.

**3** Equipment which cannot be verified due to special reasons that are related to such equipment only being capable of functioning after start-up and commissioning is to be identified for verification at the next annual survey.

**4** Stability experiments are to be carried out at suitable occasions after the completion of the main structures of Floating Offshore Facilities and before proceeding to the site of operation. A stability information booklet prepared on the basis of the stability particulars

determined by the results of stability experiments is to be approved by the Society and provided on board.

#### **14.2.10 Classification Surveys of Floating Offshore Facilities Not Built under Survey**

1 During the Classification Surveys of Floating Offshore Facilities not built under Society surveys, the actual scantlings of the main parts of Floating Offshore Facilities are to be measured in addition to the examination of the main structures, equipment, machinery, fire protection, means of escape, fire extinguishing arrangements, electric installations, computer-based systems, stability, etc. in order to ascertain that they meet the relevant requirements given in **Part PS** as required for the Special Survey corresponding to the age, kind and purpose of the Floating Offshore Facilities.

2 In the case of those Floating Offshore Facilities intended to be surveyed in accordance with **-1** above, the plans and documents as required by the requirements given in **14.2.2** are to be submitted for Society approval.

3 Hydrostatic and watertight tests are to be carried out in accordance with the requirements given in **14.2.4**.

4 Onboard testing and stability experiments are to be carried out in accordance with the requirements given in **14.2.8**. However, onboard testing and stability experiments may be dispensed with provided that sufficient information based on previous tests is available and neither alteration nor repair affecting onboard testing has been made after such previous tests.

### **14.3 Class Maintenance Surveys**

#### **14.3.1 Application**

1 Periodical surveys for the hull structures of Floating Offshore Facilities (the hull parts of Special Surveys, Intermediate Surveys, and Annual Surveys as well as the survey items for Docking Surveys) are to be in accordance with those specified in **Chapter 13**.

2 Periodical Surveys for equipment, machinery, fire extinguishing systems, etc. are to be carried out in accordance with relevant provisions given in **Chapter 3** to **Chapter 12**, at such times as specified in **1.1.3**. In the case of crude oil loading/off-loading piping, venting systems for storage tanks, inert gas systems, etc., the relevant requirements for tankers are to be applied.

3 In addition to **-1** and **-2** above, necessary items (positioning systems, production systems, etc.) unique to Floating Offshore Facilities are to comply with the requirements specified in this Chapter.

#### **14.3.2 Annual Surveys and Intermediate Surveys for Floating Offshore Facilities**

1 Annual Surveys and Intermediate Surveys for Floating Offshore Facilities are to be carried out according to **14.3.2** as well as according to **14.3.1-1** and **-2** for hulls, equipment, machinery, etc.

2 During the Annual Surveys and Intermediate Surveys for positioning systems, the following are to be carried out:

- (1) General examinations of structures of mooring line stoppers (including their foundations)
- (2) General examinations of mooring line tensioning equipment
- (3) Measurements of the catenary angles of mooring lines in order to confirm that tensions remain within their designed permissible limit. In cases where mooring wires are used, wire tensions are to be confirmed to be within designed permissible limits by using methods appropriate for such wires.
- (4) Visual inspections of mooring lines above the water to confirm no wear/tear.
- (5) General examinations of turrent mooring system bearings (including confirmation of the effectiveness of lubricating systems)
- (6) General examinations of all of the parts of structures, equipment, etc. above water and so far as can be seen/accessible to confirm no harmful corrosion, wear, damage, etc.
- (7) Confirmation of no abnormalities in the working condition of mooring system equipment (winches, windlasses, etc.).

3 The piping for importing and transferring crude oil etc. from seabeds are to be surveyed as follows during Annual Surveys and Intermediate Surveys and are to be confirmed to be in good order:

- (1) General examinations of the swivels, flexible risers, floating hoses, etc. associated with the import piping, expansion joints, seals, etc. which transfer crude oil, etc. from seabeds, and are attached to Floating Offshore Facilities.
- (2) Confirmation of that swivels are without leaks
- (3) Visual examinations and demonstrations of the functions of navigation aids for floating hoses
- (4) Confirmation that riser tensioning arrangements are in proper functioning order
- (5) General examinations of electrical equipment installed in hazardous areas

4 During Annual Surveys and Intermediate Surveys for production systems, the following are to be carried out:

- (1) Review of maintenance records (test items required at Annual/Special surveys, those results, alterations, if any, etc. are to be

recorded.)

- (2) Visual examinations and performance tests of the following systems:
  - (a) Remote shutdown systems of fuel oil systems and ventilation systems
  - (b) Emergency shutdown systems
  - (c) Emergency control stations
  - (d) Safety valves/relief valves
  - (e) General condition of piping, equipment, etc.
  - (f) Alarm systems, escape arrangements (including the general conditions of escape routes, lighting arrangements, etc.)
  - (g) General examinations of structures, piping, etc. which are at risk of damage (flare towers, etc.)
  - (h) General examinations of explosion proof equipment
  - (i) Others deemed necessary by Surveyors

### 14.3.3 Special Surveys for Floating Offshore Facilities

1 Special Surveys for Floating Offshore Facilities are to be carried out according to 14.3.3 as well as according to 14.3.1-1 and -2 for hulls, equipment, machinery, etc.

2 During the Special Surveys for positioning systems, the following general examinations and performance tests are to be carried out in addition to 14.3.2. Divers, video cameras, etc. are to be arranged as necessary in order to carry out examinations of underwater parts:

- (1) Measurements of tension acting on the mooring lines
- (2) General examinations of mooring lines (entire length including end attachments for connections)
- (3) Close examinations and measurements of dimension reductions for the mooring lines in way of areas which are potential hazards for excessive corrosion and wear (areas subject to abrasion, i.e. seabed connecting parts, wind-and-water areas near the water line, etc.)
- (4) General examinations and non-destructive tests of mooring lines and stoppers on board Floating Offshore Facilities (to be cleaned up before surveys)
- (5) General examinations of turrets and their related equipment. Reductions of thickness due to corrosion are to be measured for structure members with heavy corrosion, and for Floating Offshore Facilities in which 15 or more years have passed since being commissioned
- (6) General examinations of intermediate buoyancy tanks
- (7) General examinations and nondestructive tests for high stress level areas, or relatively short fatigue life areas (to be cleaned up before surveys)
- (8) General examinations of the parts connecting mooring lines to seabeds (to be cleaned up before surveys)
- (9) Measurements of cathodic potential readings at representative underwater locations of positioning systems to confirm the effectiveness of cathodic protection systems within a designed acceptable range

3 In cases where it is not reasonable or practicable to be in accordance with -2 above due to mooring system type, etc., operators or designers may submit alternative survey procedures based on their experiences or the recommended practice of the manufacturers of such Floating Offshore Facilities, etc. In cases where such procedures are deemed acceptable by the Society, surveys may be carried out in accordance with such procedures.

4 In addition to 14.3.2, the piping for importing and transferring crude oil, etc. from seabeds are to be surveyed as follows during Special Surveys and are to be confirmed to be in good order:

- (1) Swivels are to be disassembled and examined for wear, leaks, etc. Upon completion of reconditioning, fluid swivels are to be hydrostatically tested, and electrical swivels are to be insulation tested. Disassembly, however, may be waived if deemed acceptable by the Society providing that no abnormalities are found by general examination.
- (2) Close examinations of the piping for receiving crude oils, etc. fitted on board Floating Offshore Facilities are to be carried out. In cases where deemed necessary by surveyors, open-up inspections and non-destructive tests may be required. In such cases, hydrostatic tests are to be carried out after reassembly.
- (3) The piping for exporting crude oils, etc. from Floating Offshore Facilities is to be generally examined. Hydrostatic tests for floating export hoses are to be carried out. Hydrostatic tests, however, may be waived if deemed acceptable by the Society providing that no abnormalities are found by general examination.

- (4) Close examination of riser suspension and tensioning arrangements fitted on board Floating Offshore Facilities are to be carried out to confirm no harmful abnormalities (corrosion, wear, etc.).

**5** During the Special Surveys for production systems, the following visual inspections and performance tests are to be carried out in addition to **14.3.2**:

- (1) Open-up inspections of pressure vessels and safety valves
- (2) Close examinations of production system piping to confirm no abnormalities (corrosion, wear, damages, leaks, etc.). In cases where any abnormalities are found, thickness measurements, hydrostatic tests, etc. are to be carried out as required.
- (3) Measurements of the insulation resistance of generators and motors
- (4) Examinations of electrical equipment and circuits for possible damage
- (5) General examinations of rotating machinery under running condition (confirmation of no abnormal vibrations)
- (6) Confirmation of the functions of the controlling systems for production systems

## Chapter 15 SURVEYS FOR WORK-SHIPS

### 15.1 General

#### 15.1.1 Application

The Class Surveys of the work-ships specified in **Part O** (hereinafter referred to as “ships” in this Chapter), are to be in accordance with the requirements of this Chapter, notwithstanding the requirements specified in other chapters of this Part.

#### 15.1.2 General Requirements on Surveys

The general requirements of Classification Surveys, Class Maintenance Surveys, and other relevant surveys are to follow the requirements specified in **Chapter 1**. At Classification Surveys and Class Maintenance Surveys, it is to be verified that ships are in good condition through examinations, tests and investigations carried out to the satisfaction of the Surveyor.

### 15.2 Classification Surveys during Construction

#### 15.2.1 General

**1** In Classification Surveys During Construction, surveys are to be carried out on the hull construction, equipment, machinery, fire protection, means of escape, fire extinguishing systems, electrical installations, computer-based systems, stability and load lines in order to ascertain that they meet the relevant requirements of **Part O**.

**2** In Classification Surveys, surveys on materials, hull construction, equipment, machinery, etc. are to be carried out in accordance with the requirements specified in this **15.2** in addition to the relevant requirements specified in **Chapter 2**.

#### 15.2.2 Submission of Plans and Documents\*

**1** In the Classification Survey during Construction, the following plans and documents in addition to those plans and documents specified in relevant requirements in **2.1.3** are to be submitted as plans and documents for approval before the work is commenced. The plans and documents may be submitted for examination by the Society prior to making an application for the classification of the ship as stipulated otherwise by the Society.

- (1) Plans for the installations and machinery for the intended work (hereinafter referred to as “work-related installations”).
- (2) Plans for the supporting structures of work-related installations.
- (3) The following plans and documents for dynamic positioning systems in cases where such a system is installed on the ship.
  - (a) The operating manuals specified in **18.1, Part P**.
  - (b) The plans specified in **12.2.2-1(2)(d)**.
- (4) For self-elevating ships, the following plans and documents.
  - (a) Construction of all legs, leg connections to bottom mats or spud cans, leg tanks and leg jacking or other elevating systems.
  - (b) The plans and documents specified in **11.7.3-1(1), Part O**.

**2** In the Classification Survey during Construction, the following plans and documents in addition to the plans and documents specified in relevant requirements in **-1** above and **2.1.3** are to be submitted as other plans documents.

- (1) For units with a dynamic positioning system, the plans and documents specified in **12.2.2-2(20)**.
- (2) For self-elevating ships, the following plans and documents.
  - (a) Calculations substantiating the adequacy of the structure to transmit forces between legs and the hull through jacking or other elevating systems.
  - (b) Calculations of the ship’s ability to resist overturning.
  - (c) The plans and documents specified in **11.7.3-1(2), Part O**.
- (3) Operating manuals (excluding those for dynamic positioning systems)
- (4) For machinery installations used solely for operations that are the purpose of the ship: plans and documents indicating the safety devices of such machinery installations and those specified in **Chapters 9** and **10, Part D**
- (5) For self-elevating ships to which **4.4.2-3, Part O** applies, this is to include the following **(a)** and **(b)**
  - (a) The performance capabilities and instructions for operation of the towing winch emergency release systems specified in

**1.5.1-3 of Annex 4.4.2-3, Part O**

(b) Instructions for the surveys of the towing winch emergency release systems specified in **1.5.1-4 of Annex 4.4.2-3, Part O**

**3** Submission of other plans and documents not specified in **-1** and **-2** may be required where deemed necessary by the Society

**15.2.3 Presence of Surveyor\***

**1** During the Classification Surveys, the relevant items specified in **2.1.7** and the items specified in following **(1)** and **(2)** are to be implemented. To implement surveys of items specified otherwise by the Society, in lieu of traditional ordinary surveys where a Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate in the following cases.

(1) Performance tests, including the tests specified in **1.5, Annex 4.4.2-3, Part O**, on work-related installations

(2) For ships with a dynamic positioning system, the item specified in **12.2.3(6)**

**2** The requirements specified in **-1** may be modified having regard to the actual status of the facilities, technical abilities and quality control of the place of manufacture, except in the case of sea trials and the tests specified in **1.5 of Annex 4.4.2-3, Part O**.

**3** For the tests specified in **-1**, the applicant is to prepare test plans for review by the Society prior to testing. Test records and/or measurement records are to be submitted to the Society as required.

**15.2.4 Sea Trials and Stability Experiments****1** Sea Trials

For ships that have main propulsion machinery, the following tests corresponding to ship type are to be carried out in addition to the sea trials required in **2.1.7-7**:

(1) For self-elevating ships, elevating and lowering tests of legs and decks and function tests of their safety devices; and where legs are not provided with bottom mats, pre-loading tests on each leg to a load as near as possible to that of the strength calculation

(2) The Society may require a demonstration test in still water after the completion of the hull construction work, where the ship is operating under the severest loading condition in order to verify the adequacy of the theoretical calculations and to confirm the safety factor during operation

**2** Stability Experiments

Stability experiments required in **2.1.7-8** are to be carried out.

**15.2.5 Documents to be Maintained On Board**

At the completion of a classification survey, the finished versions of the following in addition to all of the applicable drawings, plans, manuals, lists, etc. listed in **2.1.4**, are to be on board.

(1) Operating manuals

(2) For ships with a dynamic positioning system, the documents specified in **12.2.5(4)**

(3) The following **(a)** and **(b)** in the case of ships to which **4.4.2-3, Part O** applies:

(a) The performance capabilities and operating instructions of the towing winch emergency release system specified in **1.5.1-3 of Annex 4.4.2-3, Part O**

(b) Instructions for the surveys of the towing winch emergency release system specified in **1.5.1-4 of Annex 4.4.2-3, Part O**

**15.2.6 Classification Survey of Ships Not Built under Survey\***

**1** Classification surveys of ships not built under survey are to be according to relevant requirements in **2.2**.

**2** At the completion of a classification survey, the Surveyor is to confirm that the documents specified in **15.2.5** are on board the ship.

**15.3 Annual Surveys****15.3.1 General**

**1** Annual Surveys are to be according to the requirements in this **15.3** in addition to relevant requirements in **Chapter 3**.

**2** Surveys equivalent to Special Surveys may be required when considered necessary by the Society, based on the service and repair history of the ship or damage history of similar ship types or ships with similar tanks and spaces.

**3** At the Annual Surveys for work-ships which are designed to perform more than a single purpose, surveys are to be carried out in accordance with the relevant requirements in this Chapter, in consideration of the ship's equipment, structural configuration and past operational experience.

**15.3.2 Annual Surveys for Hull, Equipment, Fire Extinguishing Systems, Computer-based Systems and Fittings\***

**1** It is to be verified that the following documents and booklets have been kept on board and are readily available.

- (1) Relevant items listed **Table B3.1** corresponding to the ship's hull structure and purpose
- (2) Operating manuals

**2 Annual Surveys for Hulls, Equipment, Fire Extinguishing Systems and Fittings**

At Annual Surveys, the following inspections are to be carried out, in addition to the relevant survey items specified in **3.2.2** through **3.2.7** corresponding to hull structure, equipment, purpose, etc.

- (1) A general examination of work-related installations and their supporting structures.
- (2) For ships to which **4.4.2-3, Part O** applies and ships for which the date of contract for construction is on or after 1 January 2020, the following inspections are to be carried out.
  - (a) Operation of the towing winch emergency release system is to be confirmed with the reference to the documented instructions for surveys provided by the manufacturer. Operation of the winch emergency release system under no load condition is to be verified. Where practical, activation of the emergency release system may be confirmed by observation of the winch brake.
  - (b) The function of the alarms associated with the emergency release system is to be verified, as far as practicable and reasonable.
  - (c) The condition of the emergency release system is to be visually examined to confirm it remains in satisfactory condition.
  - (d) The means of emergency release of the towline in the event of a blackout is to be examined, and where additional sources of energy are arranged for this purpose, the sources of energy are to be visually inspected and operationally tested.
  - (e) It is to be verified that the performance capabilities and operating instructions of the emergency release system are documented and made available on board the ship on which the winch has been installed.

**3** For self-elevating ships, general examinations of the following items are to be carried out in addition to **-1** and **-2** as far as practicable down to the waterline.

- (1) Leg structures
- (2) Jack frames, leg supporting structures and upper hulls or adjacent platform structures

**4** For ship-type ships and barge-type ships, general examinations of surrounding constructions of openings such as moon pools are to be carried out in addition to **-1** and **-2** as far as practicable down to the waterline.

**15.3.3 Annual Surveys for Machinery and Electrical Installations\***

**1** At Annual Surveys for machinery and electrical installations, general examinations of the relevant machinery and electrical installations specified in **3.3** are to be carried out in addition to the following surveys:

- (1) General examinations of work-related installations are to be carried out. In cases where deemed necessary by the Surveyor, performance tests of work-related installations may be required.
- (2) For ships with a dynamic positioning system, the survey specified in **12.3.3-1(3)** is to be carried out.
- (3) General conditions of the electrical installations in hazardous areas are to be examined. For ships of ten *years* of age and over, insulation resistance of these installations is to be measured. This measurement, however, may be dispensed with where proper measurement records are kept on board and are found to be satisfactory by the Surveyor.
- (4) For self-elevating ships, the condition of jacking or elevating systems and leg guides is to be examined.

**2** For units with a dynamic positioning system, it is to be verified that the documents and booklets specified in **12.3.3-2** are kept on board and readily available.

**15.4 Intermediate Surveys****15.4.1 General**

**1** Intermediate Surveys are to be according to the requirements in this **15.4** in addition to relevant requirements in **Chapter 4**.

**2** Surveys equivalent to Special Surveys may be required when considered necessary by the Society, based on the service and repair history of the ship or damage history of similar ship types or ships with similar tanks and spaces.

**3** At the Intermediate Surveys for work-ships which are designed to perform more than a single purpose, surveys are to be carried out in accordance with the relevant requirements in this Chapter, in consideration of the ship's equipment, structural configuration and



past operational experience.

#### **15.4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction, Computer-based Systems and Fittings**

##### **1 Examination of Plans and Documents**

At Intermediate Surveys, the management conditions of plans and documents listed in **15.3.2-1** is to be examined.

##### **2 Intermediate Surveys for Hulls, Equipment, Fire Extinguishing Systems, and Fittings**

At Intermediate Surveys, the relevant survey items specified in **4.2.2** through **4.2.7** corresponding to the ship's structure, equipment, etc. are to be examined. In addition, a general examination of hull, equipment, fire extinguishing systems and fittings specified in **15.3.2-2** is to be carried out.

##### **3 For self-elevating ships, the following survey items are to be examined in addition to the survey items specified in -1 and -2:**

- (1) For ships over 5 years of age, an internal examination and thickness measurements of representative ballast tanks and at least two pre-load tanks are to be conducted.
- (2) Where the effectiveness of the corrosion protection of those tanks is verified as a result of the internal examination specified in (1), thickness measurements may be dispensed with.

#### **15.4.3 Intermediate Surveys for Machinery and Electrical Installations**

**1** At Intermediate Surveys, relevant survey items for the machinery and electrical installations specified in **4.3** and the survey items specified in **15.3.3** are to be examined according to type.

**2** For Self-elevating ships, overhaul examinations of jacking systems are to be carried out, if deemed necessary by the Surveyor.

### **15.5 Special Surveys**

#### **15.5.1 General**

**1** Special Surveys are to be according to the requirements in this **15.5** in addition to relevant requirements in **Chapter 5**.

**2** Commencement and completion of Special Surveys are to follow the requirements specified in **5.1.1**.

**3** At the Special Surveys for work-ships which are designed to perform more than a single purpose, surveys are to be carried out in accordance with the relevant requirements in this Chapter, in consideration of the ship's equipment, structural configuration and past operational experience.

#### **15.5.2 Special Surveys for Hull, Equipment, Fire Extinguishing Systems, Computer-based Systems and Fittings**

##### **1 Examination of Plans and Documents**

At Intermediate Surveys, the management conditions of plans and documents listed in **15.3.2-1** is to be examined.

##### **2 Special Surveys for Hull, Equipment, Fire Extinguishing Systems, and Fittings**

At Special surveys, relevant survey items specified in **5.2.2** through **5.2.7** corresponding to the ship's structure, equipment, etc. are to be examined. In addition, the hull, equipment, fire extinguishing systems and fittings specified in **15.4.2-2** are to be examined thoroughly.

(1) For ships to which **4.4.2-3, Part O** applies and ships for which the date of contract for construction is on or after 1 January 2020, the following inspections are to be carried out.

- (a) The surveys specified in **15.3.2-2(2)** are to be carried out, with the additional instructions for special survey provided by the manufacturer, as appropriate, being followed.
- (b) The full functionality of the emergency release system is to be tested to the satisfaction of the surveyor. Testing may be conducted either during a bollard pull test or by applying the load against a strong point on the deck of the tug or the shore that is certified to the appropriate load.
- (c) The emergency release system is to be tested at a towline load that is equal to the lesser of 30 % of the maximum design load or 80 % of vessel bollard pull in both a normal power condition and power blackout condition to the satisfaction of the surveyor.

**3** For self-elevating ships, the thorough examinations described below are to be carried out, in addition to the survey items specified in **-1** and **-2**.

(1) All legs including chords, bracing, gussets, racks, joints, and leg guides

Tubular or similar type legs are to be examined externally and internally together with internal stiffeners.

(2) Externals of jack-house structures and attachments to upper hulls or platforms and plating and supporting structures in way of

leg wells

- (3) Connections between legs and bottom mats or footings
- (4) Interior and exterior of bottom mats or footings
- (5) Parts specified in (1) through (3) designated by the Society as having a concentration of stress may require non-destructive tests
- (6) For ships over 5 *years of age*, thickness measurement of members in representative ballast tanks and at least two pre load tanks, in addition to the examinations specified in (1) through (5)

Where the effectiveness of the corrosion protection of those tanks is verified as a result of internal examinations, thickness measurements of these structural members may be omitted as deemed appropriate by the Society.

4 For ship-type ships and barge-type ships, the thorough examinations described below are to be carried out, in addition to the survey items specified in -1 and -2

- (1) For ships with a dynamic positioning system, structural appendages and ducts for dynamic positioning systems
- (2) Hull structures around openings such as moon pools
- (3) Parts specified in (2) designated by the Society as having a concentration of stress may require non-destructive tests

### 15.5.3 Special Surveys for Machinery and Electrical Installations

1 At Special Survey, relevant survey items for the machinery and electrical installations specified in 5.3 and the survey items specified in 15.3.3 are to be examined according to type.

2 For self-elevating ships, a general examinations of jacking systems are to be carried out. Where deemed necessary by the Surveyor, an overhaul examination of the jacking system is to be carried out.

## 15.6 Docking Surveys

### 15.6.1 General\*

1 Docking Surveys are to be according to the requirements in this 15.6 in addition to relevant requirements in Chapter 6.

2 For ships with a dynamic positioning system, the survey specified in 12.6.2-1(4) is to be carried out.

3 For self-elevating ships, the following parts are to be examined in addition to the requirements specified in -1 and -2:

- (1) External surface of the hull
- (2) External surface of spud cans, mats, under water areas of legs and their connections
- (3) The surveyor may request non-destructive tests of important parts or suspect areas of substantial corrosion as a result of the examinations.

4 For ships over 5 *years of age*, internal examinations and thickness measurements of the representative ballast tanks or free-flooding compartments in bottom mats or spud cans, if accessible, and at least two representative pre-load tanks are to be carried out. However, where corrosion control arrangements of these ballast spaces are considered satisfactory, thickness measurements may be dispensed with.

## 15.7 Boiler and Thermal Oil Heater Surveys

### 15.7.1 General

Boiler and thermal oil heater surveys are to be carried out in accordance with Chapter 7.

## 15.8 Propeller Shafts and Stern Tube Shaft Surveys

### 15.8.1 General

For ships with main propulsion machinery, Propeller Shafts and Stern Tube Shaft Surveys are to be carried out in accordance with Chapter 8.

## **15.9 Planned Machinery Surveys**

### **15.9.1 General**

Planned Machinery Surveys are to be carried out in accordance with [Chapter 9](#).

## **Annex 1.5.3 CLASS MAINTAINANCE SURVEY BY MEANS OF REMOTE SURVEY**

### **An1 General**

#### **An1.1 General**

- 1 This annex specifies principles and minimum requirements for carrying out remote surveys.
- 2 Remote survey will only be appropriate provided the level of assurance is not compromised, and the survey is carried out with the same effectiveness as and is equivalent to, a survey carried out with attendance on board by a Surveyor.
- 3 In addition to the requirements of this annex, special attention is to be paid in cases when it is necessary to comply with the domestic laws and regulations of coastal State. In particular, sufficient confirmation is to be taken in advance for selecting the method of communication and communication infrastructure.

#### **An1.2 Application**

- 1 These requirements apply to all vessels, self-propelled or not.
- 2 Notwithstanding -1, for survey for mobile offshore drilling units and special purpose barges in **Chapter 12** and survey for floating offshore facilities for crude oil/petroleum gas production, storage and offloading in **Chapter 14**, the Society may permit the application of remote survey methods different from those specified in this Annex where deemed appropriate by the Society.

#### **An1.3 Definitions**

##### **An1.3.1 Remote Survey**

A “Remote Survey” is a process of verifying that a ship and its equipment are in compliance with the rules of the Society where the verification is undertaken, or partially undertaken, without attendance on board by a Surveyor.

Notes:

- (1) “Attendance on board by a Surveyor” means physical attendance on board the ship by a Surveyor.
- (2) Remote classification activities not requiring a survey, such as some administrative tasks, are not to be considered as remote surveys.
- (3) An administrative task is a task where a survey decision is not being made, for example reissue of a certificate or record following a correction, or an update to the ship’s records held by the Society or a document review.

##### **An1.3.2 Information and Communication Technology (ICT)**

Information and Communication Technology (hereinafter referred to as “ICT”) are the technologies used in the scope of remote surveys for gathering, storing, retrieving, processing, analysing, and transmitting information which includes both software and hardware.

## An2 Requirements for Equivalency

### An2.1 General

1 The requirements for equivalency of a remote survey to a survey attended on board by a Surveyor are to include:

- (1) Eligibility of the remote survey
- (2) Qualification of Surveyors
- (3) Planning of the remote survey
- (4) Performance of the remote survey
- (5) Assessment of the remote survey
- (6) Reporting

2 Equivalency is obtained when, with the use of available ICT, a Surveyor can perform a survey remotely being able to:

- (1) Obtain the supporting and technical evidence required according to the applicable rules.
- (2) Verify applicable survey items and relevant tests.
- (3) The results of the remote survey provide the same level of assurance obtained with attendance on board by a Surveyor.

### An2.2 Eligibility of the Remote Survey

1 Eligibility of the remote survey is to be decided based on type and scope of the requested survey, in accordance with [An 3.1](#) and, if applicable, Administration acceptance and possible instructions, when the class survey is also related to a statutory item, and the Society is carrying out the statutory survey on behalf of the flag State Administration.

2 A remote survey is deemed eligible when it provides the same level of assurance, according to the requirements for equivalency, as if it was conducted with attendance on board by a Surveyor.

3 Remote surveys are generally to be carried out with internet connection allowing a live streaming visual examination, although, at the discretion of the Surveyor, a combination of remote survey methods (see [An 2.4](#)) may be used. For simple/limited verifications, other types of ICT may be accepted by the Surveyor.

### An2.3 Planning of the Remote Survey

1 Planning of the remote survey is required to ensure that the remote survey is carried out in accordance with the applicable requirements. The content of the planning is to be based on the scope of the remote survey.

2 To ensure that the Surveyor can properly plan the remote survey and communicate with personnel/crew, so that the survey is carried out according to the applicable rules, adequate means are to be available enabling the Surveyor and allowing the Society to:

- (1) properly interact with personnel/crew involved in the remote survey, before and during the survey process,
- (2) agree on ICT means to be used
- (3) verify that personnel/crew involved in the remote survey are suitably skilled to use the electronic devices and/or software used by the Society to perform the remote survey
- (4) acquire as deemed necessary information on identity and ranking of personnel/crew involved in the remote survey,
- (5) provide the survey item/scope to the personnel/crew involved in facilitating the remote surveys, including the tests that will be performed,
- (6) communicate, during the remote survey, additional actions depending on the evidence to be collected.

Notes:

- (1) Training and qualification of on board personnel/Crew are regulated by the STCW Convention and is a prerogative of the flag State Administration.
- (2) The ship's flag State Administration may require that the Safety Management System of the ship is updated by the Company to include provisions for specific training of the crew engaged in remote surveys.

**3** One or more of the following means is to be provided for planning the remote survey:

- (1) live-streaming video and audio connection
- (2) exchange of data / electronic documents
- (3) other means acceptable to the Society

**4** The owner is to provide the necessary facilities for the safe execution of the survey.

#### **An2.4 Performance of the Remote Survey**

**1** To ensure that the Surveyor can properly perform the remote survey according to the applicable rules, the available evidence is to allow the attending Surveyor to:

- (1) Examine and assess a survey item and/or a group of items and/or supporting documents,
- (2) Verify and assess applicable tests and/or services.

**2** The evidence provided to the Surveyor is subject to the technical evaluation and final acceptance by the Surveyor with respect to the completeness and accuracy, necessary to perform the requested survey according to the applicable requirements.

**3** One or more of the following evidence is to be provided for performing the remote survey:

- (1) live-streaming video and audio
- (2) recorded videos provided by the Owner's representative
- (3) photos provided by the Owner's representative
- (4) other data and/or supporting documents acceptable to the Society.

**4** The live videos, recorded videos and still images taken during the remote survey is to be kept confidential and not to be used for any purpose other than to assist the remote surveyor in conducting the remote survey. Further, they are not to be disclosed to any third part, or copied, reported or altered without written consent of the Society.

**5** The applicant or any person on its behalf is not to record the videos containing the voice of the remote surveyor.

#### **An2.5 Assessment of the Remote Survey**

**1** The Surveyor is to evaluate all evidence received and accept them before crediting the remote survey.

**2** The means used for the remote survey is to allow the Surveyor to collect the necessary evidence that will be examined according to the Surveyor's professional judgement in order to satisfactorily complete and credit the relevant survey items.

**3** In case the Surveyor, according to their professional judgement, deems that the remote survey does not provide the same level of assurance as a survey with attendance on board by a Surveyor, the Surveyor may decide not to credit the relevant survey items.

## An3 Scope and Procedures

### An3.1 Scope - Eligible Survey Items

1 A remote survey will be only appropriate provided it reaches the same level of assurance as, and is equivalent to, a survey attended on board by a Surveyor.

2 A remote survey may be proposed as an alternative to a survey attended on board by a Surveyor for the surveys listed in [Table An 3.1](#).

3 When the class survey is also related to a statutory item, and the Society is carrying out the statutory survey on behalf of the Administration, then the Administration acceptance is required, and possible additional requirements are to be complied with.

4 The Surveyor may require to confirm the results of the remote survey, by a survey attended on board by a Surveyor, to credit the relevant survey items, in case the remote survey is not carried out to the Surveyor's satisfaction or it is required by the Society.

Table An 3.1 Eligible Remote Survey Items

No.	Surveys and related items eligible to remote survey	Live streaming required (See Notes)
1	Postponement, issuance, deletion of Condition of Class	○ (1)
2	Postponement of Class surveys	○ (1)
3	Items of Continuous Survey for Machinery (UR Z18) or Planned Maintenance Scheme (UR Z20, PMS)	○ (1)
4	Occasional survey for change of ship's name	○ (1)
5	Occasional survey for loss of anchor	○ (1)
6	Occasional survey for minor machinery or equipment damage	○ (1)
7	Occasional survey for minor hull damage	○ (1)
8	Occasional survey for minor deficiencies/defects not subject to a Condition of Class	○ (1)
9	In-water bottom survey	○
10	Specified items of a class periodical survey (excluding additional specific items of initial or renewal surveys), including completion of remaining items of a part held class periodical survey	○ (1)(2)
11	Non-propelled / un-manned barges/pontoon – annual surveys when no survey of hull compartments is due	○
12	Minor retrofit / installation/upgrade of equipment	○ (1)
13	Documentary or data based initial / periodical / renewal / occasional verifications and surveys	-

Notes:

- (1) "(1)" means that live streaming may not be required for minor survey scope or that a combination remote survey method, as listed in [An 2.4](#), may be used at the sole discretion of the Society.
- (2) "(2)" means that pure documentary verifications are eligible in accordance with item 13.
- (3) Live streaming may be required for surveys not marked "○" in the Table, depending on the survey scope at the sole discretion of the Society.
- (4) "Minor" in the items 6, 7, 8 and 12 means that the item can be surveyed remotely according to requirements for equivalency given in [An 2](#).

**An3.2 Procedures****An3.2.1 Eligibility**

Refer to [An 2.1](#).

**An3.2.2 Digital Information Quality, Completeness, and Accuracy**

1 Final appraisal of the quality of digital information is at the discretion of the Surveyor, who is to be satisfied with the content and the quality of digital information collected, and the survey carried out, allowing the Surveyor to confirm its completion.

2 The Owner is responsible for the completeness and accuracy of digital information provided. The digital information submitted by the Owner to the Surveyor is to reflect the real situation of the surveyed item. The date and time, when a photo or video was taken are to be made available to the Surveyor or identifiable from its metadata.

3 The Society is to collect and store digital information as evidence of the survey. It is not necessary to store all of digital information received; the exact digital information stored is to support the survey decision and is to be decided by the Surveyor crediting the survey.

4 The remote survey is carried out under the supervision and upon instructions of the Surveyor, who is in charge of crediting the remote surveys. A Surveyor attendance on board may be required to complete the survey, upon the Surveyor's request and at their discretion.

**An3.2.3 Requirements for a remote survey when live streaming is not used**

1 When live streaming is not used, communication and digital information collection are to be performed through an ICT channels (such as emails, data streams and clouds), which is to be accepted by the Society prior to the survey.

2 The Owner's representative is to confirm the identity of the ship at the commencement of the survey.

**An3.2.4 Requirements for a remote survey when live streaming is used**

1 The Owner's representative is to ensure that:

- (1) the Owner's representative is attending onboard and has access to the areas intended to be surveyed.
- (2) the Owner's representative has at his disposal a 2-ways visual and audible communication means complying with the requirements in [An 4](#).
- (3) ICT solution is available on the communication means and meets the requirement described in [An 4](#).

2 In the case these requirements cannot be fulfilled, the remote survey may be rejected.

3 The Surveyor is to verify the identity of the ship at the commencement of the survey by live streaming.

**An3.3 Hardware and ICT Solution**

Refer to [An 4.1](#).

**An3.4 Requirements for Connectivity**

1 The Owner's representative is to ensure that internet connectivity tests are carried out before the survey and that proper connectivity is available and maintained during the survey.

2 When remote survey by live streaming is being undertaken, a connection that enables live streaming between the Surveyor and the Owner's representative attending on board is required. The quality of the live streaming connection (audio and video) is to ensure proper communication and to allow the Surveyor to carry out the survey remotely, to the Surveyor's satisfaction.

3 In the case where a live streaming connection with the Surveyor is not possible or is not continuous at the place of the survey (e.g., Engine Room), partly online sequences (where the Owner is able to capture pictures and videos offline of those items not covered by live streaming) may be accepted by the Surveyor.



## An4 ICT

### An4.1 General

- 1 This [An 4.1](#) outlines the minimum requirements for the use of ICT that can capture images, record video and/or live stream video or other data from a ship as considered acceptable to the Society.
- 2 Applicants are to arrange the equipment to be used on the ships.
- 3 The method for sharing large-capacity data such as photos and videos will be specified by the Society after receiving the application for remote survey.
- 4 Both equipment for information collection and communicating equipment for two-way communication are to be selected with careful consideration for reliability of both hardware and software.
- 5 The data formats of recorded video and still images are to be general-purpose.
- 6 In principle, the means specified by the Society (specified application, etc.) are to be used for sharing large volumes of data such as recorded videos and still images. However, from the viewpoint of information security, when using the means for information sharing specified by the applicant, the applicant is to provide an environment that the Society can receive and brows data in.
- 7 Select a communication infrastructure which is sufficiently reliable in terms of information security, considering risk of data leakage, etc. Also, it is to be ensured that a communication environment can stably send and receive still images and recorded videos with the quality required by the remote Surveyor.
- 8 Both hardware (smartphone or tablet, etc.) and software (application for communication) for communicating equipment for two-way communication are to be selected with careful consideration for information security.

### An4.2 Hardware

- 1 The Owner is responsible for ensuring that all hardware installations on board used for the remote survey is to comply with the applicable requirements relevant for use and location on board, including hazardous areas.
- 2 The ICT is to typically consist of:
  - (1) A host computer device, to receive the streaming of images/data/video. This is usually a laptop or desktop computer compatible with the software application used for the remote survey.
  - (2) On board standalone device which may include digital cameras capable of capturing videos/photos/data.
  - (3) On board smart device compatible with the applicable software/technology.
  - (4) Communication accessories like headphones and microphone for the noisy environment as applicable and as deemed necessary.

Notes:

The smart device may be a smartphone, tablet, computer, wearable device, smart glass, digital camera, or any other device which can be connected to the network and capable of transmitting the necessary data/images to shore.
- 3 The communication equipment used for the live streaming is to have the following minimum functionality:
  - (1) Both ends are to simultaneously see the same image/videos in near real-time (i.e., live streaming).
  - (2) Two-way direct voice communication
  - (3) Possibility to take screenshots
- 4 When using a portable device on board for live streaming, the movement of the handheld device may affect the stability of the video and the image, leading to lower quality outputs. When necessary, a suitable anti-shake device is to be used to provide proper stability.
 

Notes:

  - (1) The host computer screen is to be able to present an image quality that is sufficient to enable a survey decision to be made.
  - (2) Portable equipment on board is to be equipped with a power capacity suitable for the intended scope and time of the survey.

**An4.3 Internet Connectivity (Coverage and Speed)**

- 1 For internet connectivity requirements on board, refer to [An 3.4](#).
- 2 The on board smart devices are to have the capability of transmitting the images/video/data over a Cellular, Wi-Fi or Satellite Connection to the remote Surveyor.
- 3 When live streaming communication is applied, the internet connection is to have sufficient and stable bandwidth capacity to ensure quality (such as resolution and frame rate) of the direct colour image/video and voice communication to the remote survey location to the satisfaction of the Surveyor.

**An4.4 Software and Data Security**

- 1 The software used for the remote survey is to be acceptable to the Society. The overall function and ability of the software used to ensure the security of data is to be evaluated prior to use as per the below requirements in this [An 4.4](#).
- 2 The Surveyor is to normally control the live video call, providing instructions to the on-site personnel/crew and supervising survey activities for capturing relevant information. The on board device is to have the capability of transmitting the data over a Cellular, Wi-Fi, or Satellite Connection to the Surveyor.
- 3 The software used to perform the remote survey may also be provided with technologies that support the Surveyor in the process of making a decision, such as:
  - (1) Artificial Intelligence (AI) for the recognition and the classification of defects
  - (2) Internet of things (IoT) for collecting parameters and evaluating acceptability/working condition of machinery and equipment
  - (3) Data driven verification or other means considered acceptable by the Society
- 4 The above software and technologies are to be evaluated and accepted by the Society in each case.
- 5 When considering the use of software/applications and other technologies, data protection is to be considered in accordance with applicable requirements of the Society before the remote survey is commenced. The software/application used to perform the remote survey is to be compatible with the technical requirements detailed in this paragraph; in addition, the software used is to comply with the Society's applicable requirements:
  - (1) Cybersecurity
  - (2) Data protection and confidentiality for the transmitted data
- 6 When not provided by the Society itself, the audio/video software or application used to perform the remote survey is to be accepted by the Society.
- 7 During the survey preparation, it is the Owner's responsibility to ensure that their data security policies are implemented as per the Company's Safety Management System.

Notes:

The Company's SMS may take into account *IMO Res. MSC.428 (98)*, *MSC-FAL.1/Circ.3* and *IACS Recommendation No.166*.

## **An5 Recording of Evidence and Reporting of Survey**

### **An5.1 Recording of Evidence**

#### **An5.1.1 Required Evidence**

**1** In principle, live streaming video and audio is to be applied to remote surveys as a primary means (refer to [Table An 3.1](#)).

**2** Additionally, and/or alternatively, one or more of the following evidence may be submitted or verified as requested by the Surveyor during remote survey so that the Surveyor is able to verify conditions of survey items:

- (1) Recorded video and audio
- (2) Photos
- (3) Master's/chief engineer's statement
- (4) Ship's logbook
- (5) Owner's confirmation

**3** Live streaming video and audio

Live streaming video and audio using ICT are to be in accordance with the requirements in [An 4](#).

**4** Recorded videos/photos

For the recorded videos/photos, the following information is to be available:

- (1) Confirmation that they were actually taken on the ship by the Owner's representative
- (2) Date and time when they were taken
- (3) Identity of the personnel/crew responsible for taking evidence

**5** Master's/chief engineer's statement

Recorded videos/photos provided by the Owner's representative may be supplemented with a statement signed by the master and/or the chief engineer confirming the condition of the items shown in the evidence. The final evaluation of the remote survey by the Surveyor is to be based on all of the provided evidence, and it does not delegate the responsibility to the master/chief engineer's statement only.

**6** Ship's logbook

The Master is to make entries into ship's logbook on the following occasions and submit copies of the relevant pages when requested by the Surveyor:

- (1) when a remote survey is carried out by the Surveyor
- (2) when videos/photos are taken and submitted to the Surveyor with the master's/chief engineer's statement and additional documents as applicable.

**7** Owner's confirmation

The Owner's representative or the master is to confirm the correctness and completeness of the provided information and evidence (if any) relevant to the condition of the items requested to be surveyed. This confirmation may be included in the survey application.

#### **An5.1.2 Retaining/Filing Evidence**

**1** The evidence submitted by the Owner's representative or master is to be retained/filed in accordance with the Society's procedures which is to include:

- (1) type of evidence to be retained/filed
- (2) duration/location to be retained/filed

**2** It is not required for the Society to record and save live streaming video and audio as evidence unless the Surveyor considers it necessary.

#### **An5.1.3 Other Supporting Documents**

**1** The Surveyor may request the Owner's representative or master to submit supplementary documents such as ship's maintenance reports and record for the operation of machinery, and equipment and service reports issued by manufacturers, service suppliers or service providers.

2 While the Surveyor is to verify that the documents are duly prepared and issued to the ship, they may not be required to be retained/filed by the Society as evidence.

## **Annex 2.1.4 PROCEDURES FOR ON-BOARD FUNCTION TEST OF FIXED FIRE DETECTION AND ALARM SYSTEM IN MACHINERY SPACES**

### **An1.1 General**

#### **An1.1.1 Scope**

These procedures apply to the on-board function test of the fixed fire detection and alarm system installed in machinery spaces specified in **7.4.1-1, Part R of the Rules**.

#### **An1.1.2 Test Timing**

The on-board function test is to be conducted during the sea trial at normal continuous rating operation. However, this test may be carried out under conditions considered to be equivalent by the Society to actual ventilation conditions at sea.

### **An1.2 Test Details**

#### **An1.2.1 Mock Fire**

Either one of the following is to be used as a mock fire at the test.

(1) Fire by burning liquid fuel

Fuel oil (Marine Diesel Oil or Heavy Fuel Oil) is ignited in a cylindrical steel container having a 200 mm diameter and 200 mm depth. The volume of fuel oil may be optional but is to be enough to complete the test. Where Heavy Fuel Oil is used, some Marine Diesel Oil may be mixed in for easy ignition. In order to prevent oil spillage due to pitch and roll of the ship or to restrict the height of the flame, rags steeped in the fuel oil may be used as the fuel source in the container.

(2) Fire by burning materials other than liquid fuel

Materials other than liquid fuel may be used for the mock fire, provided that the amount of heat release and smoke generation are confirmed to be equivalent to the liquid fuel in (1) above by placing the test device specified in ISO 9705 on top of the cylindrical container. Ignition of the mixture of lactose ( $C_{12}H_{22}O_{11}$ ) and potassium chlorate ( $KClO_3$ ) (40 g in weight each) is considered to be equivalent to the mock fire mentioned in (1). The quantity of lactose and potassium chlorate may be modified according to the size of the machinery spaces.

#### **An1.2.2 Locations for Igniting Mock Fire**

A mock fire is to be ignited at each place specified in (1) to (5) below.

The places shown in (4) and (5) may be exempted, if deemed appropriate by the Surveyor after taking into account factors such as the arrangement of detectors and the ventilation condition.

- (1) Near exhaust gas manifolds of reciprocating internal combustion engines used as main propulsion machinery
- (2) Near exhaust gas manifolds of reciprocating internal combustion engines driving main generators
- (3) Near fuel oil burners of boilers
- (4) Near fuel oil purifiers
- (5) Near fuel oil burners of incinerators

#### **An1.2.3 Elapsed Time until Detection**

The mock fire is to be detected within 3 minutes from the time when the fire or smoke is confirmed by eyesight.

### **An1.3 Other Items**

#### **An1.3.1 Requirements when Detection Fails**

Where the fire has not been detected within the required time, more detectors are to be installed and/or the current detectors are to be alternatively arranged by tracing the smoke flow during the on-board function test and deciding the optimum position according to either of the following methods. In this case, the on-board function test of these detectors is not required after their installation and/or rearrangement, provided that performance tests are carried out on the detectors individually.

However, where it is difficult to decide the location for additional installation and/or alternative arrangement of the detectors, the on-board function test is to be carried out during the sea trial after the installation and/or rearrangement.

- (1) Using removable/portable fire detectors
- (2) Verifying the smoke flow/accumulation by eyesight

#### **An1.3.2 Omission of Test**

Notwithstanding [An 1.2.2](#) above, the on-board function test may be omitted, provided that the effectiveness of the fire detection and alarm system in the engine room has been confirmed by a sister ship that has the same factors affecting fire detection. Factors affecting fire detection refers to the following.

- (1) Size, shape and structure arrangement (girders, bulkheads, frames, etc. to affect the smoke flow) of the engine room
- (2) Arrangement and type of the fire detectors
- (3) Arrangement of ventilation ducts of the engine room
- (4) Kind, type and arrangement of machinery installations (main engines, generator engines, boilers, ventilators, flammable oil piping, hot surfaces, etc.)

## Annex 2.1.5 TESTING PROCEDURES OF WATERTIGHT COMPARTMENTS

### Chapter 1 SHIPS SUBJECT TO *SOLAS CONVENTION*

#### An1.1 General

##### An1.1.1 General

1 The test procedures specified in this Annex are to confirm the watertightness of tanks and watertight boundaries as well as the structural adequacy of tanks which make up the watertight subdivisions of ships. These procedures may also be applied to verify the weathertightness of structures and shipboard outfitting. The tightness of all tanks and watertight boundaries of ships being newly constructed and ships undergoing major conversions or major repairs is to be confirmed by these test procedures prior to the delivery of the ship. "Major repairs" refers to repairs affecting the tightness of watertight boundaries.

2 Testing procedures of watertight compartments for ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) are to be carried out in accordance with **Chapter 1**, unless:

- (1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1, Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex 2.1.5 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1, Regulation 11*; and
- (2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

#### An1.2 Application

##### An1.2.1 Application

1 All gravity tanks and other boundaries required to be watertight or weathertight are to be tested in accordance with this Procedure and proven to be tight and structurally adequate as follows. "Gravity tanks" refers to a tank that is subject to vapour pressure not greater than 0.07MPa.

- (1) Gravity Tanks for their tightness and structural adequacy
  - (2) Watertight Boundaries Other Than Tank Boundaries for their watertightness
  - (3) Weathertight Boundaries for their weathertightness
- 2 The testing of structures not listed in **Table An 1.4-1** or **Table An 1.4-2** is to be specially considered.

#### An1.3 Test Types and Definitions

##### An1.3.1 Tests

1 The following two types of tests are specified in this requirement:

- (1) Structural Test

A test to verify the structural adequacy of tank construction. This may be a hydrostatic test or, where the situation warrants, a hydropneumatic test.

- (2) Leak Test

A test to verify the tightness of a boundary. Unless a specific test is indicated, this may be a hydrostatic/hydropneumatic test or an air test. A hose test may be considered an acceptable form of leak test for certain boundaries, as indicated in **Note \*3, Table An1.4-1**.

- 2 The definition of each test type is as indicated in **Table An1.3.1**.

**3** The 'top of the overflow' is defined as being the top of any overflow system which is used to prevent overfilling of a tank. Such system can be an overflow pipe, airpipe, intermediate tank. For gravity tanks (i.e. sewage, grey water and similar tanks, not filled with pumps) the top of the overflow is to be taken as the highest point of the filling line.

Note: Gauging devices are not considered equivalent to an overflow system with the exception of fuel oil overflow tanks not intended to hold fuel which have been fitted with a level alarm. Where a tank is fitted with multiple means of preventing overfilling, the decision on which overflow system is to be used to determine the test head is to be based on the highest point to which the liquid may rise in service.

Table An 1.3.1 Test Definition of Each Test Type

Hydrostatic Test: (Leak and Structural)	A test wherein a space is filled with a liquid to a specified head.
Hydropneumatic Test: (Leak and Structural)	A test combining a hydrostatic test and an air test, wherein a space is partially filled with a liquid and pressurized with air.
Hose Test: (Leak)	A test to verify the tightness of a joint by a jet of water with the joint visible from the opposite side.
Air Test: (Leak)	A test to verify tightness by means of air pressure differential and leak indicating solution. It includes tank air test and joint air tests, such as compressed air fillet weld tests and vacuum box tests.
Compressed Air Fillet Weld Test: (Leak)	An air test of fillet welded tee joints wherein leak indicating solution is applied on fillet welds.
Vacuum Box Test: (Leak)	A box over a joint with leak indicating solution applied on the welds. A vacuum is created inside the box to detect any leaks.
Ultrasonic Test: (Leak)	A test to verify the tightness of the sealing of closing devices such as hatch covers by means of ultrasonic detection techniques.
Penetration Test: (Leak)	A test to verify that no visual dye penetrant indications of potential continuous leakages exist in the boundaries of a compartment by means of low surface tension liquids (i.e. dye penetrant test).

## An1.4 Test Procedures

### An1.4.1 General

Tests are to be carried out in the presence of a Surveyor at a stage sufficiently close to the completion of work with all hatches, doors, windows, etc. installed and all penetrations including pipe connections fitted, and before any ceiling and cement work is applied over the joints. Specific test requirements are given in [An 1.4.4](#) and [Table An1.4-1](#). For the timing of the application of coating and the provision of safe access to joints, see [An 1.4.5](#), [An 1.4.6](#) and [Table An1.4-3](#).

### An1.4.2 Structural Test Procedures

#### 1 Type and time of test

Where a structural test is specified in [Table An1.4-1](#) or [An1.4-2](#), a hydrostatic test in accordance with [An1.4.4-1](#) will be acceptable. Where practical limitations (strength of building berth, light density of liquid, etc.) prevent the performance of a hydrostatic test, a hydropneumatic test in accordance with [An1.4.4-2](#) may be accepted instead.

A hydrostatic test or hydropneumatic test for the confirmation of structural adequacy may be carried out while the ship is afloat, provided the results of a leak test are confirmed to be satisfactory before the ship is afloat.

**2** Alternative equivalent tank testing procedures may be considered for tanks which are constructed from composite materials such as glass reinforced plastic (GRP) and fibre reinforced plastic (FRP) based on the recommendations of the composite manufacturer.

**3** Testing schedule for new construction or major structural conversion is as follows.

- (1) Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, are to be tested for tightness and structural strength as indicated in [Table An1.4-1](#) and [Table An1.4-2](#).
- (2) The tank boundaries are to be tested from at least one side. The tanks for structural test are to be selected so that all representative



structural members are tested for the expected tension and compression.

- (3) For the watertight boundaries of spaces other than tanks structural testing may be exempted, provided that the water-tightness of boundaries of exempted spaces is verified by leak tests and inspections. Structural testing may not be exempt and the requirements for structural testing of tanks in (1) and (2) above shall apply, for ballast holds, chain lockers and a representative cargo hold if intended for in-port ballasting.

#### **An1.4.3 Leak Test Procedures**

1 For the leak tests specified in [Table An1.4-1](#), tank air tests, compressed air fillet weld tests, vacuum box tests in accordance with [An 1.4.4-4](#) through [An 1.4.4-6](#), or their combination, will be acceptable. Hydrostatic or hydropneumatic tests may also be accepted as leak tests provided that [An 1.4.5](#), [An 1.4.6](#) and [An 1.4.7](#) are complied with. Hose tests will also be acceptable for such locations as specified in [Table An1.4-1](#), **Footnote 3**, in accordance with [An 1.4.4-3](#).

2 The application of the leak test for each type of welded joint is specified in [Table An1.4-3](#).

3 Air tests of joints may be carried out in the block stage provided that all work on the block that may affect the tightness of a joint is completed before the test. See also [An 1.4.5-1](#) for the application of final coatings and [An 1.4.6](#) for the safe access to joints and the summary in [Table An1.4-3](#).

#### **An1.4.4 Test Methods**

##### **1 Hydrostatic test**

Unless another liquid is approved, hydrostatic tests are to consist of filling the space with fresh water or sea water, whichever is appropriate for testing, to the level specified in [Table An1.4-1](#) or [Table An1.4-2](#). See also [An1.4.7](#).

In cases where a tank is designed for cargo densities greater than sea water and testing is with fresh water or sea water, the testing pressure height is to simulate the actual loading for those greater cargo densities as far as practicable, but the test pressure is not to exceed the maximum design internal pressure at the top of tank.

All external surfaces of the tested space are to be examined for structural distortion, bulging and buckling, other related damage and leaks.

##### **2 Hydropneumatic test**

Hydropneumatic tests, where approved, are to be such that the test condition, in conjunction with the approved liquid level and supplemental air pressure, will simulate the actual loading as far as practicable. The requirements and recommendations for tank air tests in [-4](#) will also apply to hydropneumatic tests. See also [An1.4.7](#).

All external surfaces of the tested space are to be examined for structural distortion, bulging and buckling, other related damage and leaks.

##### **3 Hose test**

Hose tests are to be carried out with the pressure in the hose nozzle maintained at least at 0.2 MPa during the test. The nozzle is to have a minimum inside diameter of 12 mm and be at a perpendicular distance from the joint not exceeding 1.5 m. The water jet is to impinge directly upon the weld.

Where a hose test is not practical because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where necessary by means such as a dye penetrant test or ultrasonic leak test or the equivalent.

##### **4 Tank air test**

All boundary welds, erection joints and penetrations, including pipe connections, are to be examined in accordance with approved procedure and under a stabilized pressure differential above atmospheric pressure not less than 0.015 MPa, with a leak indicating solution such as soapy water/detergent or a proprietary brand applied.

A U-tube with a height sufficient to hold a head of water corresponding to the required test pressure is to be arranged. The cross sectional area of the U-tube is not to be less than that of the pipe supplying air to the tank. Arrangements involving the use of two calibrated pressure gauges to verify the required test pressure may be accepted taking into account the provisions in *F5.1* and *F7.4* of *IACS Recommendation No.140*, "Recommendation for Safe Precautions during Survey and Testing of Pressurized Systems".

A double inspection is to be made of tested welds. The first is to be immediately upon applying the leak indication solution; the second is to be after approximately four or five minutes in order to detect those smaller leaks which may take time to appear.

##### **5 Compressed air fillet weld test**

In this air test, compressed air is injected from one end of a fillet welded joint and the pressure verified at the other end of the joint

by a pressure gauge. Pressure gauges are to be arranged so that an air pressure of at least 0.015 MPa can be verified at each end of all passages within the portion being tested.

Note: Where a leak test is required for fabrication involving partial penetration welds, a compressed air test is also to be applied in the same manner as to fillet weld where the root face is large.

#### **6 Vacuum box test**

A box (vacuum testing box) with air connections, gauges and an inspection window is placed over the joint with a leak indicating solution applied to the weld cap vicinity. The air within the box is removed by an ejector to create a vacuum of 0.020 – 0.026 MPa inside the box.

#### **7 Ultrasonic test**

An ultrasonic echo transmitter is to be arranged inside of a compartment and a receiver is to be arranged on the outside. The watertight/weathertight boundaries of the compartment are scanned with the receiver in order to detect an ultrasonic leak indication. A location where sound is detectable by the receiver indicates a leakage in the sealing of the compartment.

#### **8 Penetration test**

A test of butt welds or other weld joints uses the application of a low surface tension liquid at one side of a compartment boundary or structural arrangement. If no liquid is detected on the opposite sides of the boundaries after the expiration of a defined period of time, this indicates tightness of the boundaries. In certain cases, a developer solution may be painted or sprayed on the other side of the weld to aid leak detection.

#### **9 Other test**

Other methods of testing may be considered by the Society upon submission of full particulars prior to the commencement of testing.

### **An1.4.5 Application of Coating**

#### **1 Final coating**

For butt joints welded by an automatic process, the final coating may be applied any time before the completion of a leak test of spaces bounded by the joints, provided that the welds have been carefully inspected visually to the satisfaction of the Surveyor.

Surveyors reserve the right to require a leak test prior to the application of final coating over automatic erection butt welds.

For all other joints, the final coating is to be applied after the completion of the leak test of the joint. See also [Table An 1.4-3](#).

#### **2 Temporary coating**

Any temporary coating which may conceal defects or leaks is to be applied at the time as specified for the final coating (see [-1](#) above). This requirement does not apply to shop primer.

### **An1.4.6 Safe Access to Joints**

For leak tests, safe access to all joints under examination is to be provided. See also [Table An 1.4-3](#).

### **An1.4.7 Hydrostatic or Hydropneumatic Tightness Test**

In cases where the hydrostatic or hydropneumatic tests are applied instead of a specific leak test, examined boundaries must be dew-free, otherwise small leaks are not visible.

Table An1.4-1 Test Requirements for Tanks and Boundaries

	Tank or boundary to be tested	Test type	Test head or pressure	Remarks
1	Double bottom tanks <sup>*4</sup>	Leak and structural <sup>*1</sup>	The greater of - top of the overflow, <sup>*10</sup> - to 2.4 m above top of tank <sup>*2</sup> , or - to bulkhead deck	
2	Double bottom voids <sup>*5</sup>	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	including pump room double bottom and bunker tank protection double hull required by <a href="#">Part 3 of the Rules for Marine Pollution Prevention Systems</a>
3	Double side tanks	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , - to 2.4 m above top of tank <sup>*2</sup> , or - to bulkhead deck	
4	Double side voids	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	
5	Deep tanks other than those listed elsewhere in this table	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , or - to 2.4 m above top of tank <sup>*2</sup>	
6	Cargo oil tanks	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , - to 2.4 m above top of tank <sup>*2</sup> , or - to top of tank <sup>*2</sup> plus the design vapour pressure	
7	Ballast hold of bulk carriers	Leak and structural <sup>*1</sup>	Top of cargo hatch coaming	
8	Peak tanks	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , or - to 2.4 m above top of tank <sup>*2</sup>	After peak to be tested after installation of stern tube
9	.1 Fore peak spaces with equipment	Leak	See <a href="#">An1.4.4-3</a> through -6, as applicable	
	.2 Fore peak voids	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	
	.3 Aft peak spaces with equipment	Leak	See <a href="#">An1.4.4-3</a> through -6, as applicable	
	.4 Aft peak voids	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	After peak to be tested after installation of stern tube
10	Cofferdams	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	
11	.1 Watertight bulkheads	Leak <sup>*8</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable <sup>*7</sup>	
	.2 Superstructure end bulkheads	Leak	See <a href="#">An1.4.4-3</a> through -6, as applicable	

	Tank or boundary to be tested	Test type	Test head or pressure	Remarks
12	Watertight doors below freeboard or bulkhead deck	Leak <sup>*6,7</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	
13	Double plate rudder blades	Leak	See <a href="#">An1.4.4-4</a> through -6, as applicable	
14	Shaft tunnels clear of deep tanks	Leak <sup>*3</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	
15	Shell plating	Leak <sup>*3</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	For shell plating of the areas listed in item 1 through item 10, refer to the corresponding item
16	Shell doors	Leak <sup>*3</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	
17	Watertight hatch covers and closing appliances	Leak <sup>*3,7</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	Hatch covers closed by tarpaulins and battens excluded
18	Dual purpose tanks/dry cargo hatch covers	Leak <sup>*3,7</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	In addition to structural test in item 6 or 7
19	Chain lockers	Leak and structural <sup>*1</sup>	Top of chain pipe	
20	L.O. sump. tanks and other similar tanks/spaces under main engines	Leak <sup>*9</sup>	See <a href="#">An1.4.4-3</a> through -6, as applicable	
21	Ballast ducts	Leak and structural <sup>*1</sup>	The greater of - ballast pump maximum pressure, or - setting of any pressure relief valve	
22	Fuel Oil Tanks	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , - to 2.4 m above top of tank <sup>*2</sup> , or - to top of tank <sup>*2</sup> plus the design vapour pressure, or - to bulkhead deck	
23	Fuel oil overflow tanks not intended to hold fuel	Leak and structural <sup>*1</sup>	The greater of - top of the overflow <sup>*10</sup> , - to 2.4 m above top of tank <sup>*2</sup> , or - to bulkhead deck	

Notes:

- 1 Refer to section [An1.4.2-3](#)
- 2 The top of a tank is the deck forming the top of the tank, excluding any hatchways.
- 3 Hose Test may also be considered as a medium of the test. See [An1.3.1-2](#).
- 4 Including tanks arranged in accordance with the provisions of [2.4.1.1-3, Part 1, Part C](#).
- 5 Including duct keels and dry compartments arranged in accordance with the provisions of [2.4.1.1-3, Part 1, Part C](#), and/or oil fuel tank protection and pump room bottom protection arranged in accordance with the provisions of [1.2.3](#) and [3.2.5, Part 3 of the Rules for Marine Pollution Prevention Systems](#) respectively.
- 6 Where water tightness of a watertight door has not been confirmed by prototype test, testing by filling watertight spaces with water is to be carried out. See [2.2.2.3-1, Part 1, Part C](#)

- 7 As an alternative to the hose testing, other testing methods listed in [An1.4.4-7](#) through [-9](#) may be applicable subject to adequacy of such testing methods being verified. For watertight bulkheads (item 11.1) alternatives to the hose testing may only be used where a hose test is not practicable.
- 8 A “Leak and structural test”, see [An1.4.2-3](#) is to be carried out for a representative cargo hold if intended for in-port ballasting. The filling level requirement for testing cargo holds intended for in-port ballasting is to be the maximum loading that will occur in-port as indicated in the loading manual.
- 9 Where L.O. sump tanks and other similar spaces under main engines intended to hold liquid form part of the watertight subdivision required to satisfy the damage stability requirements of the ship, they are to be tested as per the requirements of Item 5, Deep tanks other than those listed elsewhere in this table.
- 10 Refer to section [An1.3.1-3](#).
- 11 Tests of piping systems in each part of the ship are to be carried out as specified in [12.6](#), [13.17](#), and [14.6, Part D](#).

Table An1.4-2 Additional Test Requirements for Special Service Ships/Tanks

	Type of Ship/Tank	Structures to be tested	Type of Test	Test Head or Pressure	Remarks
1	Liquefied gas carriers	Integral tanks	Leak and structural	Refer to <a href="#">Part N</a>	
		Hull structure supporting membrane or semi-membrane tanks	Refer to <a href="#">Part N</a>	Refer to <a href="#">Part N</a>	
		Independent tanks type A	Refer to <a href="#">Part N</a>	Refer to <a href="#">Part N</a>	
		Independent tanks type B	Refer to <a href="#">Part N</a>	Refer to <a href="#">Part N</a>	
		Independent tanks type C	Refer to <a href="#">Part N</a>	Refer to <a href="#">Part N</a>	
2	Edible liquid tanks	Independent tanks	Leak and structural* <sup>1</sup>	The greater of - top of the overflow* <sup>5</sup> , or - to 0.9 m above top of tank* <sup>2</sup>	
3	Chemical carriers	Integral or independent cargo tanks	Leak and structural* <sup>1,4</sup>	The greater of - to 2.4 m above top of tank* <sup>2,3</sup> , or - to top of tank* <sup>2</sup> plus the design vapour pressure	Where a cargo tank is designed for the carriage of cargoes with specific gravities larger than 1.0, see <a href="#">An1.4.4-1</a>

Notes:

- 1 Refer to Section [An1.4.2-3](#).
- 2 Top of tank is deck forming the top of the tank excluding any hatchways.
- 3 For gravity tanks that are to be loaded with cargoes having a cargo density exceeding 1.0, a hydrostatic test is to be carried out with a head of water to the height obtained from the following formula above the top of the tank.

$$\frac{H}{2}(\gamma - 1) + 2.4 \text{ (m)}$$

$H$  : Vertical distance measured from the lower edge of the bulkhead plate of the tank to the top of the tank ( $m$ )

$\gamma$  : Density of cargoes loaded in the tank.

Where  $L$  exceeds 150 m, or  $H$  is exceptionally large in comparison with  $L$ , the manner of the hydrostatic test is to be considered by the Society.

- 4 For pressure tanks, these tests are to be carried out in accordance with [4.23.6, Part N](#). In applying [4.23.6, Part N](#), “design vapour pressure” is to be read as “design pressure.”
- 5 Refer to section [An1.3.1-3](#).

Table An 1.4-3 Application of Leak Test, Coating and Provision of Safe Access for Type of Welded Joints

Type of welded joints		Leak test	Coating <sup>*1</sup>		Safe Access <sup>*2</sup>	
			Before leak test	After leak test but before structural test	Leak test	Structural test
Butt	Automatic	Not required	Allowed <sup>*3</sup>	<i>N/A</i>	Not required	Not required
	Manual or Semi-automatic <sup>*4</sup>	Required	Not allowed	Allowed	Required	Not required
Fillet	Boundary including penetrations	Required	Not allowed	Allowed	Required	Not required

Notes:

- 1 Coating refers to internal (tank/hold coating), where applied, and external (shell/deck) painting. It does not refer to shop primer.
- 2 Temporary means of access for verification of the leak test.
- 3 The condition applies provided that the welds have been carefully inspected visually to the satisfaction of the Surveyor.
- 4 Flux Core Arc Welding (FCAW) semiautomatic butt welds need not be tested provided that careful visual inspections show continuous uniform weld profile shape, free from repairs, and the results of NDE testing show no significant defects.

## Chapter 2 SHIPS SUBJECT TO *SOLAS CONVENTION* EXEMPT/EQUIVALENT

### An2.1 General

#### An2.1.1 General

1 The test procedures specified in this Annex are to confirm the watertightness of tanks and watertight boundaries as well as the structural adequacy of tanks which make up the watertight subdivisions of ships. These procedures may also be applied to verify the weathertightness of structures and shipboard outfitting. The tightness of all tanks and watertight boundaries of ships being newly constructed and ships undergoing major conversions or major repairs is to be confirmed by these test procedures prior to the delivery of the ship. "Major repairs" refers to repairs affecting the tightness of watertight boundaries.

2 Testing procedures of watertight compartments are to be carried out in accordance with **Chapter 2, Annex 2.1.5 "Testing Procedures of Watertight Compartments"** for ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) for which:

- (1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1, Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2, Annex 2.1.5 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1, Regulation 11*; and
- (2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

### An2.2 Application

#### An2.2.1 Application

1 Testing procedures are to be carried out in accordance with the requirements of **Chapter 1** of this Annex in association with the following alternative procedures specified in -2 to -7 for **An 1.4.2-3**.

2 The tank boundaries are to be tested from at least one side. The tanks for structural test are to be selected so that all representative structural members are tested for the expected tension and compression.

3 Structural tests are to be carried out for at least one tank of a group of tanks having structural similarity (i.e. same design conditions, alike structural configurations with only minor localised differences determined to be acceptable by the attending Surveyor) on each vessel provided all other tanks are tested for leaks by an air test. The acceptance of leak testing using an air test instead of a structural test does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships.

4 Additional tanks may require structural testing if found necessary after the structural testing of the first tank.

5 For tanks which are less than 2 m<sup>3</sup> in volume, structural testing may be replaced by leak testing.

6 Where the structural adequacy of the tanks and spaces of a vessel were verified by the structural testing required by either **Chapter 1** or -3 above, subsequent vessels in the series (i.e. sister ships built from the same plans at the same shipyard) may be exempted from structural testing of tanks, provided that:

- (1) Water-tightness of boundaries of all tanks and spaces is verified by leak tests and thorough inspections are carried out.
- (2) Structural testing is carried out for at least one tank or space of each type among all tanks/spaces of each sister vessel.
- (3) Additional tanks and spaces may require structural testing if found necessary after the structural testing of the first tank or if deemed necessary by the attending Surveyor.

For cargo space boundaries adjacent to other compartments in tankers and combination carriers or boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships, structural tests are to be carried out for at least one tank of a group of tanks having structural similarity (i.e. same design conditions, alike structural configurations with only minor localised differences determined to be acceptable by the attending Surveyor) on each vessel provided all other tanks are tested for leaks by an air test.

7 Sister ships built (i.e. keel laid) two years or more after the delivery of the last ship of the series, may be tested in accordance with -6 above at the discretion of the Society, provided that:

- (1) General workmanship has been maintained (i.e. there has been no discontinuity of shipbuilding or significant changes in the construction methodology or technology at the yard, shipyard personnel are appropriately qualified and demonstrate an adequate level of workmanship as determined by the Society) and:
- (2) An NDT plan is implemented and evaluated by the Society for the tanks not subject to structural tests. Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. The work is to be carried out in accordance with the Rules and under survey of the Society.



## Chapter 3 SHIPS NOT SUBJECT TO *SOLAS CONVENTION*

### An3.1 General

#### An3.1.1 General

1 The test procedures specified in this Annex are to confirm the watertightness of tanks and watertight boundaries as well as the structural adequacy of tanks which make up the watertight subdivisions of ships. These procedures may also be applied to verify the weathertightness of structures and shipboard outfitting. The tightness of all tanks and watertight boundaries of ships being newly constructed and ships undergoing major conversions or major repairs is to be confirmed by these test procedures prior to the delivery of the ship. "Major repairs" refers to repairs affecting the tightness of watertight boundaries.

2 Testing procedures of watertight compartments are to be carried out in accordance with **Chapter 3, Annex 2.1.5 "Testing Procedures of Watertight Compartments"** for ships not subject to *SOLAS Convention*.

### An3.2 Application

#### An3.2.1 Application

1 Testing procedures are to be carried out in accordance with the requirements of **Chapter 1** of this Annex in association with the following alternative procedures specified in **-2** to **-8** for **An1.4.2-3**.

2 The tank boundaries are to be tested from at least one side. The tanks for structural test are to be selected so that all representative structural members are tested for the expected tension and compression.

3 The requirements given in **Table An1.4-1** of **Chapter 1** for structurally testing tanks at 2.4 m above the top of the tank do not apply. Instead, the minimum test pressure for structural testing is to be taken as  $0.3D + 0.76$  m above the top of the tank where the top of the tank is the deck forming the top of the tank, excluding any hatchways and  $D$  is the depth of the ship. The minimum test pressure need not be taken greater than 2.4 m above the top of the tank.

4 Structural tests are to be carried out for at least one tank of a group of tanks having structural similarity (i.e. same design conditions, alike structural configurations with only minor localised differences determined to be acceptable by the attending Surveyor) on each vessel provided all other tanks are tested for leaks by an air test. The acceptance of leak testing using an air test instead of a structural test does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships.

5 Additional tanks may require structural testing if found necessary after the structural testing of the first tank.

6 For tanks which are less than  $2\text{ m}^3$  in volume, structural testing may be replaced by leak testing.

7 Where the structural adequacy of the tanks and spaces of a vessel were verified by the structural testing required by either **Chapter 1** or **-4** above, subsequent vessels in the series (i.e. sister ships built from the same plans at the same shipyard) may be exempted from structural testing of tanks, provided that:

- (1) Water-tightness of boundaries of all tanks and spaces are verified by leak tests and thorough inspections are carried out.
- (2) Structural testing is carried out for at least one tank or space among all tanks/spaces of each sister vessel.
- (3) Additional tanks and spaces may require structural testing if found necessary after the structural testing of the first tank or if deemed necessary by the attending Surveyor.

For cargo space boundaries adjacent to other compartments in tankers and combination carriers or boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships, structural tests are to be carried out for at least one tank of a group of tanks having structural similarity (i.e. same design conditions, alike structural configurations with only minor localised differences determined to be acceptable by the attending Surveyor) on each vessel provided all other tanks are tested for leaks by an air test.

8 Sister ships built (i.e. keel laid) two years or more after the delivery of the last ship of the series, may be tested in accordance with **-7** above at the discretion of the Society, provided that:

- (1) General workmanship has been maintained (i.e. there has been no discontinuity of shipbuilding or significant changes in the construction methodology or technology at the yard, shipyard personnel are appropriately qualified and demonstrate an adequate level of workmanship as determined by the Society) and:

- (2) An NDT plan is implemented and evaluated by the Society for the tanks not subject to structural tests. Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. The work is to be carried out in accordance with the Rules and under survey of the Society.

## Annex 2.3.1-1 TEST OF SHIP MANOEUVRABILITY

### An1 Guidance for the Test of Ship Manoeuvrability

#### An1.1 General Requirements

##### An1.1.1 Terminology

- 1 Length of ship is the distance defined in [2.1.2, Part A of the Rules](#).
- 2 Midship point of ship is the point on the centre line of a ship at the midway of the length of ship.
- 3 Fore draught ( $T_f$ ) is the draught at the forward perpendicular.
- 4 Aft draught ( $T_a$ ) is the draught at the aft perpendicular.
- 5 Mean draught ( $T_m$ ) is defined as  $T_m = (T_f + T_a)/2$ .
- 6 Trim ( $\tau$ ) is defined as  $\tau = (T_a - T_f)$ .
- 7  $\Delta$  is the full load displacement of the ship (*tonnes*).
- 8 Standard conditions are the ship conditions that satisfy the requirements in [An 1.2.1-1\(1\)](#) and [An 1.2.1-2\(1\)](#).
- 9 The test speed is the ship speed that is required to perform the tests of ship manoeuvrability specified in this Guidance. This speed is to be a speed of at least 90% of the ship speed corresponding to not less than 95% of the maximum continuous revolutions of the main engine.

(Note) In *IMO Res. MSC. 137 (76)*, the test speed is defined as a speed of at least 90% of the ship speed corresponding to 85% of the maximum engine output.

10 Advance (used in the turning test) is the distance travelled in the direction of the original course by the midship point from the position where the rudder order is given, to the position where the heading has changed 90 *degrees* from the original course.

11 Tactical diameter (used in the turning test) is the distance travelled by the midship point from the position where the rudder order is given to the position where the heading has changed 180 *degrees* from the original course. It is measured in the direction perpendicular to the original heading of the ship.

12 Transfer (used in the turning test) is the distance travelled by the midship point from the position where the rudder order is given to the position where the heading has changed 90 *degrees* from the original course. It is measured in the direction perpendicular to the original heading of the ship.

13 Overshoot angle is the additional heading deviation experienced by the ship after the rudder angle change is executed the second or third time in the zigzag test. See [Fig. An1.4.5](#).

14 Track reach (used in the stopping test) is the distance along the path described by the midship point measured from the position where the order for full astern is given to the position where the ship stops in the water.

15 Stopping distance (used in the stopping test) is the distance travelled by the midship point from the position where the order for full astern is given, to the position where the ship stops in the water. It is measured in the direction of the original heading of the ship.

16 Lateral deviation (used in the stopping test) is the distance travelled by the midship point measured from the position where the order for full astern is given, to the position where the ship stops in the water. It is measured in the direction perpendicular to the original heading of the ship.

#### An1.2 Test Conditions

##### An1.2.1 Condition of Ship

###### 1 Loaded Condition

- (1) Unless specified otherwise, tests of ship manoeuvrability are to be carried out in full load condition. "Full load condition" referred to in this Guidance means that the ship is loaded to within 5% of the full load draught.

- (2) Notwithstanding (1), where the tests of ship manoeuvrability cannot be carried out in full load condition, these tests may be carried out in an appropriately loaded condition such as ballast condition. However, these tests should be carried out as close to full load condition as possible.

## 2 Trim Condition

- (1) Unless specified otherwise, tests of ship manoeuvrability are to be carried out in even trim condition. “Even trim condition” referred to in this Guidance means that the ship’s trim is within 5% of the full load draught from even keel.
- (2) Notwithstanding (1), where the tests of ship manoeuvrability cannot be carried out in even trim condition, these tests may be carried out with a deeper aft draught in order to fully submerge the propeller.

### An1.2.2 Sea Area for Testing

#### 1 Sea Area for Testing

- (1) Tests of ship manoeuvrability are to be carried out preferably in deep, unconfined but sheltered sea. The water depth is to be more than 4 times the mean draught of the ship.

### An1.2.3 Environmental Condition

#### 1 Environmental Condition

- (1) Tests of ship manoeuvrability are to be carried out preferably in the calmest possible weather conditions. The tests should be conducted in conditions preferably within the following limits.
- (a) Winds not exceeding 5 on the Beaufort scale
  - (b) Waves not exceeding a sea state of
  - (c) Uniform current only
  - (d) Visibility good (such as no fog)

## An1.3 Preparation for Tests of Ship Manoeuvrability

### An1.3.1 General

#### 1 Measurement of Ship’s Draught

- (1) Necessary data such as draught of ship and density of sea water are to be measured in order to ascertain the loaded condition and ship’s trim before tests are carried out.
- (2) Values such as displacement, wetted surface area, and block coefficient ( $C_b$ ) are to be determined by the hydrostatic curves or hydrostatic tables from the measurements taken.

## An1.4 Tests of Ship Manoeuvrability

### An1.4.1 General

#### 1 Heading Direction

Where the tests of ship manoeuvrability specified in An 1.4.2 to An 1.4.6 are to be carried out, the ship is preferably to run upwind for the approach.

#### 2 Control of Main Engines

The Engine control setting is to be kept constant during the trial except when it is required to be changed.

#### 3 Test Speed

In order to obtain a stable test speed as defined in An 1.1.1-9, the ship is to maintain a straight course for at least 2 minutes preceding the test by keeping the main engine constant and the rudder at a minimum angle.

#### 4 Pre-test Measurements

- (1) The following items are to be measured before the tests specified in An 1.4.2 to An 1.4.6 are carried out.
- (a) Environmental conditions (Wind: wind is measured by a wind indicator; Wave: wave height, wave period and wave direction are measured by visual observation; and Current: current estimated by a tide table if available may be used)
  - (b) Ship conditions (draught, trim and displacement corresponding to the draught)
- However, where the ship condition has not changed from when the measurements were taken in An 1.3.1-1 or is capable of being calculated from factors such as fuel and water consumption, measurement of the ship condition may be dispensed

with.

- (c) Water depth of the sea area where tests are conducted

#### **An1.4.2 Turning Test**

##### **1 General**

- (1) The turning test is a test to verify the ship's turning ability.
- (2) This test includes both the right turning test and left turning test.

##### **2 Testing Method**

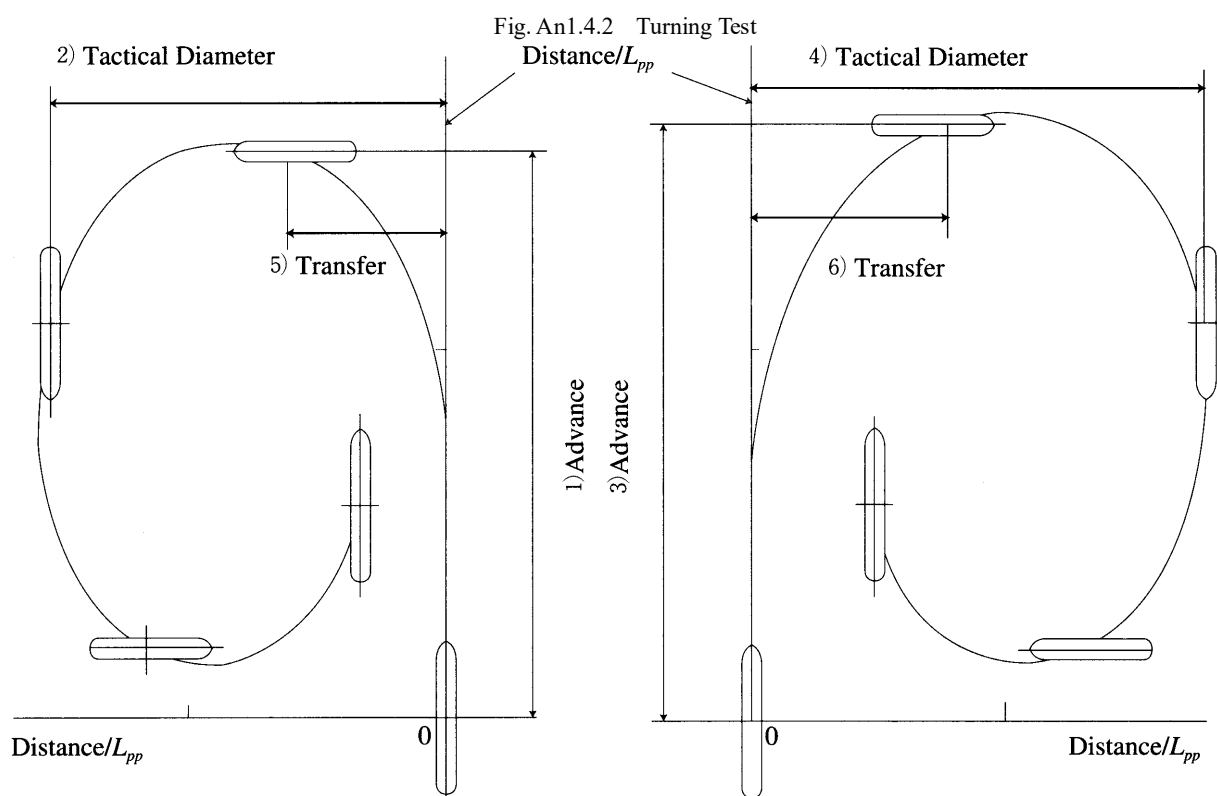
- (1) While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle (this angle need not exceed 35 *degrees*). The rudder angle is kept until the ship turns 360 *degrees*.
- (2) Where deemed necessary as a result of considering the effects of wind, waves or currents; the turning test may be continued until the ship turns 720 *degrees*.

##### **3 Measurement Method**

- (1) The ship speed and/or turning rate as well as the elapsed time are measured when the heading angle reaches 0, 5, 15, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, and 360 *degrees*.
- (2) Where the ship continues for a 720-*degree* turn, the measurements specified in (1) are taken every 30 *degrees* after the 360-*degree* turn is made.
- (3) Where a differential global positioning system (hereinafter referred to as "DGPS") or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position, ship speed and elapsed time at each heading angle are measured.

##### **4 Measurement Items and Report**

- (1) The following items are to be measured. (See [Fig. An 1.4.2](#))
  - (a) Ship speed at the beginning and the end of the test
  - (b) Advance (1) and (3) in the Figure), tactical diameter (2) and (4) in the Figure) and transfer (5) and (6) in the Figure)  
Where the ship continues for a 720-*degree* turn, the advance, tactical diameter and transfer of the first and second turns are to be measured separately.
  - (c) The elapsed time for the ship to turn 360 *degrees* (where the ship continues on for a 720-*degree* turn, separate times for each 360-*degree* turn)
  - (d) Number of main engine revolutions at the beginning and the end of the test
- (2) A figure indicating the ship track as shown in [Fig. An 1.4.2](#) and the measurement items specified in (1) are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship-lengths.



### An1.4.3 Stopping Test

#### 1 General

The stopping test is a test to verify the ship's stopping ability.

#### 2 Testing Method

- (1) While the ship is running ahead at test speed, an order for full astern is issued, and the reversing operation from ahead run to full astern run is carried out as soon as possible. The test is continued until the speed of the ship against the water has become 0.

- (2) The rudder is to be kept at the mid position during the test.

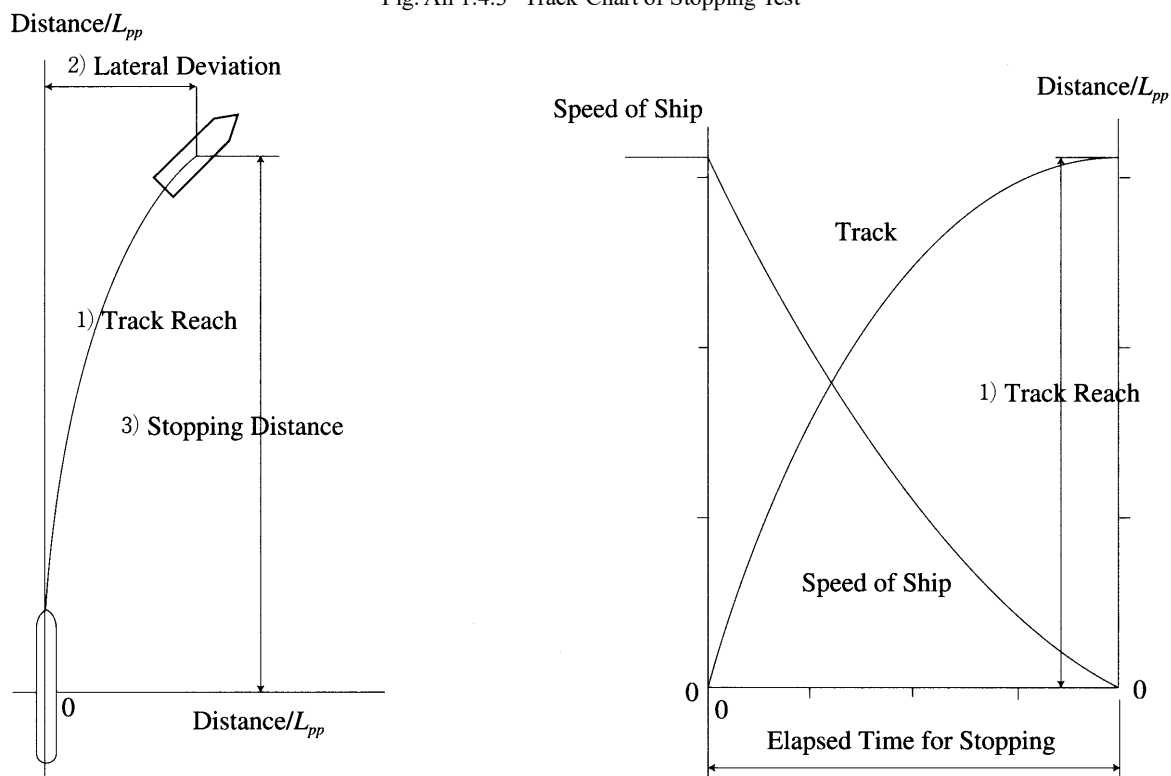
#### 3 Measurement Method

- (1) The ship speed, heading angle and the ship track are to be measured at constant intervals.
- (2) Where a DGPS or doppler log is used for the measurement, this equipment is to be appropriately calibrated, and the ship's position and ship speed are to be measured at constant intervals.

#### 4 Measurement Items and Report

- (1) The following items are to be measured. (See Fig. An1.4.3)
  - (a) Ship speed at the beginning of the test
  - (b) Number of main engine revolutions at the beginning, at the time when the full astern is ordered, and at the end of the test
  - (c) Track reach (1) in the Figure), stopping distance (3) in the Figure), lateral deviation (2) in the Figure) and change of ship speed at constant intervals
  - (d) The elapsed time for the ship to stop after the full astern order
- (2) A figure indicating the ship track as shown in Fig. An1.4.3 and the measurement items specified in (1) are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship-lengths.

Fig. An 1.4.3 Track Chart of Stopping Test



#### An1.4.4 Initial Turning Test

##### 1 General

- (1) The initial turning test is a test to verify the ship's initial turning ability.
- (2) This test includes both right turning and left turning tests.
- (3) This test may be conducted at the 10/10-degrees zigzag test specified in [An 1.4.5](#).

##### 2 Testing Method

- (1) While the ship is running ahead at test speed, the rudder angle is changed 10 degrees to one side. This rudder angle is kept until the ship turns 10 degrees from the original course.
- (2) Where this test is conducted as part of the 10/10-degrees zigzag test, the testing method is to be in accordance with [An 1.4.5](#).

##### 3 Measurement Method

- (1) The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled by the ship to change its heading to 10 degrees from the original course.
- (2) Where a DGPS or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position and speed are to be measured at constant intervals.

##### 4 Measurement Items and Report

- (1) The following items are to be measured. (See [Fig. An1.4.5](#))
  - (a) Ship speed at the beginning and the end of the test
  - (b) Number of main engine revolutions at the beginning and the end of the test
  - (c) Travelling distance from the original course
  - (d) The elapsed time ( $t_{a1}$  in [Fig. An1.4.5](#)) for the ship's heading angle to change 10 degrees from the original course.
- (2) A figure indicating the ship track as shown in [Fig. An1.4.5](#) and measurement items specified in (1) above are to be reported in the results of the sea trial. However, where this test is conducted as a part of the 10/10-degree zigzag test specified in [An1.4.5](#), this figure indicating the ship track may be dispensed with.

#### An1.4.5 Zigzag Test

##### 1 General

- (1) The zigzag test is a test to verify the ship's yaw checking and course keeping ability.
- (2) This test includes both right turning and left turning tests.

- (3) This test consists of the 10/10-*degrees* zigzag test and the 20/20-*degrees* zigzag test.

## 2 Testing Method

- (1) The 10/10-*degrees* zigzag test

The 10/10-*degrees* zigzag test is carried out as follows:

- (a) While the ship is running ahead at test speed, the rudder angle is changed to 10 *degrees* starboard (or port).
- (b) When the ship's heading reaches 10 *degrees* starboard (or port) from the original course, the rudder angle is changed to 10 *degrees* port (or starboard).
- (c) When the ship's heading reaches 10 *degrees* port (or starboard) from the original course, the rudder angle is changed to 10 *degrees* starboard (or port).
- (d) The ship is returned to its original course.

- (2) The 20/20-*degrees* zigzag test

The 20/20-*degrees* zigzag test is carried out as follows:

- (a) While the ship is running ahead at test speed, the rudder angle is changed to 20 *degrees* starboard (or port).
- (b) When the ship's heading reaches 20 *degrees* to starboard (or port) from the original course, the rudder angle is changed to 20 *degrees* port (or starboard).
- (c) The ship is returned to its original course.

## 3 Measurement Method

- (1) The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled for the ship to change its heading to 10 *degrees* from the original course.
- (2) Where a DGPS or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position and speed are to be measured at constant intervals.

## 4 Measurement Items and Report

- (1) The following items for the 10/10-*degrees* zigzag test are to be measured. (See [Fig. An1.4.5](#))

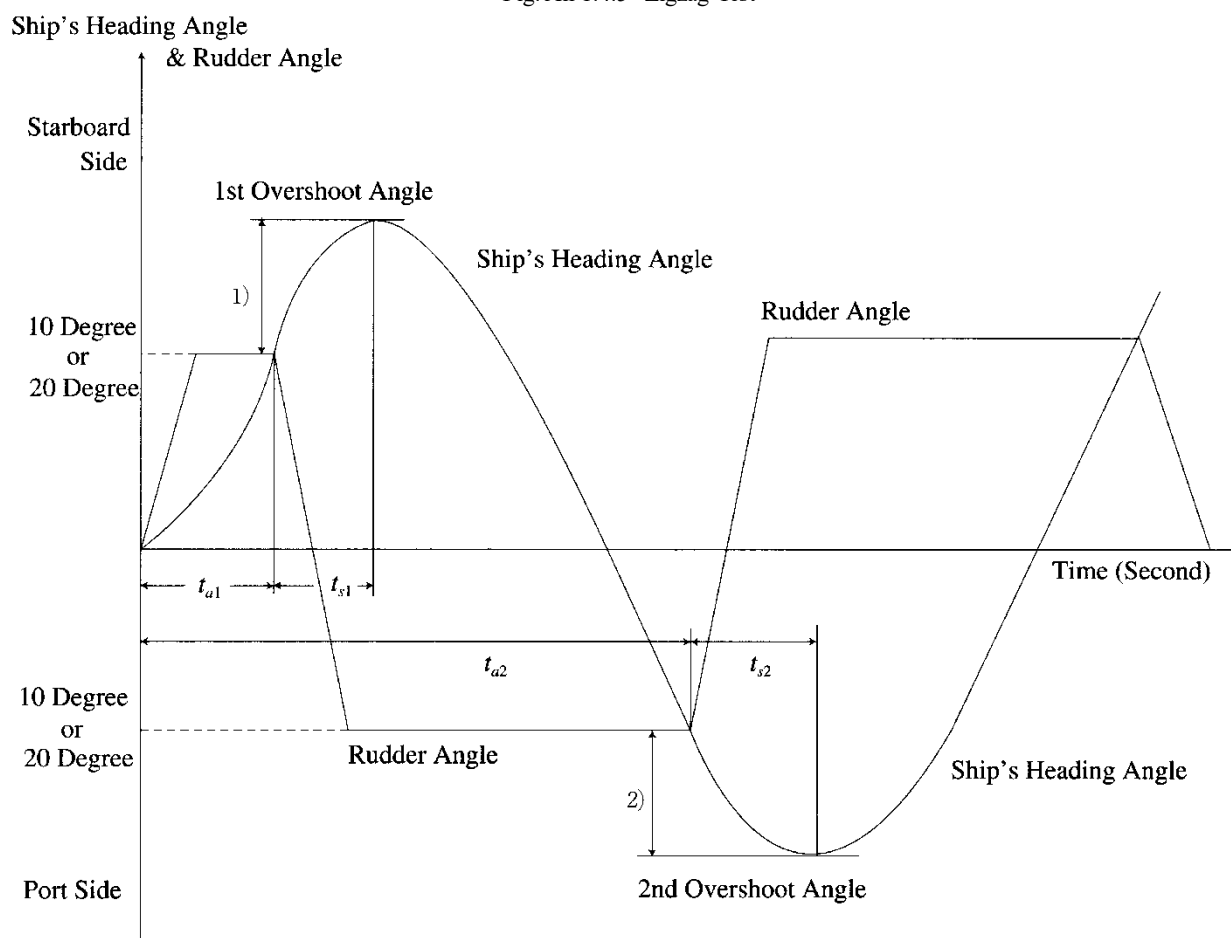
- (a) Ship speed at the beginning and the end of the test
- (b) Number of main engine revolutions at the beginning and the end of the test
- (c) Elapsed time ( $t_{a1}$  and  $t_{a2}$  in the Figure) and distance travelled for the ship to change its heading to 10 *degrees* from the original course
- (d) 1st overshoot angle (1) in the Figure)
- (e) Elapsed time ( $t_{s1}$  and  $t_{s2}$  in the Figure) from when the ship overshoots the 10 *degree* heading until when the ship starts turning in the opposite direction.
- (f) 2nd overshoot angle (2) in the Figure)

- (2) In the 20/20-*degrees* zigzag test, measurement items specified in (1) are to be read 20-*degrees* instead of 10-*degrees*, except (1)(f).

- (3) A figure indicating the time history of rudder angle and ship's heading as shown in [Fig. An1.4.5](#) and measurement items specified in (1) and (2) are to be reported in the results of the sea trial.



Fig. An 1.4.5 Zigzag Test

**An1.4.6 Other Manoeuvrability Tests****1 Other Manoeuvrability Tests**

When other manoeuvrability tests as shown in [An 5](#) "Other Manoeuvring Tests" are carried out, test items and their result are to be reported in the results of the sea trial.

**An1.4.7 Correction****1 Correction**

- (1) Where the manoeuvrability tests specified in [An 1.4.2](#) to [An 1.4.6](#) are not carried out under standard conditions, test results may be corrected to those corresponding to the standard conditions using the correcting method specified in [An 4](#).
- (2) Where deemed necessary, the results may be corrected by an appropriate method considering the effects of wind, waves or currents. For correction of the results of the turning test, a standard correcting method is shown in [An 4](#).
- (3) For correction of the results of tests other than turning tests, the results are to be corrected by appropriate methods such as computer calculation using a mathematical model, model experiments, and by using sufficient data of similar ships. The outline of each method is shown in [An 3](#).
- (4) Where the test results are corrected, corrected results are to be reported in the results of the sea trial together with the correction method used.

**An1.5 Equipment for Measurement and Record-keeping****An1.5.1 Equipment for Measurement****1 General**

- (1) In general, the following equipment is to be used for the measurement of the manoeuvring tests unless otherwise specified by the Society.
  - (a) Clock

- (b) Gyro-compass
  - (c) Indicator of rate of turn
  - (d) Speed Indicator
  - (e) Indicator of positioning (DGPS, doppler log, etc.)
  - (f) Rudder angle indicator
  - (g) Propeller revolution indicator
  - (h) Indicator of propeller pitch
  - (i) Wind meter
- (2) The equipment specified in **(1)** above is to be capable of measuring as continuously as possible. Where a measurement can be taken at least once every 20 *seconds*, the Society may consider this within the scope of continuous measurement.
- (3) The equipment specified in **(1)** above is to have adequate accuracy. Navigational equipment approved by the Administration for measurement may be considered to have adequate accuracy by the Society.

#### **An1.5.2 Record-keeping**

##### **1 Records**

Measured data is to be recorded continuously and kept available for when requested.

## An2 Standards for Ship Manoeuvrability

### An2.1 Scope

#### An2.1.1 General

1 This requirement is based upon *IMO Res. MSC. 137(76)* “STANDARDS FOR SHIP MANOEUVRABILITY” adopted on 4 December 2002.

2 Standards for ship manoeuvrability shown in this Appendix are based on the standard conditions defined in [An 1.1.1-8](#).

3 Standards for ship manoeuvrability shown in this requirement are for ships carrying dangerous chemicals in bulk, ships carrying liquefied gasses in bulk and ships of not less than 100 *m* in length.

### An2.2 Standards for Ship Manoeuvrability

#### An2.2.1 Turning Ability

The tactical diameter is not to exceed  $5L$ .

The advance is not to exceed  $4.5L$ .

#### An2.2.2 Stopping Ability

The track reach is not to exceed  $15L$ . However, this value may be modified by the Administration where ships of large displacement make this criterion impracticable, but should in no case exceed 20 ship lengths.

#### An2.2.3 Initial Turning Ability

Travelling distance is not to exceed  $2.5L$ .

#### An2.2.4 Yaw Checking and Course Keeping Ability

1 The Overshoot angle for the 10/10-*degrees* zigzag test is not to exceed the value shown in [Table An 2.2.4](#).

2 The 1st Overshoot angle for the 20/20-*degrees* zigzag test is not to exceed 25 *degrees*.

Table An 2.2.4 Maximum Value of the Overshoot Angle for the 10/10-*degrees* Zigzag Test

$L/V$	$<10s$	$10s \leq L/V < 30s$	$\geq 30s$
1st Overshoot Angle	10 <i>degrees</i>	$\{5+(L/V)/2\}$ <i>degrees</i>	20 <i>degrees</i>
2nd Overshoot Angle	25 <i>degrees</i>	$\{17.5+0.75(L/V)\}$ <i>degrees</i>	40 <i>degrees</i>

Note:

(1) The following designations are used.

$L$  : length of ship (*m*)

$V$  : test speed (*m/s*)

## **An3 Prediction of Ship Manoeuvrability by Model Tests and Computer Calculation Using Mathematical Model**

### **An3.1 Scope**

#### **An3.1.1 General**

1 This Appendix gives the outline of the prediction of ship manoeuvrability by model tests and computer calculation using mathematical models.

2 The prediction method for ship manoeuvrability by model tests and computer calculation using mathematical models is to be submitted to the Society in order to demonstrate the effectiveness and accuracy.

### **An3.2 Prediction Method**

#### **An3.2.1 General**

The prediction method of ship manoeuvrability may be based on the following (1) to (4).

- (1) Method based upon experience and existing data, assuming that the manoeuvring characteristics of the new ship will be close to those of similar existing ships
- (2) Method based upon the results from model tests
- (3) Method based upon the prediction by computer calculation using mathematical models
- (4) Method combining (1) to (3)

### **An3.3 Prediction Method based upon the Results from Model Tests**

#### **An3.3.1 General**

- 1 The model tests are to incorporate the standard conditions of the full scale ship as defined in [An 1.1.1-8](#).
- 2 Scale effects are to be considered by an appropriate means.
- 3 The ship manoeuvrability predicted by the model test is to be verified partly or wholly by a full scale test.
- 4 Model tests include manoeuvring tests with a free-running model and a captive model.

#### **An3.3.2 Manoeuvring Test with Free-running Model**

The manoeuvring test with a free-running model is a model test that is conducted in a large-sized rectangular tank, a wide towing tank or a still lake, using a model to imitate the manoeuvres performed by a full scale ship in order to predict the manoeuvring characteristics either directly or by considering scaled effects.

#### **An3.3.3 Manoeuvring Test with Captive Model**

The manoeuvring test with a captive model is a model test that is conducted in a towing tank or circulated tank using a Planar Motion Mechanism (PMM) system capable of producing any kind of motion by combining static or oscillatory mode of drift and yaw to move a captive model. Factors such as the hydrodynamic forces acting on the ship, rudder force, and propeller thrust are measured and the coefficients necessary for the computer calculation specified in [An 3.4](#) are obtained. However, the manoeuvring characteristics of the ship cannot be predicted directly from this test.

### **An3.4 Computer Calculation by Using Mathematical Models**

#### **An3.4.1 General**

1 A mathematical model is an equation of motion derived from mechanically analysing the manoeuvring motion of the ship. By incorporating the coefficients (obtained from the manoeuvring test with captive model specified in [An 3.3.3](#)) into the mathematical model, the manoeuvring characteristics can be predicted by making computer calculations with the equation of motion

2 Where the manoeuvring characteristics are predicted by using computer calculations with the mathematical model, the

mathematical method, calculation method, and relevant information are to be submitted to the Society.

**3** The manoeuvring characteristics predicted by using computer calculations with the mathematical model are to be verified partly or wholly by full scale tests or the manoeuvring test with free-running model specified in [An 3.3.2](#).

## An4 Correcting Method of Manoeuvring Test

### An4.1 Scope

#### An4.1.1 General

This requirement shows the standard method for correcting the results of tests not carried out in the standard conditions defined in [An 1.1.1-8](#) and the standard approach to incorporating the effects of environmental conditions.

### An4.2 Correcting Method

#### An4.2.1 Loading Condition

##### 1 General

Where the manoeuvring tests are carried out in non-standard conditions, the manoeuvring characteristics under standard conditions can be estimated by the following methods.

##### 2 Method 1

From the test results of the non-standard condition and the correlation between the results of the standard and non-standard conditions determined by model tests or numerical simulation using the mathematical model, the manoeuvring characteristics in the standard condition of the full scale ship can be estimated by using the following formula.

$$R = T \cdot F/B$$

Where,

$B$  : Estimated manoeuvring characteristics during the sea trial based on the model test or numerical simulation using the mathematical model

$F$  : Estimated manoeuvring characteristics in standard conditions based on the model test or numerical simulation using the mathematical model

$T$  : Manoeuvring characteristics measured during the sea trial

$R$  : Manoeuvring characteristics of the ship in standard conditions

##### 3 Method 2

The manoeuvring characteristics of the ship in the sea trial are estimated by numerical simulation using the mathematical model and the estimates are checked with the actual results of the sea trial in order to ascertain their degree of accuracy. The manoeuvring characteristics of standard conditions may be obtained by means of the same method using the mathematical model.

#### An4.2.2 Environmental Conditions

##### 1 General

- (1) Ship manoeuvrability can be significantly affected by the immediate environmental such as wind, waves and currents. The test results are to be corrected by a suitable method.
- (2) In this section, the correcting method for the results of the turning test under uniform wind, wave, and current conditions is shown.
- (3) The results of tests other than the turning test are to be corrected by a suitable method considering the direction of the wind, waves, and current.

##### 2 Correcting method for the results of the turning test

- (1) In order to have enough data to correct the results of the turning test, the ship is to complete at least a 720-degree turn during the turning test. (See [Fig. An4.2.2](#)) The ship's track, heading and the elapsed time are to be recorded during the turning test. The data obtained after the ship's heading changes 180 degrees is used to estimate magnitude and directions of the current.
- (2) If the results of the turning tests are as shown in [Fig. An4.2.2](#) due to the effect of wind and current, the following correcting method may be applied.
  - (a) Where the position  $(X_{1i}, Y_{1i})$  of the ship measured at the heading of  $i$  degree(s) during the first 360-degree turn changes to position  $(X_{2i}, Y_{2i})$  measured at the heading of  $i$  degree(s) during the second 360-degree turn, the local current velocity

$V_i$  for any two corresponding positions is defined as follows:

$$V_i = (X_{2i} - X_{1i}, Y_{2i} - Y_{1i}) / (t_{2i} - t_{1i})$$

- (b) Mean velocity  $V_c$  is obtained from the following by calculating at each point.

$$V_c = \frac{1}{n} \sum_{i=1}^n V_i$$

The above vector  $V_c$  includes the effects of wind and waves.

- (c) All trajectories obtained from the turning test are corrected by using vector  $V_c$  as follows:

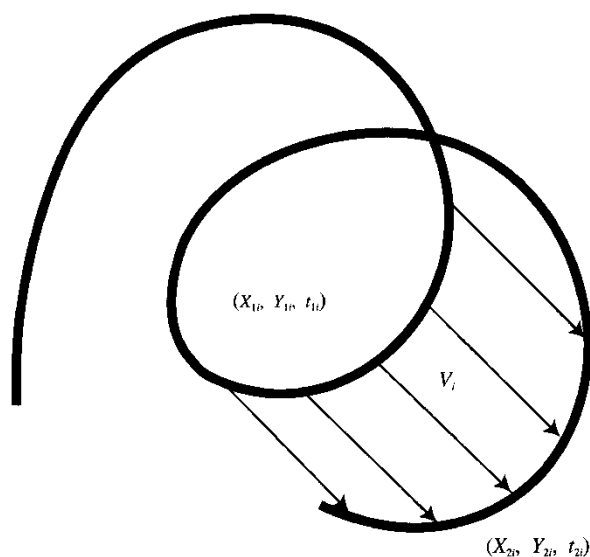
$$X'(t) = X(t) - V_c \cdot t$$

Where,

$X(t)$  is the measured position vector

$X'(t)$  is the corrected position vector

Fig. An4.2.2 Trajectory Obtained from the Turning Test



## An5 Other Manoeuvring Tests

### An5.1 Scope

#### An5.1.1 General

1 This requirement shows standard manoeuvring tests that supplement the tests specified in [An 1](#). Where the ship is found to have instability when changing or keeping course, these tests may be conducted in addition in order to investigate ship manoeuvrability in more detail.

2 Where the manoeuvring tests specified in this requirements are conducted, the test results are to be reported to the Society.

### An5.2 Tests

#### An5.2.1 General

1 Spiral manoeuvres test, pull out manoeuvres test, and modified zigzag test are shown in this requirement as supplementary tests.

#### An5.2.2 Spiral Manoeuvre Test

##### 1 General

- (1) The spiral manoeuvring test is a test to verify the ship's course keeping ability by using the unstable loop width obtained from the yaw rate - rudder angle curve shown in [Fig. An5.2.2](#).
- (2) The spiral manoeuvring test includes the direct spiral manoeuvre test, reversed spiral manoeuvre test, and simplified spiral manoeuvre test.

##### 2 Direct Spiral Manoeuvre Test

###### (1) Testing Method

While the ship is running ahead at test speed, the rudder angle is changed to 15 *degrees* starboard (or port) and held until the yaw rate remains constant for approximately one minute. The rudder angle is then decreased in 5 *degrees* increments, and is held at each increment until a constant yaw rate is obtained.

###### (2) Measurement Method

At each rudder angle, the ship speed and yaw rate are measured.

###### (3) Measurement Items and Report

(a) The following items are to be measured.

- i) Rudder angle
- ii) Ship speed and yaw rate at each rudder angle
- iii) Elapsed time for until the yaw rate becomes steady state after the ship is steered.

(b) The yaw rate - rudder angle curve as shown in [Fig. An5.2.2](#) and the measurement items specified in (a) are to be reported in the results of the sea trials.

##### 3 Reversed Spiral Manoeuvre Test

###### (1) Testing method

While the ship is running ahead at test speed, the rudder angle is changed to over 15 *degrees* starboard (or port) and held until a constant yaw rate is obtained. A new yaw rate is then selected and the rudder angle is changed accordingly (lesser angle) causing the ship to ease out of the turn slightly. This is repeated until 15 *degrees* port (or starboard) is attained. The mean rudder angle required to produce this yaw rate is measured, and the yaw rate - angle curve is created as shown in [Fig. An5.2.2](#).

###### (2) Measurement Method

At each specific yaw rate, ship speed and rudder angle are measured.

###### (3) Measurement Items and Report

(a) The following items are to be measured.

- i) Yaw rate
- ii) Ship speed and rudder angle at each yaw rate



- (b) The yaw rate - rudder angle curve as shown in [Fig. An5.2.2](#) and the measurement items specified in (a) are to be reported in the results of the sea trials.

#### 4 Simplified Spiral Manoeuvre Test

##### (1) Testing method

While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle until a constant yaw rate is obtained. The rudder angle is then brought to zero until the yaw rate returns to zero. If the ship returns to zero yaw rate, the ship is stable and the test may be terminated. If the ship does not return to zero yaw rate, the ship is steered to a half of the following angles in the opposite direction until the yaw rate stabilizes at zero.

- (a)  $L/V < 9s$  0 degrees  
 (b)  $9 \leq L/V < 45s$   $\{-3 + 1/3 \cdot (L/V)\}$  degrees  
 (c)  $L/V \geq 45s$  12 degrees

##### (2) Measurement Method

Yaw rate, ship speed and rudder angle are measured.

##### (3) Measurement Items and Report

- (a) The following items are to be measured.
- Yaw rate, maximum rudder angle, and ship speed when a constant yaw rate is obtained at the maximum rudder angle
  - Ship speed and yaw rate when the rudder is returned to the neutral position
  - Time taken to achieve a constant yaw rate after the rudder is returned to the neutral position
  - Yaw rate, rudder angle, and ship speed for ships requiring steering in the opposite direction
- (b) The yaw rate / rudder angle relation curve and the measurement items specified in (a) are to be reported in the results of the sea trials.

#### An5.2.3 Pull out Manoeuvre Test

##### 1 Testing method

After the turning test is completed, the rudder angle is returned to zero *degrees*, and held until a steady yaw rate is obtained.

##### 2 Measurement Method

Yaw rate and ship speed are measured at constant intervals.

##### 3 Measurement Items and Report

- (1) The following items are to be measured.
- Yaw rate at constant intervals
  - Ship speed and rudder angle
- (2) The yaw rate time history curve as shown in [Fig. An5.2.3](#) and the measurement items specified in (1) are to be reported in the results of the sea trials.

#### An5.2.4 Modified Zigzag Test

The modified zigzag test is a modified version of the 10/10-*degrees* zigzag test and 20/20-*degrees* zigzag test specified in [An 1](#) that is conducted at 10/20-*degrees*. The testing method and measurement items are to be in accordance with [An 1.4.5](#).

Fig. An5.2.2 Spiral Manoeuvre Test

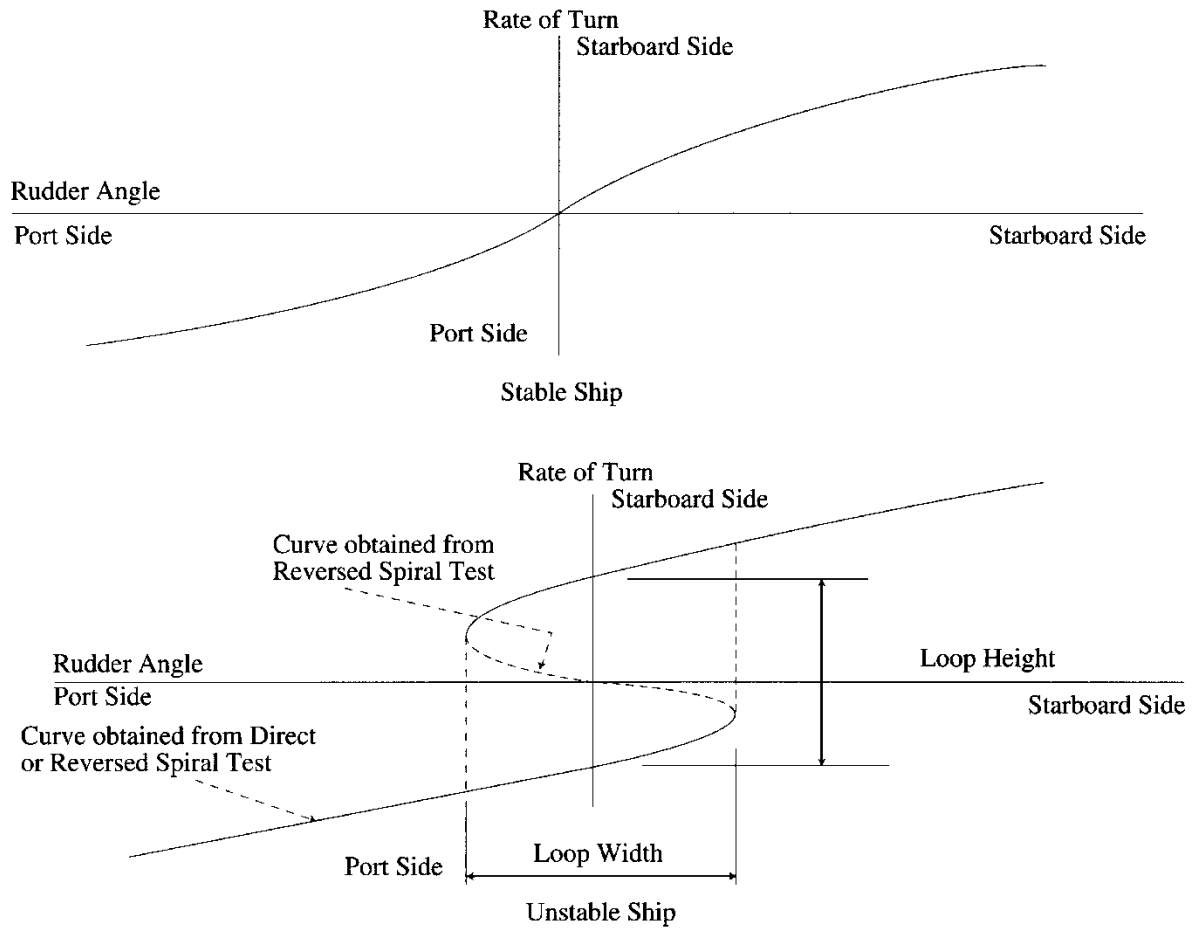
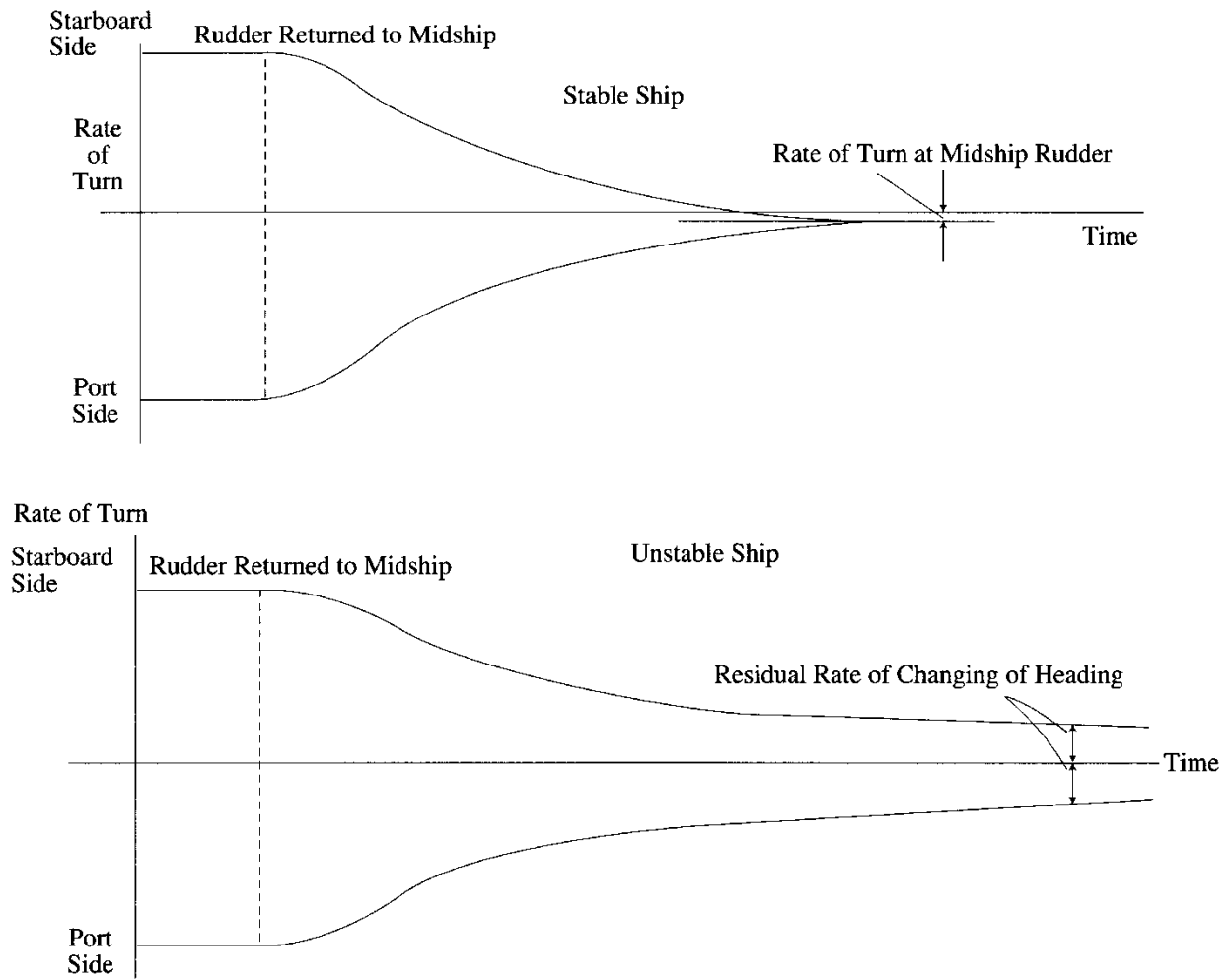


Fig. An5.2.3 Pull out Manoeuvre Test



## Annex 2.3.1-2 PROCEDURES FOR ON BOARD NOISE MEASUREMENTS

### Chapter 1 GENERAL

#### An1.1 General

##### An1.1.1 General

1 This Annex is based on the mandatory requirements specified in the *Code on Noise Levels on Board Ships* adopted by IMO Res. MSC.337(91) (hereinafter, referred to as “the Code”).

2 In addition to the requirements in this annex, recommendatory requirements are stipulated in the Code.

##### An1.1.2 Scope

1 This Annex applies to ships of 1,600 *gross tonnage* and upward engaged on international voyages, except in cases where specified by the Administration.

2 Notwithstanding the requirement specified in -1 above, this Annex does not apply to the following ships:

- (1) Fishing vessels
- (2) Pipe-laying barges
- (3) Crane barge
- (4) Mobile offshore drilling units
- (5) Ships not propelled by mechanical means
- (6) Pile driving vessels
- (7) Dredgers

3 In the case of repairs, alterations and modifications of a major character and outfitting related thereto of existing ships, it is to be ensured that areas in which changes have been made are to meet the requirements of this Annex.

4 This Annex does not apply to passenger cabins and other passenger spaces, except in so far as they are work spaces and are covered by the provisions of this Annex. Passenger spaces where they are also occupied by crew such as recreation rooms and open recreation areas are to be considered as “other passenger spaces”, and therefore are not subject to this Annex. However, bulkhead and decks of crew cabins and hospitals adjacent to such rooms/areas are to have the weighted sound reduction index ( $R_w$ ) in compliance with [An 5.1.1-1](#).

5 This Annex covers only noise sources related to the ship such as machinery and propulsion, but does not include wind, wave, ice noise, alarms and public address systems, etc.

##### An1.1.3 Dispensation

1 In cases where the requirements in this Annex cannot be complied with and the dispensation from certain requirements is granted by the Administration, the requirements in this Annex need not be satisfied.

2 For ships designed for and employed on voyages of short duration, or on other services involving short periods of operation of the ship, to the satisfaction of the Administration, the noise level limits for accommodation spaces and service spaces in [Table An 4.1](#) may be applied only with the ship in the port condition.

#### An1.2 Definitions

For the purpose of this Annex, the following definitions in -1 to -25 are to apply.

1 *Accommodation spaces* are the spaces used for cabins, offices (for carrying out ship’s business), hospitals, messrooms, recreation rooms (such as lounges, smoke rooms, cinemas, gymnasiums, libraries and hobbies and games rooms) and open recreation areas to be used by seafarers.

2 *A-weighted equivalent continuous sound level  $L_{Aeq}(T)$*  is the A-weighted sound pressure level of a continuous steady sound that,

within a measurement time interval,  $T$ , has the same mean square sound pressure as a sound under consideration which varies with time. It is expressed in decibels  $A$  ( $dB(A)$ ) and is given by the following equation:

$$L_{Aeq,T} = 10 \log \frac{1}{T} \int_0^T \frac{p_a(t)^2}{p_0^2} dt$$

where:  $T$  = measurement time

$p_a(t)$  = A-weighted instantaneous sound pressure

$p_0 = 20 \mu Pa$  (the reference level)

**3** *A-weighted sound pressure level or noise level* is the quantity measured by a sound level meter in which the frequency response is weighted according to the A-weighting curve (see IEC 61672-1).

**4** *C-weighted equivalent continuous sound level*  $L_{Ceq}(T)$  is the C-weighted sound pressure level of a continuous steady sound that within a measurement time interval,  $T$ , has the same mean square sound pressure as a sound under consideration which varies with time. It is expressed in decibels  $C$  ( $dB(C)$ ) and is given by the following equation:

$$L_{Ceq,T} = 10 \log \frac{1}{T} \int_0^T \frac{p_c(t)^2}{p_0^2} dt$$

where:  $T$  = measurement time

$p_c(t)$  = C-weighted instantaneous sound pressure

$p_0 = 20 \mu Pa$  (the reference level)

**5** *C-weighted peak sound level*  $L_{Cpeak}$  is the C-weighted maximum instantaneous sound pressure level. It is expressed in decibels  $C$  ( $dB(C)$ ) and is given by the following equation:

$$L_{Ceq,T} = 10 \log \frac{1}{T} \int_0^T \frac{p_c(t)^2}{p_0^2} dt$$

where:  $P_{peak}$  = C-weighted maximum instantaneous sound pressure

$P_0 = 20 \mu Pa$  (the reference level).

**6** *C-weighted sound pressure level or noise level* is the quantity measured by a sound level meter in which the frequency response is weighted according to the C-weighting curve (see IEC 61672-1 (2002-05)).

**7** *Crane barge* is a vessel with permanently installed cranes designed principally for lifting operations.

**8** *Dredger* is a vessel undertaking operations to excavate bottom sediment, where the vessel has permanently installed excavation equipment.

**9** *Duty stations* are those spaces in which the main navigating equipment, the ship's radio or the emergency source of power are located or where the fire recording or fire control equipment is centralized and also those spaces used for galleys, main pantries, stores (except isolated pantries and lockers), mail and specie rooms, workshops other than those forming part of the machinery spaces and similar such spaces.

**10** *Fishing vessel* is a vessel used commercially for catching fish, whales, seals, walrus or other living resources of the sea.

**11** *Hearing protector* is a device worn to reduce the level of noise reaching the ears. Passive noise-cancelling headsets block noise from reaching the ear. Active noise-cancelling headphones generate a signal that cancels out the ambient noise within the headphone.

**12** *Integrating sound level meter* is a sound level meter designed or adapted to measure the level of the mean squared time averaged A-weighted and C-weighted sound pressure.

**13** *Machinery spaces* are any space which contains steam or internal-combustion machinery, pumps, air compressors, boilers, oil fuel units, major electrical machinery, oil filling stations, thrusters, refrigerating, stabilizing, steering gear, ventilation and air conditioning machinery, etc., and trunks to such spaces.

**14** *Mobile offshore drilling unit* is a vessel capable of engaging in drilling operations for the exploration for, or exploitation of, resources beneath the seabed, such as liquid or gaseous hydrocarbons, sulphur or salt.

**15** *Navigating bridge wings* are those parts of the ship's navigating bridge extending towards the ship's sides.

**16** *Noise* is the all sound which can result in hearing impairment, or which can be harmful to health or be otherwise dangerous or disruptive.

**17** *Noise level*. See A-weighted sound pressure level specified in -3 above.

**18** *Pile driving vessel* is a vessel undertaking operations to install pilings in the seabed.

**19** *Pipe-laying barge* is a vessel specifically constructed for, or used in conjunction with, operations associated with the laying of submarine pipelines.

**20** *Port condition* is the condition in which all machinery solely required for propulsion is stopped.

**21** *Repairs, alterations and modifications of a major character* are means a conversion of a ship which substantially alters the dimensions, carrying capacity or engine power of the ship, which change type of the ship, which otherwise so alters the ship that, if it were a new ship, it would become subject to the relevant provisions.

**22** *Sound* means the energy that is transmitted by pressure waves in air or other materials and is the objective cause of the sensation of hearing.

**23** *Sound pressure level*  $L_p$  is the sound pressure level expressed in decibel (dB), of a sound or noise given by the following equation:

$$L_p = 10 \log \frac{p^2}{p_0^2}$$

where:  $p$  = sound pressure, in Pascal

$p_0 = 20 \mu Pa$  (the reference level).

**24** *Voyages of short duration* is the voyages where the ship is not generally underway for periods long enough for seafarers to require sleep, or long off-duty periods, during the voyages.

**25** *Weighted sound reduction index*,  $R_w$ , is a single number value expressed in decibels (dB) which describes the overall sound insulation performance (in laboratory) of walls, doors or floors provides (see ISO 717-1:1997 as amended by 1:2006).

## Chapter 2 MEASURING EQUIPMENT

### An2.1 Equipment Specifications

#### An2.1.1 Sound Level Meters

Measurement of sound pressure levels is to be carried out using precision integrating sound level meters subject to the requirements of this chapter. Such meters are to be manufactured to *IEC 61672-1*(2002-05) type/class 1 standard as applicable, or to an equivalent standard acceptable to the Society.

#### An2.1.2 Octave Filter Set

An octave filter set is to conform to *IEC 61260* (1995) or an equivalent standard acceptable to the Society.

### An2.2 Use of Equipment

#### An2.2.1 Calibration

Sound calibrators are to comply with *IEC 60942* (2003-01) and are to be approved by the manufacturer of the sound level meter used.

#### An2.2.2 Check of Measuring Instrument and Calibrator

Calibrator and sound level meter (hereinafter referred to as “instruments”) are to be verified at least every two years by a national standard laboratory or a competent laboratory accredited according to *ISO 17025* (2005) as corrected by (Cor 1:2006) in accordance with (1) and (2) below.

- (1) Calibration is to be carried out in accordance with *IEC 61672-3* or the equivalent thereto for sound level meters and *IEC 60942* Appendix B or the equivalent thereto for field calibrators. The edition of the calibration standard is to correspond with the edition of the manufacturing standard for the instruments.
- (2) Measurement companies are to provide documentation about the standards being met if not clearly marked on sound level meters or field calibrators, and such documentation or markings are to include a clear statement of the results of periodic tests and the performance class instruments meet after calibration.

#### An2.2.3 Microphone Wind Screen

A microphone wind screen is to be used when taking readings outside and below deck where there is any substantial air movement. The wind screen is not to affect the measurement level of similar sounds by more than 0.5 *dB(A)* in “no wind” conditions.

## Chapter 3 MEASUREMENT

### An3.1 General

#### An3.1.1 Noise Levels

1 Measurements of the A-weighted equivalent continuous sound level,  $L_{Aeq}(T)$  are to be made for the purpose of ensuring compliance with [Table An 4.1](#).

2 Measurements of the C-weighted equivalent continuous sound level  $L_{Ceq}(T)$  and the C-weighted peak sound level  $L_{Cpeak}$  are to be made in spaces where  $L_{Aeq}(T)$  exceeds 85 dB(A) for the purpose of determining appropriate hearing protection according to the HML method specified in ISO 4869-2:1994.

### An3.2 Personnel Requirements

#### An3.2.1 Personnel Taking Measurements

The person conducting measurements is to have knowledge in the field of noise, sound measurements and the handling of the equipment used as well as training concerning the procedures specified in this Annex.

### An3.3 Measurement Conditions

#### An3.3.1 Operating Conditions at Sea Trials

Measurements are to be carried out under the following conditions specified in the following (1) to (8). The actual conditions during measurement are to be recorded on the noise survey report.

- (1) Measurements are to be taken with the ship in the loaded or ballast condition.
- (2) Measurements are to be taken at a course that is as straight as possible.
- (3) Measurements are to be taken at normal service speed and no less than 80% of the maximum continuous rating (MCR). Controllable pitch and Voith-Schneider propellers, if any, are to be in the normal seagoing position. This does not apply to special ship types and ships with special propulsion and power configurations.
- (4) All machinery, navigation instruments, radio and radar sets, etc., normally in use at normal seagoing condition and levels, including squelch are to operate throughout the measurement period. However, neither energized fog signals nor helicopter operations are to take place during the taking of these measurements.
- (5) Measurements in spaces containing emergency diesel engine driven generators, fire pumps or other emergency equipment that would normally be run only in emergency, or for test purposes, are to be taken with the equipment operating. Measurements are not intended for determining compliance with maximum noise level limits in [Table An4.1](#), but as a reference for personal protection of seafarers carrying out maintenance, repair and test activities in such spaces.
- (6) Mechanical ventilation, heating and air-conditioning equipment are to be in normal operation, taking into account that the capacity is to be in accordance with the design conditions. With respect to the requirement, air conditioning vents are to be kept open during the taking of noise measurements on board, unless they are designed to be kept closed in the normal operating condition.
- (7) In general, doors and windows are to be closed. With respect to the requirement, closing devices of ventilation grilles/louvres of cabin doors are to be kept open during the taking of noise measurements on board, unless they are designed to be kept closed in the normal operating condition.
- (8) Spaces are to be furnished with all necessary equipment. Measurements without soft furnishings may be taken but no allowance is to be made for their absence. Rechecks or follow-up readings may be taken with soft furnishings included.

4 All machinery, navigation instruments, radio and radar sets, etc., normally in use at normal seagoing condition and levels, including squelch are to operate throughout the measurement period. However, neither energized fog signals nor helicopter operations are to take place during the taking of these measurements.



**An3.3.2 Equipment for Long Periods of Use**

1 In cases where stabilizers are provided, measurements are to be taken at positions around such machinery when in operation as well as in adjacent accommodation spaces and duty stations; moreover, such measurements are to be taken to ensure compliance with [Table An 4.1](#). For thrusters, etc. which are intended for short temporary use only, measurements are to be taken for reference at 40% thruster power and the ship's speed is to be appropriate for thruster operation.

2 In the case of ships with Dynamical Positioning (DP), which is intended for use under normal working conditions, additional noise measurements at the DP mode, which would approximate station-holding at or above 40% of maximum thruster power for design environmental conditions that the ship operates in, are to be made at control stations, duty stations, and accommodation spaces to ensure that the maximum noise level limits in these spaces are not exceeded. With respect to the requirement, the wording "40% of maximum thruster power" means exactly "40% of maximum" and does not mean "40% of 80% as required by [An 3.3.1-3](#)".

**An3.3.3 Operating Conditions in Port**

Measurements are to be taken in machinery spaces with the machinery operating in the port condition.

**An3.3.4 Environmental Conditions**

1 In cases where the water depth is less than five times the draught or if there are large reflecting surfaces in the ship's vicinity, such conditions are to be noted in the noise survey report.

2 Meteorological conditions such as wind and rain as well as sea state are to be such that they do not influence the measurements. Wind force 4 and 1 m wave height should not be exceeded. If this cannot be achieved, the actual conditions are to be reported.

3 Care is to be taken to see that noise from extraneous sound sources does not influence the noise level on board the ship at the positions of measurement. If necessary, measured values may be corrected for steady state background noise according to the energy summation principle.

**An3.3.5 Measurement Procedures**

1 During noise level measurements, only seafarers necessary for the operation of the ship and persons taking the measurements are to be present in the space concerned.

2 Sound pressure level readings are to be taken in decibels using an A-weighting ( $dB(A)$ ) and/or C-weighting ( $dB(C)$ ) filter and if necessary also in octave bands between 31.5 and 8,000 Hz.

3 The noise level measurements are to be taken over a time period until stable readings are found or at least 15 seconds.

4 Readings are to be made only to the nearest decibel. If first decimal of the  $dB$  reading is 5 or higher, the reading is to be made to nearest higher integer.

**An3.3.6 Determination of Noise Exposure**

The noise exposure level of seafarers is to be determined based upon *ISO 9612:2009*.

**An3.3.7 Calibration**

The sound level meter is to be calibrated both before and after measurements are taken.

**An3.4 Points of Measurement****An3.4.1 Points of Measurement**

Measurements are to be taken at the following -1 to -5:

1 If not otherwise specified, measurements are to be taken with the microphone at a height of between 1.2 m and 1.6 m from the deck.

2 The distance between two measurement points is to be at least 2 m.

3 In large spaces not containing machinery, measurements are to be taken at intervals not greater than 10 m throughout the space including positions of maximum noise level.

4 Measurements are not to be taken closer than 0.5 m from the boundaries of a space.

5 Measurements are to be taken at positions where the personnel work, including at communication stations.

**An3.4.2 Duty Stations**

The noise level is to be measured at all points where work is carried out. Additional measurements are to be taken in spaces containing duty stations if variations in noise level are thought to occur in the vicinity of the duty stations.

**An3.4.3 Intake and Exhaust Openings**

When measuring noise levels, the microphone is, where possible, not to be placed within a 30° angle away from the direction of the gas stream and not less than a distance of 1 *m* from the edge of the intake or exhaust opening of engines, ventilation, air conditioning and cooler systems, and as far as possible from reflecting surfaces.

**An3.5 Measurements in Machinery Spaces**

1 Measurements are to be taken at the principal working and control stations of the seafarers in the machinery spaces and in the adjacent control rooms, if any, special attention being paid to telephone locations and to positions where voice communication and audible signals are important.

2 Measurements are not normally to be taken closer than 1 *m* from operating machinery, or from decks, bulkheads or other large surfaces, or from air inlets. Where this is not possible, measurement is to be taken at a position midway between the machinery and adjacent reflecting surface.

3 Measurement is to be made at a height of between 1.2 *m* to 1.6 *m* above the deck, platform or walkway in the following locations.

(1) The following equipment, etc. at a distance of 1 *m* from, and at intervals not greater than 3 *m* around:

- (a) Main turbines or engines at each level
- (b) Main gearing
- (c) Turbo blowers
- (d) Purifiers
- (e) Electrical alternators and generators
- (f) Boiler firing platforms
- (g) Forced and/or induced draught fans
- (h) Compressors

(2) Local control stations and the machinery control rooms

(3) All other locations which would normally be visited during routine inspection, adjustment and maintenance

(4) All normally used access routes at intervals not greater than 10 *m*

(5) Workshops within the machinery space

4 Where the measured sound pressure level in *dB(A)* at the intervals specified -3(1) above does not vary significantly, it will not be necessary to record each position. However, full measurement at representative positions and at the positions of maximum sound pressure level is to be made and recorded, subject to at least four measurements being recorded at each level.

**An3.6 Measurements in Navigation Spaces**

Measurements are to be taken on both navigating bridge wings but are to only be taken when the navigating bridge wing to be measured is on the lee side of the ship.

**An3.7 Measurements in Accommodation Spaces**

1 One measurement is to be taken in the middle of the space. The microphone is to be moved slowly horizontally and/or vertically over a distance of 1 *m*. Additional measurements are to be performed at other points if appreciable differences, i.e. greater than 10 *dB(A)*, in the level of sound inside the room occur.

2 The number of measurement cabins is to be not less than 40% of total number of cabins. Cabins which are obviously affected by noise, i.e. cabins adjacent to machinery or casings, are to be considered in any case.

3 For ships with a large number of crew cabins, such as passenger/cruise ships, it will be acceptable to reduce the number of measurement positions. The selection of cabins to be tested is to be representative for the group of cabins being tested by selecting those cabins in closer proximity to noise sources.

4 On open deck, measurements are to be taken in any areas provided for the purpose of recreation.

**An3.8 Measurements in Normally Unoccupied Spaces**

**1** Measurements are to be taken in all locations with unusually high noise levels where seafarers may be exposed, even for relatively short periods, and at intermittently used machinery locations.

**2** Noise levels need not be measured for normally unoccupied spaces, holds, deck areas and other spaces which are remote from sources of noise. In cargo holds, at least three microphone positions in parts of holds where personnel are likely to carry out work are to be used.

## Chapter 4 MAXIMUM ACCEPTABLE SOUND PRESSURE LEVELS

### An4.1 General

Measurement results are not to be more than the noise level limits specified in [Table An4.1](#). In large rooms with many measurement positions the individual positions are to be compared to the limits.

Table An 4.1 Noise Level Limits (Unit:  $dB(A)$ )

Designation of rooms and spaces	Ship size	
	1,600 up to 10,000 GT	$\geq 10,000$ GT
Work spaces		
Machinery spaces <sup>1,2</sup>	110	110
Machinery control rooms	75	75
Workshops other than those forming part of machinery spaces <sup>3</sup>	85	85
Non-specified work spaces (other work areas)	85	85
Navigation spaces		
Navigating bridge and chartrooms <sup>4</sup>	65	65
Look-out posts, incl. navigating bridge wings and windows <sup>5</sup>	70	70
Radio rooms <sup>6</sup> (with radio equipment operating but not producing audio signals)	60	60
Radar rooms	65	65
Accommodation spaces		
Cabin and hospitals <sup>7</sup>	60	55
Messrooms	65	60
Recreation rooms	65	60
Open recreation areas (external recreation areas)	75	75
Offices	65	60
Service spaces		
Galleys, without food processing equipment operating	75	75
Serveries and pantries	75	75
Normally unoccupied spaces		
Spaces referred to in section 3.8	90	90

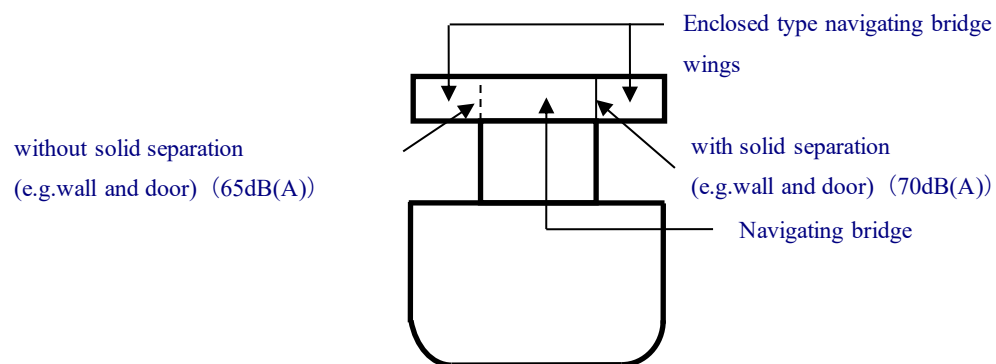
Notes:

1. If the maximum noise levels in [Table An 4.1](#) are exceeded when machinery is operating, stay is to be limited to very short periods if dispensation is granted by the Administration.
2. Workshops(including workbenches and workstations) in machinery spaces are to be regarded as “machinery spaces”.
3. Notwithstanding 2 above, enclosed workshops located in machinery spaces are to be regarded as “workshops other than those forming part of machinery spaces” in cases where the enclosed workshops are separated from machinery spaces by bulkheads, which may include access doors with acoustic insulating properties equivalent to the bulkhead.
4. A navigating bridge provided with radio equipment is to be regarded as a “navigating bridge”.
5. With respect to the enclosed type navigating bridge wings, navigating bridge wings without solid separation (e.g. wall and door), and those with solid separation (e.g. wall and door) are to be regarded as “navigating bridge” and “navigating bridge wings” respectively. (See [Fig. An 4.1](#))
6. “Radio rooms” mean separate rooms dedicated for sending/receiving radio messages.
7. A room consisting of day-room and bedroom is to be regarded as a single “cabin” in cases where the room is for single occupancy.

**An4.2 Noise Survey Reports**

A noise survey report is to be made for each ship. (See **Form 1**) The measuring points are to be marked on a general arrangement plan, or on accommodation drawings and are to be identified. The noise survey report is always to be carried on board and be accessible to the crew.

Fig. An 4.1 Noise Levels in Enclosed Type Navigating Bridge



## Chapter 5 ACOUSTIC INSULATION BETWEEN ACCOMMODATION SPACES

### An5.1 Sound Insulation Index

#### An5.1.1 Bulkheads and Decks

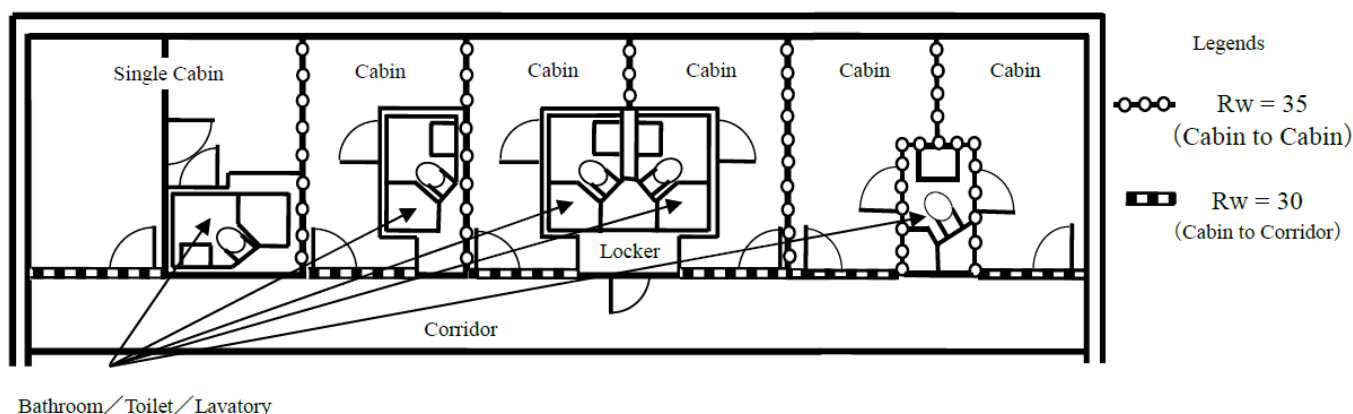
1 The airborne sound insulation properties for bulkheads and decks within accommodation spaces are to comply at least with the following (1) to (4) weighted sound reduction index ( $R_w$ ) according to *ISO Standard 717-1:1996 as amended (1:2006)*, part 1.

- (1) Cabin to cabin:  $R_w=35$
- (2) Messrooms, recreation rooms, public spaces and entertainment areas to cabins and hospitals:  $R_w=45$
- (3) Corridor to cabin:  $R_w=30$
- (4) Cabin to cabin with communicating door:  $R_w=30$

2 If a cabin is completely separated by more than one bulkhead from the airborne sound source, the bulkheads are not required to have the airborne sound insulation properties as required in -1 above. For this purpose, bathrooms, toilets or lavatories are not regarded as cabins, but are regarded as origins of airborne sounds to other cabins. (See Fig. An5.1.1)

3 For a room consisting of a day-room and bedroom for single occupancy, partitions (panels and doors) between the day-room and bedroom need not have the airborne sound insulation properties required in -1 above.

Fig. An 5.1.1 Arrangement of Cabins



#### An5.1.2 Airborne Sound Insulation Properties of Bulkheads and Decks

With respect to the requirement, the airborne sound insulation properties of bulkheads and decks are to comply with the following (1) to (4):

- (1) The requirements regarding airborne sound insulation properties for bulkheads are to apply to components installed in bulkheads (e.g., cabin doors).
- (2) In cases of bulkheads consisting of acoustic insulation panels and doors, each component forming the surface of the bulkhead (acoustic insulation panels and doors, etc.) is to have at least the required  $R_w$  in An 5.1.1-1.
- (3) Notwithstanding (2) above, in cases where either acoustic insulation panels or doors forming parts of bulkheads have a weighted sound reduction index inferior to that required by An 5.1.1-1, this requirement is considered satisfied provided that the  $R_w$  of the bulkheads is not inferior to their required values, i.e. the  $R_w$  of the bulkhead calculated using both the airborne sound insulation properties of the doors and those of the panels is not inferior to the required value. As guidance on evaluation of the  $R_w$  of bulkheads, the following formulae can be used:

$$\bar{R} = 10 \log_{10} \left[ S / \sum_{i=1}^n (S_i \cdot 10^{-R_i/10}) \right]$$

S: Area of the concerned bulkhead

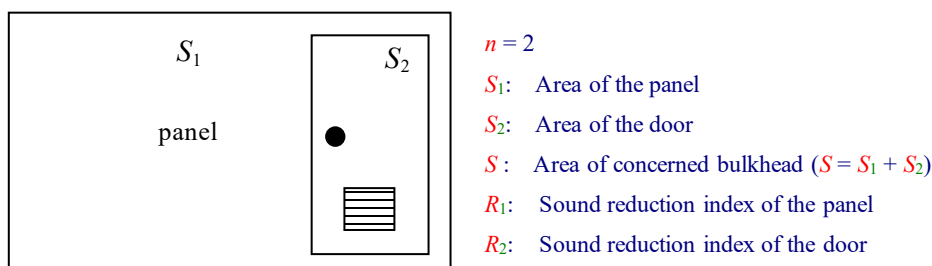
$n$ : Number of components forming the concerned bulkhead

$R_i$ : Sound reduction index of the  $i$ -th component (Note:  $R_i$  has frequency elements in the frequency range from 100 to 5,000 Hz)

$S_i$ : Area of the  $i$ -th component

- (4) The requirements regarding airborne sound insulation properties for decks are to apply to decks together with their coverings. However, they need not apply to ceiling panels.

Fig. An5.1.2 Acoustic Insulation Panels and Doors Forming Parts of Bulkheads



## An5.2 Measurements of Airborne Sound Insulation Properties

1 Materials used to comply with the requirements of [An 5.1](#) are to be one of the following (1) to (3):

- (1) Materials whose airborne sound insulation properties are determined by laboratory tests in accordance with *ISO 10140-2:2010* and approved by the Administration;
- (2) Materials which are approved by the Society in accordance with [Chapter 6, Part 4 of the GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE](#); or
- (3) Materials whose airborne sound insulation properties are determined by laboratory tests in accordance with *ISO 10140-2:2010* and deemed equivalent to those listed in (1) or (2) above.

2 With respect to the tests in accordance with *ISO 10140-2:2010*, the following (1) to (3) apply:

- (1) Coverings are to be tested in laboratory as in the onboard arrangement;
- (2) Closing devices of ventilation grilles/louvres of cabin doors are to be kept open during laboratory tests; and
- (3) Doors are to be tested together with the associated door frame. In cases where there is no sill being part of the door frame, the doors are to be tested with the gap specified by manufacturers and with sealing materials, if fitted.

## Chapter 6 HEARING PROTECTION AND WARNING INFORMATION

### An6.1 General

Hearing protectors in accordance with [An 6.2](#) are to be provided on ships which have spaces with nominal noise levels greater than 85 *dB(A)* to seafarers who are required to enter such spaces on an individual basis.

### An6.2 Requirements for Hearing Protectors

Hearing protectors are to be of a type such that they can reduce sound pressure levels to 85 *dB(A)* or less. Selection of suitable hearing protectors is to be in accordance with the *HML* method described in *ISO 4869-2:1994*. Noise cancelling technology may be used if the headsets have equivalent performance to hearing protectors in their unpowered condition.

### An6.3 Warning Notices

Where the noise level in machinery spaces or other spaces is greater than 85 *dB(A)*, entrances to such spaces are to carry a warning notice comprising symbol and supplementary sign in the working language of the ship (See **Table An 6.1** and **Fig. An 6.1**). If only a minor portion of the space has such noise levels, the particular location(s) or equipment is to be identified at eye level, visible from each direction of access.

Table An 6.1 Examples of Warning Notices (Signs)

Signs at the entrances to noisy rooms	
80-85 <i>dB(A)</i>	HIGH-NOISE LEVEL – USE HEARING PROTECTORS
85-110 <i>dB(A)</i>	DANGEROUS NOISE – USE OF HEARING PROTECTORS MANDATORY
110-115 <i>dB(A)</i>	CAUTION: DANGEROUS NOISE – USE OF HEARING PROTECTORS MANDATORY – SHORT STAY ONLY
>115 <i>dB(A)</i>	CAUTION: EXCESSIVELY HIGH-NOISE LEVEL – USE OF HEARING PROTECTORS MANDATORY – NO STAY LONGER THAN 10 MINUTES

Fig. An6.1 Examples of Warning Notices (Symbols)





## Form 1 NOISE SURVEY REPORT

The following items are to be included in the noise survey report.

**1 Ship Particulars**

- 1.1 Name of ship
- 1.2 Port of registry
- 1.3 Name and address of shipowner, managing owner or agent
- 1.4 Name and address of shipbuilder
- 1.5 Place of build
- 1.6 IMO number
- 1.7 Gross tonnage
- 1.8 Type of ship
- 1.9 Ship's dimensions – length, breadth, depth, maximum draught (summer load line)
- 1.10 Displacement at maximum draught
- 1.11 Date of keel laying
- 1.12 Date of delivery

**2 Machinery Particulars**

- 2.1 Propulsion machinery
  - 1 Manufacturer, type, and number of units
  - 2 Maximum cont. rating – power (*kW*)
  - 3 Normal designed service shaft speed (*rpm*)
  - 4 Normal service rating – power(*kW*)
- 2.2 Auxiliary diesel engines
  - 1 Manufacturer, and type
  - 2 Output (*kW*), and number of units
- 2.3 Main reduction gear
- 2.4 Type of propeller (fixed propeller, controllable pitch propeller, Voith-Schneider propeller)
  - 1 Number of propellers and number of blades
  - 2 Designed propeller shaft speed (*rpm*)
- 2.5 Other (in the case of special propulsion and power configurations)
- 2.6 Engine room ventilation
  - 1 Manufacturer, type and number of units
  - 2 Fan diameter (*m*), fan speed (*rpm*) and variable speed (Yes/No)
  - 3 Airflow capacity ( $m^3/h$ ) and total pressure (*Pa*)

**3 Measuring Instrumentation and Personnel**

- 3.1 Instrumentation maker, type and serial No. of sound level meter, microphone, filter, windscreen, calibrator and other equipment
- 3.2 Calibration of sound level meter (date calibration started/finished)
  - at survey by competent authority
- 3.3 Identification of persons/organizations carrying out measurements

**4 Conditions during Measurement**

- 4.1 Date of measurement, start time, and completion time

- 4.2 Ship's position during measurement
- 4.3 Loading condition of the ship
- 4.4 Conditions during measurement
  - 1 Draught forward
  - 2 Draught aft
  - 3 Depth of water under keel
- 4.5 Weather conditions
  - 1 Wind force
  - 2 Sea state
- 4.6 Ship speed
- 4.7 Actual propeller shaft speed (*rpm*)
- 4.8 Propeller pitch
- 4.9 Propulsion machinery speed (*rpm*)
- 4.10 Propulsion machinery power (*kW*)
- 4.11 Number of propulsion machinery units operating
- 4.12 Number of diesel auxiliary engines operating
- 4.13 Number of turbo generators operating
- 4.14 Engine room ventilation speed mode (high/low/variable)
- 4.15 Engine load (%*MCR*)
- 4.16 Other auxiliary equipment operating (Ventilation, heating and air conditioning equipment in operation)

## 5 Measuring Data

- 1 Noise limits  $dB(A)$   
 Measured sound pressure levels  $L_{Aeq} dB(A)$ ,  $L_{Ceq} dB(C)$  and  $L_{Cpeak} dB(C)$   
 Note: Measurement of sound pressure level  $L_{Ceq}$  and  $L_{Cpeak}$  is to be done only in the case of exceeding  $85dB(A)$  and hearing protectors are required.
- 2 Work spaces
  - (1) Machinery spaces
  - (2) Machinery control rooms
  - (3) Workshops
  - (4) Non-specified workspaces
- 3 Navigation spaces
  - (1) Navigating bridge and chartrooms
  - (2) Look-out posts, including navigating bridge wings and windows
  - (3) Radio rooms
  - (4) Radar rooms
- 4 Accommodation spaces
  - (1) Cabins and hospitals
  - (2) Messrooms
  - (3) Recreation rooms
  - (4) Open recreation areas
  - (5) Offices
- 5 Service spaces
  - (1) Galleys, without food processing equipment operating
  - (2) Serveries and pantries
- 6 Normally unoccupied spaces

## 6 Main Noise Abatement Measures (List Measures Taken)

**7        Remarks (List Any Exceptions to the Code)**

Name, address, place, date and signature of person taking measurements

## **Annex 2.3.1-3 TESTING PROCEDURES FOR CONTROL SYSTEMS FOR CONTROLLABLE PITCH PROPELLERS INTENDED FOR MAIN PROPULSION**

### **An1.1 General**

#### **An1.1.1 Purpose**

The purpose of the tests required by this annex is to ascertain that the pitch control system of controllable pitch propellers for main propulsion is working correctly.

#### **An1.1.2 Application**

This annex applies to all new ships and to all replacements, modifications, repairs, or re-adjustments that may affect the pitch control or response characteristics for main propulsion.

### **An1.2 Tests**

#### **An1.2.1 Pitch Response Test**

1 A full range of tests is to be carried out to get the pitch response and verify that it coincides with the combinator curve of the propeller. The combinator curve is the relationship between the propeller pitch setting and the propeller speed.

2 The tests are to be carried out for at least three positions of the control lever in ahead and astern directions (e.g. dead slow ahead / astern, half ahead / astern and full ahead / astern).

3 The tests are to be carried out in normal and emergency operating conditions. In this context, “emergency operation conditions” means operations from those locations from where it is planned to operate the system in an emergency.

4 Tests that are not affected by the control position may be carried out from one control position only.

#### **An1.2.2 Test of Fail-to-safe Characteristics**

1 A test of the fail-to-safe characteristics of the propeller pitch control system is to be carried out to demonstrate that failures in the pitch command and control or feedback signals are alarmed and do not cause any change of thrust.

2 Such failures are to be clearly identified and included in the test procedure.

#### **An1.2.3 Test Procedure**

The test procedure is to be prepared and proposed by the pitch control system manufacturer or integrator and approved by the Society.

### **An1.3 Records**

1 The list of the parameters to be recorded during the pitch response test within this annex is to be established by the pitch control system manufacturer or integrator and approved by the Society.

2 The parameters in -1 above are to include at least the following:

- (1) Position of the control handle;
- (2) Actual pitch indication (local indications and remote indications);
- (3) Rotational speed of the propeller;
- (4) Response time between the pitch change order (modification of the lever position) and the instant when the pitch and propeller speed have reached their final position;
- (5) Propelling thrust variation during the transfer of the control from one location to another.

### **An1.4 Test Results**

1 It is to be verified that propelling thrust is not significantly altered under the following (1) and (2):

- (1) Transferring control from one location to another;
- (2) Failures in the pitch command and control or feedback signals.

**2** The pitch response times measured during the test are not to exceed the maximum value to be defined by the pitch control system manufacturer or integrator.

## Annex 2.3.2 GUIDANCE FOR INCLINING TEST

### An1.1 General

#### An1.1.1 General

This annex shows the standard method for the inclining test stipulated in [2.1.7-8, Part B of the Rules](#).

### An1.2 Preparation for the Test

#### An1.2.1 Data to be Submitted

The following plans are to be available at the time of the test as necessary.

- (1) General arrangement drawing
- (2) Tank capacity plan
- (3) Hydrostatic curves
- (4) Draft marks locations

#### An1.2.2 Inclining Test Conditions

1 The ship is to be as near to completion in lightweight condition as possible. Equipment used by the yard on board is to be removed as much as is possible.

2 Prior to the inclining test, lists of all items which are to be added, removed, or relocated are to be prepared. These weights and their locations are to be accurately recorded.

3 The weight of the ship at testing is not to be below 98 percent of the lightweight condition. However, it is not to be in excess of 102 percent excluding the weight of surplus weights, liquid ballast, fuel oil, diesel oil and fresh water. For smaller ships, a greater deviation may be allowed.

4 All objects are to be secured in their regular positions. All weights which may swing or shift are to be secured in their sea stowage position. If more than one sea stowage position is possible, the actual stowage position used during the test is to be recorded.

5 The ship is to be cleared of residues of cargo, tools, debris, scaffolding and snow. Icing of the inner and outer surfaces, the underwater hull included, is not permitted.

6 Bilge water and liquids accumulated on deck are to be removed in order to exclude an influence on measurements.

7 Only persons participating in the inclining test are to be on board the ship during testing.

#### An1.2.3 Tank Contents

1 As a rule, all tanks are to be either full or empty. The number of tanks containing liquids is to be kept to a minimum.

2 Soundings and density of liquids are to be measured in tanks containing liquids. Where tanks are partly filled, free surface effect which has an influence on the result of the test is to be estimated from the shape of the tanks.

3 Where tanks are intended to be filled completely, attention is to be paid to the removal of air pockets. All empty tanks are to be adequately dried.

4 All connections between tanks are to be closed.

#### An1.2.4 Mooring Arrangements and Environmental Conditions

1 Mooring lines are to be free of any transverse tension when taking readings. No external moments are to be brought upon the ship from mooring lines. If possible, the ship is to be located in a calm, protected area free from external forces.

2 The depth of water under the hull is to be sufficient to ensure that the hull will be entirely free of the bottom even if the ship is inclined, taking into account tide differences, if applicable.

3 The following mooring arrangements are to be referred to as the standard. Moreover, other mooring arrangements may be approved at the discretion of the Society.

- (1) A ship is moored by bow and stern lines on both sides of the ship attached at or near the centre-line. Longitudinal mooring lines are to be as long as practicable.
- (2) A ship is moored by bow and stern lines on one side only and supplemented by spring lines.

4 Where only a single bow or stern line is used, it is to be confirmed that the ship's freedom of movement is not adversely affecting the results of the experiment.

5 When tidal currents are present, the experiment is to be conducted at or around slack tide as is possible.

6 The ship's gangway is to be in the stowed position and any shore gangway removed during the inclining test. The number of cables and hoses connected to shore are to be as few as possible. Those which are needed are to be slack.

7 To carry out the inclining test under the influence of wind and currents may be permitted, provided the accuracy of the test is assured.

#### **An1.2.5 Inclining Weights**

1 As a rule, not less than four solid weights are to be used for the inclining test. Use of water ballast transfer to incline the ship may be permitted only in cases where it is impracticable to incline the ship using solid weights. However, the procedure is to be submitted to the Society for approval prior to commencement.

2 The solid weights are to be heavy enough to comply with the requirements in [An 1.3.3-1](#). Each solid weight is to be almost equal in mass.

3 Each weight is to be compact, impervious to water. Its centre of gravity is to be accurately determined.

4 Each inclining weight is to be marked with an identification number. The inclining weights are to be weighted with a calibrated instrument. In such cases, a report including the identification number, weight, weight measuring date, a instrument and calibration date is to be prepared to show to the Surveyor at the time of the survey.

#### **An1.2.6 Measuring Devices**

1 In general, not less than two measuring devices, one of which is to be a pendulum or a U-tube, are to be used to determine the ship's inclination.

2 Where pendulums are used, the pendulums are normally to be long enough to give a measured deflection, to each side of upright, of at least 100 mm, and be suspended at sheltered locations to be protected from the wind.

3 Where U-tubes are used, the arrangement of the U-tube length is to be such as to ensure the accuracy of its readings.

4 Where stabilographs are used, the calibration of the instruments is to be verified to the Surveyor's satisfaction prior to the experiment.

#### **An1.2.7 Initial Condition and Stability**

1 The ship is to be preferably upright prior to inclining. However, an initial list of the ship not exceeding 0.5° is permissible.

2 Initial trim of the ship is not to exceed 1% of the ship's length.

3 The persons conducting the test are to be satisfied that the ship has adequate, positive stability and acceptable allowance of the stress levels during the test.

### **An1.3 Inclining Test and Record of Data**

#### **An1.3.1 Accuracy of Data**

Measurement of inclining test data is to be as accurate as possible and to the satisfaction of the attending Surveyor.

#### **An1.3.2 Draught and Water Density Measurements**

1 Draught is to be measured at fore, aft and midship draught marks on both sides immediately before the test.

2 The distance from the draught mark (which is used as a reference point) to the base line is to be verified prior to the test.

3 It is to be ensured that no significant changes have occurred to the load condition of the ship during the test.

4 In case of non-coincidence of separate measuring points, additional measurements are to be taken.

5 Water samples are to be taken at a suitable depth away from surface water which could contain rainwater.

#### **An1.3.3 Weight Shifts**

1 Positioning of inclining weights which gives a maximum heeling moment is to result in a minimum heel angle of 1° up to a maximum 4° from upright, depending upon ship type and size. Where it is impracticable to incline the ship above 1° because of factors such as the GoM being too large, the precision of the measurements is to be enhanced taking account of the characteristic and conditions of the ship and the conditions of the test.

2 Procedures for shifting weights are shown in [Table An1.3.3](#).

3 The transverse shift distance is to be as great as practicable. The inclining weights are to be positioned symmetrically to the

centre line in order to measure the transverse shift distance easily.

- 4 The inclining weight positions are to be marked on the deck to ensure that consistency in placement is achieved.

#### **An1.3.4 Measurement of Heel Angle**

- 1 Pendulum or U-tube readings are to be taken on the recording batten or scale by either of the following ways:

- (1) On the final stable position of the pendulum or liquid column after stopping of ship motions due to shifting of the inclining weight;
- (2) By marking the centre of residual motion about the mean position.

- 2 When using other devices, angles of inclination are to be recorded according to instructions supplied for each device.

3 Whenever the inclining weights are shifted, the plot of heel angle against heeling moment is to be made. If there is a deviation of points from the straight line passing through the initial position, the deflections and moments are to be checked and corrected prior to the next weight movement.

- 4 It is to be checked that weights remain on assigned positions and all lines connected to shore remain slack during measurement.

#### **An1.3.5 Other Relevant Data**

1 Where the inclining test is carried out by means of transfer of water, it has to be possible to evaluate accurately the weight and the centre of the shifted liquid in relation to the ship's heel and trim.

2 The weather conditions, i.e., wind speed and direction relative to the ship, sea state, air and water temperatures, etc., during the test are to be recorded.

#### **An1.4 Postponement of the Test**

If during the course of the inclining test circumstances arise such that the requirements in this chapter are not complied with, the Surveyor may advise the person in charge to postpone the test.

#### **An1.5 Inclining Test Report**

1 The test report containing all the data gathered during the test, the results calculated from this data, and the calculations is to be prepared and submitted to the Society.

- 2 The Surveyor is to ensure that the data given in the report is consistent with that gathered during the test and to sign the report.

Table An 1.3.3

	Four		Six	
	Port side	Starboard side	Port side	Starboard side
No.0	2, 4	1, 3	2, 4, 6	1, 3, 5
No.1	4	1, 2, 3	4, 6	1, 2, 3, 5
No.2		1, 2, 3, 4		1, 2, 3, 4, 5, 6
No.3	1	2, 3, 4	6	1, 2, 3, 4, 5
No.4	1, 3	2, 4	2, 4, 6	1, 3, 5
No.5	1, 2, 3	4	1, 2, 3, 4, 6	5
No.6	1, 2, 3, 4		1, 2, 3, 4, 5, 6	
No.7	2, 3, 4	1	1, 2, 4, 6	3, 5
No.8	2, 4	1, 3	2, 4, 6	1, 3, 5

Notes:

- (1) The numbers shown in this table show identification number of the weights
- (2) The underlined number indicates the last weight or weight group shifted.



## **Annex 5.2.7 GUIDANCE ON PRESSURE TESTING OF BOUNDARIES OF CARGO TANKS UNDER DIRECTION OF THE MASTER (in reference to MSC.1/Circ.1502 ANNEX)**

### **An1 Introduction**

#### **An1.1**

This guidance gives information and advice on technical and formal matters related to the required testing of cargo tanks when this is undertaken under direction of the master according to [5.2.7-3, Part B of the Rules](#).

#### **An1.2**

Where the ship is in a shipyard or is under attendance of the surveyor, the testing of cargo tanks is to be carried out under the direction, and in the presence, of the surveyor. It is to be noted that all ballast tanks adjacent to cargo tanks are to be tested by the surveyors.

## **An2 Objective and applicability**

### **An2.1**

This guidance is prepared as a reference for Administrations, companies, masters and crews in order to facilitate a common understanding of the procedures for testing of cargo tanks when this is undertaken under the direction of the master.

### **An2.2**

This procedure applies to oil tankers and ships carrying dangerous chemicals in bulk with integral tanks to which the provision of [5.2.7-3, Part B of the Rules](#) is applicable.

## **An3     Testing of cargo tanks**

### **An3.1**

The minimum requirements for cargo tank testing at renewal survey are given in [5.2.7, Part B of the Rules](#).

### **An3.2**

Tests of the cargo tanks carried out under this procedure are to be to the satisfaction of the master.

### **An3.3**

Boundaries of cargo tanks are to be tested with liquid to the highest point that the liquid will rise under service conditions. The minimum scope of bulkheads to be tested is to be in accordance with the requirements in [Table B5.23-1, Part B of the Rules](#).

### **An3.4**

Testing of the boundaries of cargo tanks carried out by the ship's crew under the direction of the master may be accepted by the surveyor provided the following conditions are complied with:

- .1 a tank testing procedure specifying fill heights, tanks being filled and boundaries being tested has been submitted by the owner and reviewed by the Society prior to the testing being carried out;
- .2 there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;
- .3 the tank testing has been satisfactorily carried out within the renewal survey window not more than three months prior to the date of the survey on which the overall or close-up survey is completed;
- .4 the satisfactory results of the testing are recorded in the ship's logbook; and
- .5 the internal and external condition of the tanks boundaries and associated structure are found satisfactory by the surveyor at the time of the overall and close-up survey.

### **An3.5**

“Failed test”: where the outcome of tank testing reveals structural damage or leakage, the Society is to be advised with immediate effect, and attendance on board by (an) surveyor arranged.

## An4 Procedure for testing of cargo tanks

### An4.1

In order to comply with the cargo pressure testing requirements, section [An 4.2](#) or [An 4.3](#) below is to be completed.

### An4.2 Strength testing using cargo

#### An4.2.1

The required pressure testing condition is to be in accordance with the tank testing procedure reviewed by the Society (refer to [5.2.7-3\(1\), Part B of the Rules](#)) but not less than the minimum as stated in section [An 3.3](#) above.

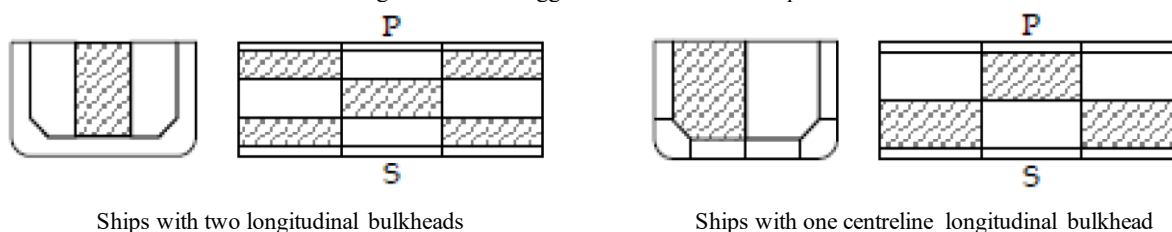
#### An4.2.2

In order to test the relevant boundaries, the ship may be loaded in a checkerboard pattern ([Fig. An4.2.2](#)), so that each cargo tank internal bulkhead is subjected to a fully loaded head of pressure provided that the intended loading and stability conditions are checked and confirmed by the master.

#### An4.2.3

The ship's logbook is to confirm that paragraph [An 4.2.2](#) and section [An 4.3](#) below have been successfully carried out and that it is to be signed by the master.

Fig. An4.2.2 - "Stagger test" - checkerboard pattern



### An4.3 Combined strength and tightness testing using ballast water

If practical with respect to the operation of the ship, it is acceptable to carry out combined strength and tightness testing using ballast water provided the relevant requirements in section [An 4.2](#) above are complied with and that the relevant tank boundaries are accessible for inspection. The boundaries and associated welds between the tank being tested and adjacent cargo tanks are to be fully inspected to ensure there is no indication of water leakage across the boundaries.

### An4.4 General

Water ballast tanks inclusive boundaries facing the cargo tanks, are to be tested in accordance with [5.2.7, Part B of the Rules](#). These tests are to be witnessed and all boundaries are to be examined by the surveyor.

### An4.5 Safety

Careful consideration is to be given to the *REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIP* (resolution A.1050(27)).

## **An5 Master's inspections, assessments and reports**

### **An5.1 General**

The following paragraphs describe the operations that are required of the master when carrying out the inspections of the boundaries of the tank which are to be submitted to a hydrostatic test. All safety precautions and facilities (lighting, ventilation, etc.) are to be provided according to the ship's Safety Management System (SMS) documentation and the cargo tank testing procedure as reviewed by the Society.

### **An5.2 Places to be inspected**

#### **An5.2.1**

All boundaries of the cargo tank under testing are to be examined from positions outside of the cargo tank boundaries. Boundaries of commonly shaped tanks are constituted by the following:

- .1 a transverse aft bulkhead and associated structure;
- .2 a transverse fore bulkhead and associated structure;
- .3 two longitudinal bulkheads and relevant associated structure; and
- .4 an inner bottom plating and associated structure.

#### **An5.2.2**

Each of these boundaries is the common division between the cargo tank under testing and another:

- .1 cargo tank, or
- .2 ballast tank/double bottom, or
- .3 fuel oil tank, or
- .4 void space or pump-room.

#### **An5.2.3**

The inspection is to verify that:

- .1 the plating and structures of each boundary are not affected by evident geometrical defects, such as deflection/distortion of the structures supporting the plating of the boundaries, when hydrostatically loaded; and
- .2 the tightness of each boundary is not impaired, i.e., no leakages are to appear anywhere on surface of each boundary, especially at the welded joints connecting the plates which constitute the boundary itself.

#### **An5.2.4**

Each boundary is to be closely inspected, noting any defective items from the two categories above.

### **An5.3 Reporting**

#### **An5.3.1**

Following the inspection of all boundaries surrounding the cargo tank being tested, the master is required to report, in a simple manner, the results of the inspection. The report is to be recorded in the ship's logbook and include all data relevant to the following:

- .1 identification of the tank subjected to testing;
- .2 identification of the compartments surrounding the cargo tank subjected to testing;
- .3 date, time and place of testing;
- .4 ship's loading condition during the testing, including ship trim; and
- .5 outcome of the inspections carried out during the testing.

The report is to be retained on board for the attending surveyor's review.

#### **An5.3.2**

Where no deficiencies have been found or noted, the testing of the cargo tank may be considered as having a satisfactory outcome.

## **Annex 9.1.3 PROCEDURES FOR THE APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE**

### **An1.1 General**

#### **An1.1.1 Scope**

1 These procedures apply to the tests, examinations, etc. of the computer software required by ships adopting the Planned Machinery Maintenance Scheme (hereinafter referred to as “PMS”) or the Condition Based Maintenance Scheme (hereinafter referred to as “CBM”) in accordance with the requirements given in [9.1.3-3, Part B of the Rules](#) or [B9.1.4-2, Part B of the Guidance](#).

2 The approval of system software developed to manage all internal ship operations is to follow these procedures.

3 The software used on ships which is not subject to CBM need not comply with [An 1.3.3](#).

### **An1.2 Application for Approval**

#### **An1.2.1 Application Form**

Applicants for software approval are to submit an application form (**Form-PMSsoftware**) to the Society.

#### **An1.2.2 Documents to be Submitted**

The documents listed below are to be submitted together with the application form specified in [An 1.2.1](#):

- (1) Software: 1 set (demonstrational software may be submitted. In cases where a dedicated installer is necessary to install such software, the installer is to be submitted together with the software)
- (2) Operation manual which indicates the following contents in detail: 3 sets (1 set of the manual may be submitted in the case of an electronic manual)
  - (a) System requirements (central processing unit, operating system, required capacity of the hard disc and memory, etc.)
  - (b) Procedure to install and uninstall the software
  - (c) Function of the software
  - (d) Operating method
- (3) Other documents deemed necessary by the Society

### **An1.3 Function**

#### **An1.3.1 Planned Maintenance Function**

Software is to have the following planned maintenance functions:

- (1) It is to be capable of registering the maintenance plans for those survey items required by the machinery maintenance scheme (PMS).
- (2) It is to be capable of specifying the time schedule of maintenance or running hours for each item of machinery and equipment including their parts.
- (3) It is to be capable of displaying a list of at least the following items. The list is to classify the registered machinery, equipment and their parts and to be displayed in a tree structure format, etc.
  - (a) Names of machinery, equipment and their parts
  - (b) Maintenance items
  - (c) Maintenance interval (next inspection date or running hour)
  - (d) Maintenance schedule (It is to be able to directly input the inspection date or calculate from the maintenance interval)
  - (e) Person in charge of maintenance
- (4) Maintenance intervals are not, in principle, to exceed five years. Maintenance intervals are to be capable of being displayed on the list of maintenance within a term which is arbitrarily designated.
- (5) In cases where there are maintenance items which expire after the maintenance period, such items are to be easily identified.

**An1.3.2 Maintenance Records Function**

The software is to have the following maintenance record functions:

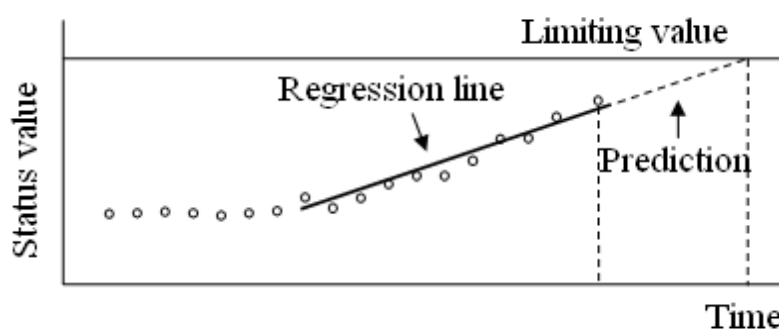
- (1) It is to be capable of managing and recording the results of the maintenance conducted by the planned maintenance specified in [An 1.3.1](#). The items regarding management and record are to be included the following:
  - (a) Names of machinery, equipment and their parts
  - (b) Maintenance items and results (including an exchange of parts)
  - (c) Maintenance completion date
  - (d) Total running hour
  - (e) Next inspection date
  - (f) Measurement data (including original design dimensions and allowable tolerance) However, such data is only required in cases where measurements are taken.
  - (g) The condition of damage and the repair method in cases where damage was found.
- (2) List of the maintenance items within the designated term is to be displayed. Such lists are to include the name of machinery, equipment and their parts together with the maintenance items and the maintenance completion date.
- (3) Past maintenance records are to be displayed in cases where machinery, equipment and their parts are arbitrarily selected.

**An1.3.3 Condition Monitoring Function**

1 The software is to have a function for the condition monitoring of machinery, equipment and their parts as necessary. Such condition monitoring is to be capable of analysis such as trend analysis if necessary. In cases where trend analysis is adopted, the following requirements are to be satisfied:

- (1) In cases where measurement data is affected by temperature, running speed, load, etc., the data is to be standardized and trend analysis is to be conducted against the index except in those cases where trend analysis is conducted against measurement data obtained during steady operating conditions.
- (2) The limiting parameters of measurement data are to be determined in accordance with the recommended values of the manufacturer or through statistical processing based on baseline data. In cases where such values are determined by the manufacturer through statistical processing, limiting parameters are to be automatically calculated based on accumulated data. However, these values may be determined by other methods deemed appropriate by the Society.
- (3) Trends of measurement data together with relevant limiting values are to be able to be displayed by a simple operation. (See [Fig. An 1.3.3](#))

Fig. An 1.3.3 Trend Display



2 Software may use diagnostic technology such as complex algorithms, machine learning and statistical knowledge obtained from data from machinery, etc. installed on other ships in order to identify the acceptability of continued service for machinery, equipment and components, or whether maintenance is required. The software need not follow machinery manufacturer recommended maintenance instructions or use manufacturer specified limiting parameters; in such cases, however, the software is to be approved in accordance with machinery manufacturer recommendations, industry standards and its usage history on other ships registered by the Society.

- 3 Maintenance management based on the condition monitoring specified in -1 above is to satisfy the following:

- (1) Planned maintenance
  - (a) Machinery, equipment and their parts are to be capable of being registered apart from those which are periodically during open up examination.
  - (b) The registration of the machinery, equipment and their parts which apply to condition monitoring are to include the following items:
    - i) Names of machinery, equipment and their parts
    - ii) Kind of measured signal
    - iii) Measurement interval
    - iv) Limiting value (This value is to be set up for each kind of measured signal)
- (2) Measuring process and recording
  - (a) Measurement date and measurement value are to be recorded.
  - (b) In cases where open up examinations are conducted, it is to be capable of recording the same results of the maintenance specified in [An 1.3.2](#).

#### **An1.4 Administration of Software**

##### **An1.4.1 Administration of Revision**

System manufacturers and administrators are to handle any software revisions caused by changes in the system. Specific information related to software revisions are to be verified on main displays or menus.

##### **An1.4.2 Administration of Backup**

System manufacturers and administrators are to specify proper procedures for backing up administrated maintenance data.

#### **An1.5 Verification Test**

In principle, the Society will conduct verification tests of those functions specified in [An 1.3](#) after examining the documents specified in [An 1.2](#). Verification tests may be conducted under the conditions that the systems are actually used at either the ship management company or onboard the ship. However, in cases where the relevant functions can be verified by the software which has been submitted, verification tests may be omitted.

#### **An1.6 Approval**

##### **An1.6.1 Notification of Approval**

In cases where the documents specified in [An 1.2](#) and verification test records specified in [An 1.5](#) are considered appropriate, the Society will approve the issue of a new certificate. In cases where the software has a function specified in [An 1.3.3](#) or other optional functions, these functions are stated on the certificate.

##### **An1.6.2 Term of Validity**

The term of validity of the “Certificate of Approval” will be 5 *years* from the date of approval. In cases where renewal of approval is carried out in accordance with [An 1.6.3](#), the term of validity will be 5 *years* from the next day after the expiration date of the previous period of validity.

##### **An1.6.3 Renewal of Validity**

In the case of renewing validity, manufacturers are to submit the Society an application Form (**Form 1**) along with the previously issued certificate. Changes of specification, if any, are to be described on the application form.

##### **An1.6.4 Changes in the Contents of Approval**

1 In the case of specification changes of approved software, applicants are to submit a “Certificate of Approval” (original) and those documents specified in [An 1.2.2](#) according to the content of changes together with an application form (**Form 1**).

2 The Society requires the verification test specified in [An 1.5](#) as necessary.

3 In cases where the documents specified in [-1](#) and verification test records specified in [-2](#) are considered appropriate, the Society will issue a new certificate.



- 4 In cases where approval is given for a design with a partial modification, the expiration date will not be renewed in principle.

**An1.6.5 Revocation of Approval**

In cases where any of the following is relevant, the Society may revoke its approval and give notice of such revocation to manufacturers.

- (1) In cases where the approval renewal procedures given in [An 1.6.3](#) were not followed.
- (2) In cases where requests for revocation are made by applicants or manufacturers.
- (3) In cases where the approved condition was changed without the permission of the Society.
- (4) In cases where applicants or manufacturers do not pay approval fees.

## Contents

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS .....	3
Part B CLASS SURVEYS .....	3
B1 GENERAL .....	3
B1.1 Surveys .....	3
B1.3 Definitions.....	14
B1.4 Preparation for Survey and Other Items.....	17
B1.5 Others .....	22
B2 CLASSIFICATION SURVEYS .....	24
B2.1 Classification Survey during Construction.....	24
B2.2 Classification Survey of Ship Not Built under Survey .....	25
B2.3 Alterations .....	25
B3 ANNUAL SURVEYS .....	26
B3.1 General .....	26
B3.2 Annual Surveys for Hull, Equipment, Fire Extinction and Fittings .....	26
B3.3 Annual Surveys for Machinery .....	31
B3.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	32
B3.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	33
B3.6 Special Requirements for Ships Using Low-flashpoint Fuels.....	34
B3.9 Special Requirements for Ships Affixed with the Notation “ <i>Cybr</i> ” .....	34
B4 INTERMEDIATE SURVEYS.....	35
B4.1 General .....	35
B4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction and Fittings .....	35
B4.3 Intermediate Surveys for Machinery .....	36
B4.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	36
B4.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	37
B4.6 Special Requirements for Ships Using Low-flashpoint Fuels.....	37
B5 SPECIAL SURVEYS .....	38
B5.1 General .....	38
B5.2 Special Surveys for Hull, Equipment, Fire Extinction and Fittings .....	38
B5.3 Special Surveys for Machinery.....	43
B5.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk .....	44
B5.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk .....	44
B5.6 Special Requirements for Ships Using Low-flashpoint Fuels.....	45
B6 DOCKING SURVEYS .....	46
B6.1 Docking Surveys.....	46
B8 PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS .....	47
B8.1 General .....	47
B9 PLANNED MACHINERY SURVEYS .....	48
B9.1 Planned Machinery Surveys .....	48

B10	SURVEYS FOR STEEL BARGES .....	58
B10.4	Annual Survey .....	58
B10.5	Intermediate Survey.....	58
B10.6	Special Surveys .....	58
B11	SURVEYS OF SUBMERSIBLES.....	59
B11.1	General .....	59
B11.2	Classification Survey during Construction.....	59
B12	SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES.....	60
B12.1	General .....	60
B12.2	Classification Survey during Construction.....	60
B12.3	Annual Surveys .....	63
B12.4	Intermediate Surveys .....	63
B12.5	Special Surveys .....	63
B12.6	Docking Surveys.....	66
B13	SPECIAL REQUIREMENTS OF PERIODICAL SURVEYS FOR OFFSHORE STRUCTURES 68	
B13.1	General .....	68
B13.2	Preparation of Surveys and Inspections .....	68
B13.3	Selection of Structural Members to be Inspected .....	69
B13.4	Periodical Surveys for Hull Structure .....	71
B13.5	Periodical Surveys for Equipment, Machinery Installations and Fire Extinguishing Systems 73	
B14	SURVEY FOR FLOATING OFFSHORE FACILITIES FOR CRUDE OIL/PETROLEUM GAS PRODUCTION, STORAGE AND OFFLOADING .....	75
B14.2	Classification Surveys .....	75
B15	SURVEYS FOR WORK-SHIPS.....	76
B15.2	Classification Surveys during Construction .....	76
B15.3	Annual Surveys .....	78
B15.6	Docking Surveys.....	79

# GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

## Part B CLASS SURVEYS

### B1 GENERAL

#### B1.1 Surveys

##### B1.1.2 Class Maintenance Surveys

1 Modifications and changes that are subject to Occasional Surveys referred to in **1.1.2-2(3), Part B of the Rules** are as specified in (1) through (5) below:

- (1) Change in the purpose of combined deep water tank/oil tank/cargo hold  
When such dual-purpose holds are intended to be used for cargoes exclusively, the Owner is to submit an application form (APP-CP) to the Society. A part of the oil/ballast suction line is to be removed and blank flanges are to be fitted at the end of the line. Hydrostatic tests for the holds need not be carried out after the change.
- (2) Change in the purpose of tanks  
When the purpose of a tank is changed for ships complying with the Rules in editions since 1964, the Owner is to submit an application for the change of purpose to the Society. The longitudinal strength is to be verified again, and suitable reinforcement is to be provided as necessary.
- (3) Change in the loading conditions  
When ships are loaded in an extremely different way from the conditions specified in the approved plans, the longitudinal strength, shearing force and local strength are to be verified and approved by the Society.
- (4) Change in the loading manuals, the stability information and other similar documents  
When a modification is intended that alters the principal data of the ship, **2.3.1, Part B of the Rules** apply.
- (5) Other changes and modifications  
As changes and modifications may require approval by the Society, the Owner is to notify the Society in such a case. In general, modifications to the main hull structure require approval by the Society. Reference is made to the provisions of **2.3.1, Part B of the Rules**.

2 Where a change needs to be made to the documents listed in **Table B2.1 to Table B2.5, Part B of the Rules** as a result of modifications and changes specified in -1 above, relevant documents are to be renewed and then confirmed/approved by the Surveyor. However, small changes to the contents of such documents due to repair work based on the principle of restoration or localized reinforcement (e.g. changes of welding lines due to the replacement of plate structure, addition of local stiffeners for carrying short-term deck cargoes) need not require such renewal and confirmation/approval.

##### B1.1.3 Intervals of Class Maintenance Surveys

1 In applying the requirements specified in **1.1.3-1(3)(b), Part B of the Rules**, where Annual Surveys or Intermediate Surveys have been carried out in advance in accordance with **1.1.4-1** and **-2, Part B of the Rules**, the Special Survey may be carried as specified in (1) or (2) below:

- (1) The Special Survey may commence up to 15 months before the date of expiry of the *Certificate of Classification* and be completed within 3 months before the date of expiry of the *Certificate of Classification*.
- (2) The Special Survey may be carried out during the period specified in accordance with **1.1.4-3, Part B of the Rules**.

2 The main parts of machinery specified in **1.1.3-3(1), Part B of the Rules** generally refer to the parts subject to examination at the Classification Survey.

3 The Occasional Surveys specified in **1.1.3-3(5), Part B of the Rules** are as specified below:

## (1) Fire-extinguishing mediums and deep-fat cooking equipment

New installations of fire-extinguishing mediums and deep-fat cooking equipment on or after 1 July 2002 are to comply with the requirements of **10.4.1-3** or **10.6.3, Part R of the Rules**, as applicable. Deep-fat cooking equipment is to be confirmed at the time of the installation.

## (2) Cargo hoses

For cargo hoses installed on board ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk on or after 1 July 2002, a survey is to be carried out to verify compliance with the requirements of **5.11.7, Part N of the Rules** or **5.7.3, Part S of the Rules**, as applicable, at the time of the installation.

(3) For ice class ships with *IA Super* and *IA* defined in **1.2.5-2, Part A of the Rules**, which had been at the beginning stage of construction before 1 September 2003, a survey is to be carried out to verify compliance with the requirements of **8.4.2-2, Part I of the Rules** by 1 January in the year 20 years since the year the ship was delivered.

## (4) Additional requirement for fittings on exposed fore deck

For bulk carriers, general dry cargo ships (excluding container vessels, vehicle carriers, Ro-Ro ships and woodchip carriers), and combination carriers (e.g. OBO ships, Ore/Oil Carriers, etc.) of length ( $L_C$ ) 100 m or more (where,  $L_C$  is the length of ship specified in **1.4.3.1-1, Part 1, Part C of the Rules**) which have been contracted for construction prior to 1 January 2004, a survey is to be carried out to verify compliance with the requirements specified in (a) and implementation schemes specified in (b).

## (a) Requirements

- (i) **20.2.10, Part C of the Rules** applies to hatches on the exposed deck giving access to spaces forward of the collision bulkhead that also extend aft over this line.
- (ii) **23.6.8, Part C of the Rules** applies to ventilator pipes and their closing devices on the exposed deck serving spaces forward of the collision bulkhead that also extend aft over this line.
- (iii) **13.6.5, Part D of the Rules** applies to air pipes and their closing devices on the exposed deck serving spaces forward of the collision bulkhead that also extend aft over this line.

## (b) Implementation scheme

- (i) For ships which will be 15 years of age or more on 1 January 2004: by the due date of the first intermediate or special survey after that date
- (ii) For ships which will be 10 years of age or more but less than 15 years of age on 1 January 2004: by the due date of the first special survey after that date
- (iii) For ships which will be less than 10 years of age on 1 January 2004: by the date on which the ship reaches 10 years of age (Where the due date of the first intermediate or special survey is not until after the ship reaches 10 years of age, then the due date of the first intermediate or special survey)

## (5) (Deleted)

## (6) Secondary means of pressure/vacuum relief for controlled tank venting system for small chemical tanker

For ships carrying dangerous chemicals in bulk of less than 500 gross tonnage which had been at the beginning stage of construction before 1 July 2002, a survey is to be carried out to verify compliance with the requirements of **8.2.3, Part S of the Rules** by the date of 1 January 2007.

(7) With respect to the provisions of **8.1.2-3, Part I of the Rules**, ships built before 1 July 2007 and whose summer load line is located at a higher level than the *UIWL*, are to be provided with a warning triangle and with an ice class draught mark at the maximum permissible ice class draught amidships by the date of the first scheduled dry docking after 1 July 2007. In such cases, the engine output and the maximum and minimum ice class draught fore, amidships and aft are to be indicated in the classification certificate.

## (8) Safety practice of fixed carbon dioxide fire-extinguishing systems

For fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms installed on ships which had been at the beginning stage of construction before 1 October 1994, a survey is to be carried out to verify compliance with the requirements of **25.2.2-2(1)** and **(2), Part R of the Rules** by the date of the first scheduled dry-docking after 1 January 2010.

## (9) Emergency towing procedures

For cargo ships not less than 500 *gross tonnage* engaged on international voyages which had been at the beginning stage of construction prior to 1 January 2010, a survey is to be carried out by 1 January 2012 to verify that the emergency towing procedures specified in **14.5.3, Part 1, Part C of the Rules** or **23.3, Part CS of the Rules** are provided.

- (10) In the case of ships not less than 500 *gross tonnage* engaged on international voyages which had been at the beginning stage of their construction before 1 January 2010 and have closed vehicle and Ro-Ro spaces equipped with fixed water pressure spraying systems, a survey is to be conducted to verify that the measures specified in **20.5.1-5, Part R of the Rules** have been carried out by the first survey after 1 January 2010.

- (11) Carriage of dangerous goods

For cargo ships with cargo spaces intended for the carriage of packaged dangerous goods which are not less than 500 *gross tonnage* and had been at the beginning stage of construction on or after 1 September 1984 but before 1 January 2010 or which are less than 500 *gross tonnage* and had been at the beginning stage of construction on or after 1 February 1992 but before 1 January 2011, a survey is to be carried out to verify compliance with the requirement specified in **19.3, Part R of the Rules** in accordance with **Tables R19.1** and **R19.3**, by the first special survey of the ship after 1 January 2011. However, the following provisions may apply:

- (a) Cargo ships not less than 500 *gross tonnage* which had been at the beginning stage of construction on or after 1 September 1984 but before 1 July 1986 need not comply with **19.3.3, Part R of the Rules** provided that they comply with the requirements which were in effect when such ships were constructed.
- (b) Cargo ships not less than 500 *gross tonnage* which had been at the beginning stage of construction on or after 1 September 1984 but before 1 July 1998 need not comply with **19.3.10-1** and **19.3.10-2, Part R of the Rules**.
- (c) Cargo ships less than 500 *gross tonnage* which had been at the beginning stage of construction on or after 1 February 1992 but before 1 July 1998 need not comply with **19.3.10-1** and **19.3.10-2, Part R of the Rules**.
- (d) Cargo ships not less than 500 *gross tonnage* which had been at the beginning stage of construction on or after 1 February 1992 but before 1 July 2002 need not comply with **19.3.3, Part R of the Rules** provided that they comply with the requirements which were in effect when such ships were constructed.
- (e) Cargo ships not less than 500 *gross tonnage* which had been at the beginning stage of construction on or after 1 September 1984 but before 1 July 2002 need not comply with **19.3.1, 19.3.5, 19.3.6** and **19.3.9, Part R of the Rules** provided that they comply with the requirements which were in effect when such ships were constructed.

- (12) Portable instruments for measuring oxygen concentrations

For tankers which had been at the beginning stage of construction prior to 1 January 2012, a survey is to be carried out by the first survey on or after 1 January 2012 to verify that the portable instruments for measuring oxygen concentrations specified in **4.5.7(1), Part R of the Rules** are equipped.

- (13) Devices to prevent the passage of flame (flame screen, flame arrester, detonation flame arrester and high velocity device)

For devices to prevent the passage of flame required to ships which had been at the beginning stage of construction before 1 January 2013 and for ships which carry cargos shown as apparatus groups IIB, IIC or no apparatus group assigned in the column *i* of **Table S17.1, Part S of the Rules**, a survey is to be carried out to verify that the devices are in compliance with the requirements of **7.4.2-2, Chapter 7, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use** by the first scheduled dry-docking after 1 January 2013.

- (14) Means of recharging breathing apparatus cylinders and spare cylinders

For ships at the beginning stage of construction prior to 1 July 2014, a survey is to be carried out by the first survey on or after 1 July 2014 to verify compliance with the requirements of **15.2.3, Part R of the Rules**.

- (15) Fire-fighter's communication

For ships at the beginning stage of construction prior to 1 July 2014, a survey is to be carried out by the first survey on or after 1 July 2018 to verify compliance with the requirements of **10.10.4, Part R of the Rules**.

- (16) Fire-fighter's outfits

For ships equipped with self-contained compressed air breathing apparatus of fire-fighter's outfits which had been at the beginning stage of construction before 1 July 2014, a survey is to be carried out to verify that such apparatuses comply with the requirements of **23.2.1-2(2), Part R of the Rules** by the first survey on or after 1 July 2019.

- (17) Stability instruments for ships carrying dangerous chemicals in bulk

For ships carrying dangerous chemicals in bulk which had been at the beginning stage of construction before 1 January 2016, a survey is to be carried out to verify compliance with the requirements of **2.2.3, Part S of the Rules** by the first scheduled special survey on or after 1 January 2016 but not later than 1 January 2021.

(18) Stability instruments for ships carrying liquefied gases in bulk

For ships carrying liquefied gases in bulk which had been at the beginning stage of construction before 1 July 2016, a survey is to be carried out to verify compliance with the requirements of **2.2.3, Part N of the Rules** by the first scheduled special survey on or after 1 July 2016 but not later than 1 July 2021.

(19) Portable gas detector

For vehicle carriers defined in **3.2.54, Part R** for the carriage of motor vehicles with compressed natural gas in their tanks for their own propulsion and/or motor vehicles with compressed hydrogen in their tanks for their own propulsion which had been at the beginning stage of construction before 1 January 2016, a survey is to be carried out to verify compliance with the requirements of **20A.5, Part R of the Rules** by the first survey on or after 1 January 2016.

(20) Portable atmosphere testing instruments for enclosed spaces

For ships of not less than 500 *gross tonnage* engaged on international voyages which had been at the beginning stage of construction before 1 July 2016, it is to be verified that portable atmosphere testing instruments complying with **1.5.1, Part B of the Rules** are provided on board by the first survey on or after 1 July 2016.

(21) Ships operating in polar waters

For ships operating in polar waters defined in **1.1.1-2, Part I of the Rules** at the beginning stage of construction before 1 January 2017, a survey is to be carried out to verify compliance with the requirements of **Chapter 1** (except for **1.1.1-4, 1.1.1-5, 1.1.2, 1.1.3 and 1.1.4-2**) to **Chapter 7, Part I of the Rules** by the first Intermediate Survey or Special Survey after 1 January 2018, whichever occurs first.

(22) Ships using low-flashpoint fuels

(a) For ships that fall under the following **i**) or **ii**), a survey is to be carried out to verify compliance with the requirements of **Part GF of the Rules** before using low-flashpoint fuels or undertaking to use different low-flashpoint fuels than specified:

- i) Ships which convert to using low-flashpoint fuels on or after 1 January 2017; or
- ii) Ships which, on or after 1 January 2017, undertake to use low-flashpoint fuels different from those which they were originally approved to use before 1 January 2017.

(b) For ships that fall under the following **i**) or **ii**), a survey is to be carried out to verify compliance with the requirements of **GF11.3.1-1, GF11.3.1-2, GF12.5.2-2 and GF15.10.1, Part GF of the Guidance** before using low-flashpoint fuels or undertaking to use different low-flashpoint fuels than specified:

- i) Ships which convert to using low-flashpoint fuels on or after 1 July 2019; or
- ii) Ships which, on or after 1 July 2019, undertake to use low-flashpoint fuels different from those which they were originally approved to use before 1 July 2019.

(c) For ships that fall under the following **i**) or **ii**), a survey is to be carried out to verify compliance with the requirements of **11.8.1, Part GF of the Rules** and **GF11.3.1-2, Part GF of the Guidance** before using low-flashpoint fuels or undertaking to use different low-flashpoint fuels than specified:

- i) Ships which convert to using low-flashpoint fuels on or after 1 January 2024; or
- ii) Ships which, on or after 1 January 2024, undertake to use low-flashpoint fuels different from those which they were originally approved to use before 1 January 2024.

(23) Inspection/survey plans for cargo containment systems for ships carrying liquefied gases in bulk (including programs of non-destructive testing for periodical surveys for independent tanks of Type *B* and programs of examination and testing of cargo containment systems for periodical surveys for membrane and semi-membrane tanks)

For ships carrying liquefied gases in bulk which are at the beginning stage of construction on or after 1 July 2016, a survey is to be carried out to verify that the inspection/survey plans for cargo containment systems specified in **4.3.6, Part N of the Rules** are provided on board by the first survey on or after 1 July 2018.

(24) Inspection/survey plans for liquefied gas fuel containment systems for ships using low-flashpoint fuels (including programs of non-destructive testing for periodical surveys for independent fuel storage tanks of Type *B* and programs of examination and testing of liquefied gas fuel containment systems for periodical surveys for membrane tanks)

For ships which fall under the following, a survey is to be carried out to verify that the inspection/survey plans for liquefied gas fuel containment systems specified in **6.4.1-8, Part GF of the Rules** are provided on board by the first survey on or after 1 July 2018.

- (a) Ships using low-flashpoint fuels for which the building contract is placed on or after 1 January 2017; or
- (b) In the absence of a building contract, ships using low-flashpoint fuels which are at the beginning stage of construction on or after 1 July 2017; or
- (c) Ships using low-flashpoint fuels for which delivery is on or after 1 January 2021; or
- (d) Ships using low-flashpoint fuels which convert to using low-flashpoint fuels on or after 1 January 2017; or
- (e) Ships using low-flashpoint fuels which, on or after 1 January 2017, undertake to use low-flashpoint fuels different from those which it was originally approved to use before 1 January 2017.

**4** With respect to the provisions of **-3** above, for ships at beginning stage of construction, such construction began before the effective date of each Occasional Survey requirements and such ships are delivered after these effective date, the Classification Survey of such ships is regarded as either their “first survey” or their “first scheduled dry docking”; therefore, these ships need to comply with each of the requirements of Occasional Surveys by the completion date of their Classification Survey.

**5** With respect to the wording “whenever the survey is considered necessary by the Society” in **1.1.3-3(6), Part B of the Rules** means, for example, a case where abnormal conditions are observed from the measurement data of vibration measurement system or Fe-density measurement system used instead of the temperature sensors and the temperature recorder of the azimuth thrusters which adopts roller bearings for propeller shafts bearings. In this case, abnormal conditions are to be reported to the Society immediately. Upon review of the reports, the Society may request an occasional survey when considered necessary.

#### **B1.1.4 Periodical Surveys Carried Out in Advance**

Where an Annual Survey or Intermediate Survey was carried out in advance in accordance with **1.1.4-1** and **-2, Part B of the Rules**, the anniversary date is to be amended to a date which is not to be more than three *months* later than the date on which the Annual Survey or Intermediate Survey was completed. Subsequent Annual Surveys and Intermediate Surveys specified in **1.1.3-1(1)** and **1.1.3-1(2), Part B of the Rules** are to be carried out at the intervals using the new anniversary date. However, where the third Periodical Survey (determined using the intervals corresponding to the new anniversary date) after the previous Intermediate Survey is due before the expiry date of the Classification Certificate of the ship, the Intermediate Survey is to be carried out in lieu of the Annual Survey.

#### **B1.1.5 Postponement of Surveys**

The procedure and approval of the postponement of Periodical Surveys specified in **1.1.5, Part B of the Rules** are to be handled in accordance with **(1)** and **(2)** below;

##### **(1) Procedure for postponement of Surveys**

The ship's Owner or Captain is to submit the documents listed below for approval to the Society before the due time of the Survey intended to be postponed. The documents are to be submitted at any one of our offices at the applicant's convenience. However, where the report file of the Class Survey is not part of the submission, then the documents must be submitted to the head office.

- (a) Application form (**APP-PP**): 3 copies (or 2 copies in case where the application is to be submitted to the head office of the Society.)
- (b) Report file of Class Surveys

##### **(2) Approval of postponement of Surveys**

The Society will verify the items specified in **(a)** and **(b)** below, and upon approval, will return one copy of the application to the applicant as proof of approval. The applicant is to take suitable action, such as to keep the approval letter on board the ship, in order to show the Surveyor that the ship is accepted to extend the Survey by the Society.

- (a) The ship is maintained in good order. Verification may be made by reviewing the description of the current condition of the ship on the application and the report file of the Class Surveys.
- (b) There are no critical Conditions in the survey reports. Critical conditions (used hereafter in this Part) refer to matters that affect or may affect the seaworthiness of the ship.
- (c) Postponement of the Boiler surveys specified in **1.1.5-3, Part B of the Rules** is to be approved by the Society after the following is satisfactorily carried out.
  - i) External examination



- ii) Operation test of the relieving gear of the safety valve or the relief valve
- iii) Operation tests of safety devices, alarm devices and pressure indicators
- iv) Review of the following records since the last Boiler Survey
  - 1) Operation
  - 2) Maintenance
  - 3) Repair history
  - 4) Quality control of the feed water or thermal oil

#### **B1.1.6 Modification of the Requirements**

**1** “In cases where considered appropriate by the Society” specified in **1.1.6-1, Part B of the Rules** means only those cases where any of the modifications specified in **Table B1.1.6-1** are carried out during Periodical Surveys and Planned Machinery Surveys. However, this regulation is not to be applied to surveys required by international regulations or by the requirements of flag states.

**2** Conditions that “the Surveyor considers ... necessary” as used in **1.1.6-2, Part B of the Rules** means any of the following **(1)** and **(2)**:

- (1) Where the condition of protective coating in the compartment is poor
- (2) Where there are tanks or cargo holds similar in structure to tanks, cargo holds or ships that have experienced defects

**3** The procedures for internal examination, close-up survey, thickness measurements and hydrostatic tests of tanks and compartments required at Special Surveys carried out on the continuous survey basis in accordance with the requirements in **1.1.6-4, Part B of the Rules** are to conform to the following requirements in **(1)** to **(5)**.

- (1) Submission of application for CHS

Where the inspection and tests of the tanks and compartments of the hull are desired to be carried out under the CHS system, the applicant is to submit the inspection plan either on or separately attached to the application form (**Form-CHS-AP**).

- (2) Record book of CHS

When the application for CHS is made for the first time, a record book of CHS will be prepared by the Society and handed to the applicant.

- (3) Filing of application for survey and survey record book

The application for survey and survey record book are to be placed in the survey file provided on board the ship for proper custody.

- (4) Plan for CHS

The CHS is to commence at the time of the next survey after the Classification Survey or any Special Survey and finish at the time of the subsequent Special Survey.

- (5) Cancellation of CHS

- (a) Where an application for cancellation of CHS is made by the Owner or his representative, ordinary examinations required for compartments or tanks of ships not adopting CHS are to be carried out henceforth. However, where there are compartments or tanks that will not be covered by a Special Survey within 5 years of the previous survey, those compartments and tanks are to be examined within those 5 years.
- (b) CHS may be cancelled if the CHS is not carried out in accordance with the Guidance. In this case, the ship is to be handled in accordance with the requirements in (a).
- (c) Where the Owner changes, the CHS is, as a rule, discontinued. Where the new Owner wishes to continue CHS, an application is to be made in accordance with the requirements specified in **(1)** above.

Table B1.1.6-1 Modification of Requirements

Survey	Extent and contents of survey
1 General	The surveyor may extend the contents of an examination based on the survey history of the ship.
2 Surveys for similar ships or similar tanks	In cases where damage has occurred in similar ships or similar tanks, the scope of examinations may be expanded.
3 Examination of auxiliary machinery and pressure vessels	With the exception of general examinations, auxiliary machinery and pressure vessels subject to examinations in accordance with the Rules are as follows: (1) Essential auxiliary machinery as specified in <b>1.1.6, Part D of the Rules</b> . (2) Pressure vessels (Group I and II) and pressure vessels (Group III) for essential uses as specified in <b>10.1.3, Part D of the Rules</b> .
4 Examination of machinery and equipment of small capacity or infrequent use	Examinations of the following machinery and equipment in working condition and general examinations are to be carried out during Special Surveys. An open-up examination is required based on the results of the examination. (1) Air compressors for emergency use and their motors (2) Starting devices of boilers in cold conditions (3) Forced draft fans, pumps, and related parts attached to small packaged boilers (4) Electrical heaters with a capacity of not more than 10 kW (5) Oil tanks with a capacity of not more than 1 m <sup>3</sup> (6) Lubricating oil tanks (7) Hand pumps (for bilge, transfer of fuel oil, etc.)
5 Boiler Surveys	With respect to Boiler Surveys, the following requirements (1) and (2) may be applied. (1) The examinations of boilers other than those of water tube type subject to Classification Surveys may be modified at the first Boiler Survey after the Classification Survey at the discretion of the Surveyor based on present conditions. (2) The required examinations for pressure vessels less than 8 years of age used for processing fish may be modified at the discretion of the Surveyor.
6 Others	With respect to other surveys in cases where specially approved by the Society, examinations are to be carried out in accordance with approved measures.

**B1.1.7 Bulk Carriers**

1 In order to appropriately verify the thickness of the vertical corrugated watertight bulkhead abaft the foremost hold, the thickness measurements required in **1.1.7-1, Part B of the Rules** subject to compliance with **31B.3, Part C of the Rules** are to be carried out for the following positions.

- (1) Lower end of the corrugation (Refer to Level A in **Fig. B1.1.7-1**)
  - (a) The mid-breadth of each corrugation flange at approximately 200 mm above the line of shedder plates;
  - (b) The mid-breadth of each corrugation web at approximately 200 mm above the line of shedder plates;
  - (c) The middle of the shedder plates;
  - (d) The middle of the gusset plates between corrugation flanges, where fitted.
- (2) Mid-span of corrugation (Refer to Level B in **Fig. B1.1.7-1**)
  - (a) The mid-breadth of each corrugation flange and webs at about the mid-height of the corrugation. Where the thickness changes within this horizontal level, the thinner plate is to be gauged.

2 The thickness measurements required in **1.1.7-1, Part B of the Rules** subject to compliance with **31B.5, Part C of the Rules** are to be carried out as follows.

- (1) For the purpose of steel renewal, sand blasting and coating, four zones A, B, C and D are defined as shown in **Fig. B1.1.7-2**.
- (2) Thickness measurement methodology
  - (a) The number of side frames to be measured is to be determined in accordance with **5.2.6-4, Part B of the Rules** for Special Surveys, or **4.1.1-2** or **4.2.6, Part B of the Rules** corresponding to the ship's age for Intermediate Surveys. Where

measurements are nearing the steel renewal or reinforcing criteria ( $t_{REN}$  or  $t_{COAT}$  in **31B.5, Part C of the Rules**), the number of hold frames to be measured is to be increased.

- (b) If renewal or reinforcement is required on individual frames in a hold, then all the frames in that hold are to be measured.
  - (c) Representative thickness measurements are to be taken for each zone as specified in (d) through (f) below. However, special consideration may be given to the extent of the thickness measurements where deemed appropriate by the Society, if the structural members show no thickness diminution with respect to the original thickness and the coating is found in an “as-new” condition (i.e., without breakdown or rusting).
  - (d) The gauging pattern of web plating for zones *A*, *B* and *D* is to be a five point pattern. See **Fig. B1.1.7-3**. The 5 point pattern is to be over a square area extending the depth of the web. The gauging report is to reflect the average reading.
  - (e) Depending upon the condition of the web in way of zone *C*, the web may be measured by taking 3 readings over the length of zone *C* and averaging them. The average reading is to be compared with the allowable thickness. If the web plating has general corrosion then this pattern is to be expanded to a five point pattern as noted in (d) above.
  - (f) Where the calculation of the actual section modulus of the brackets and side frames at sections *a*) and *b*) is required in accordance with **31B.5.3-5(1), Part C of the Rules**, at least 2 readings on the flange/faceplate are to be taken in way of each section and, at least one reading of the attached shell plating is to be taken on each side of the frame (i.e. fore and aft) in way of each section. See **Fig. B1.1.7-4**. If bulb plate has been used, then the web of the bulb plate is to be measured in the normal manner and special consideration needs to be given to the sectional modulus.
- (3) Pitting and grooving
- (a) Coating blisters over the pits are to be removed before inspection. Some pits are to be ground as deemed necessary before assessment.
  - (b) To measure the plate thickness of pits or grooving the normal ultrasonic transducer (generally 10 mm diameter) will not suffice. A miniature transducer (3 to 5 mm diameter) is to be used. Alternatively a pit gauge can be used to measure the depth of the pits and grooving and the remaining thickness calculated.
  - (c) If pitting intensity is higher than 15% in one area (see **Fig. B1.1.7-5**), then thickness measurements are to be taken to check the extent of the pitting corrosion. The 15% is based upon pitting or grooving on only one side of the web. In this case, an area of 300 mm diameter or more is to be cleaned down to bare metal at the most pitted part of the frame, and the thickness is to be measured in way of the five deepest pits within the cleaned area. The least thickness measured in way of any of these pits is to be recorded.
  - (d) The minimum acceptable remaining thickness in any pit or groove is equal to:
    - (i) 75% of the as built thickness, for pitting or grooving in the cargo hold frame and bracket webs and flanges.
    - (ii) 70% of the as built thickness, for pitting or grooving in the side shell, hopper tank and topside tank plating over a width up to 30 mm from each side of the connection to the cargo hold side frame.
- 3** The thickness measurements required in **1.1.7-2** and **-3, Part B of the Rules** are to be carried out according to **-1** and **-2** above.

Fig. B1.1.7-1 Additional Gauging Position

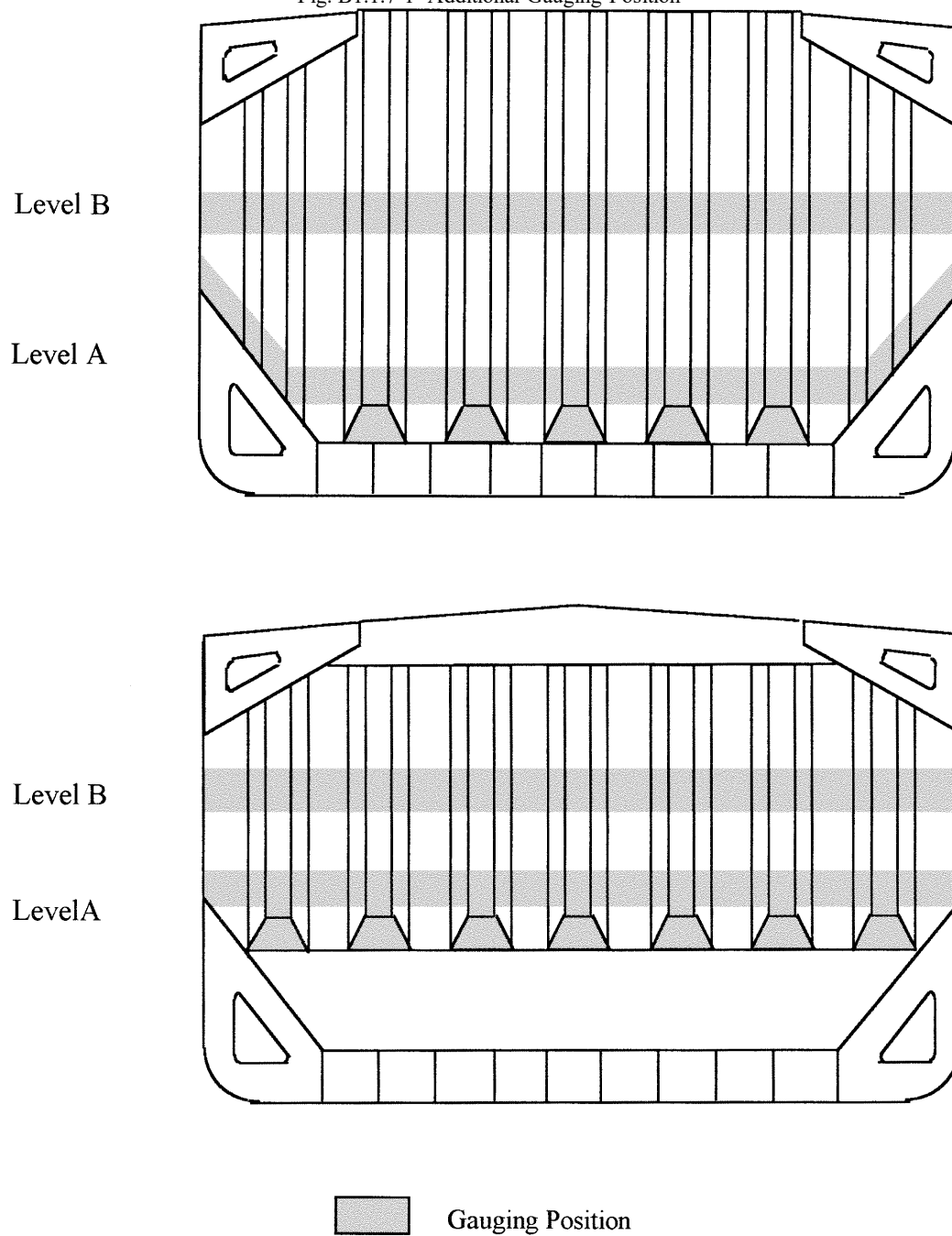


Fig. B1.1.7-2 Lower Part and Zones of Side Frame

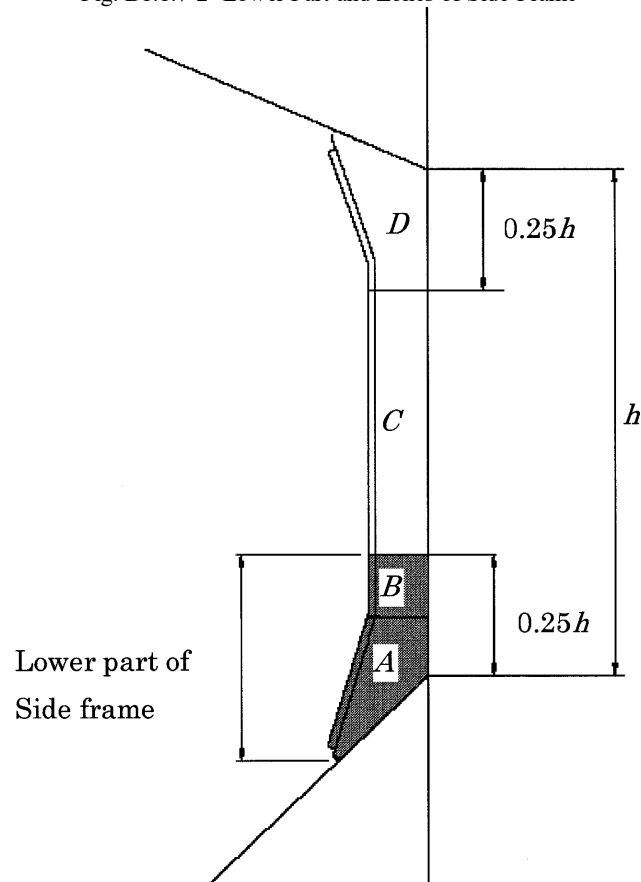


Fig. B1.1.7-3 Typical 5 Point Pattern on the Web Plate

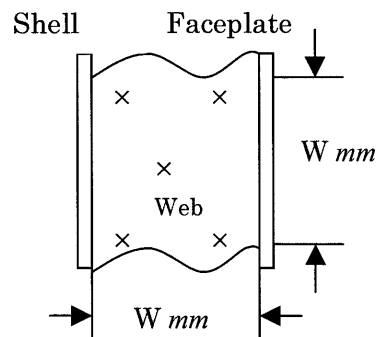


Fig. B1.1.7-4 Sections *a*) and *b*)

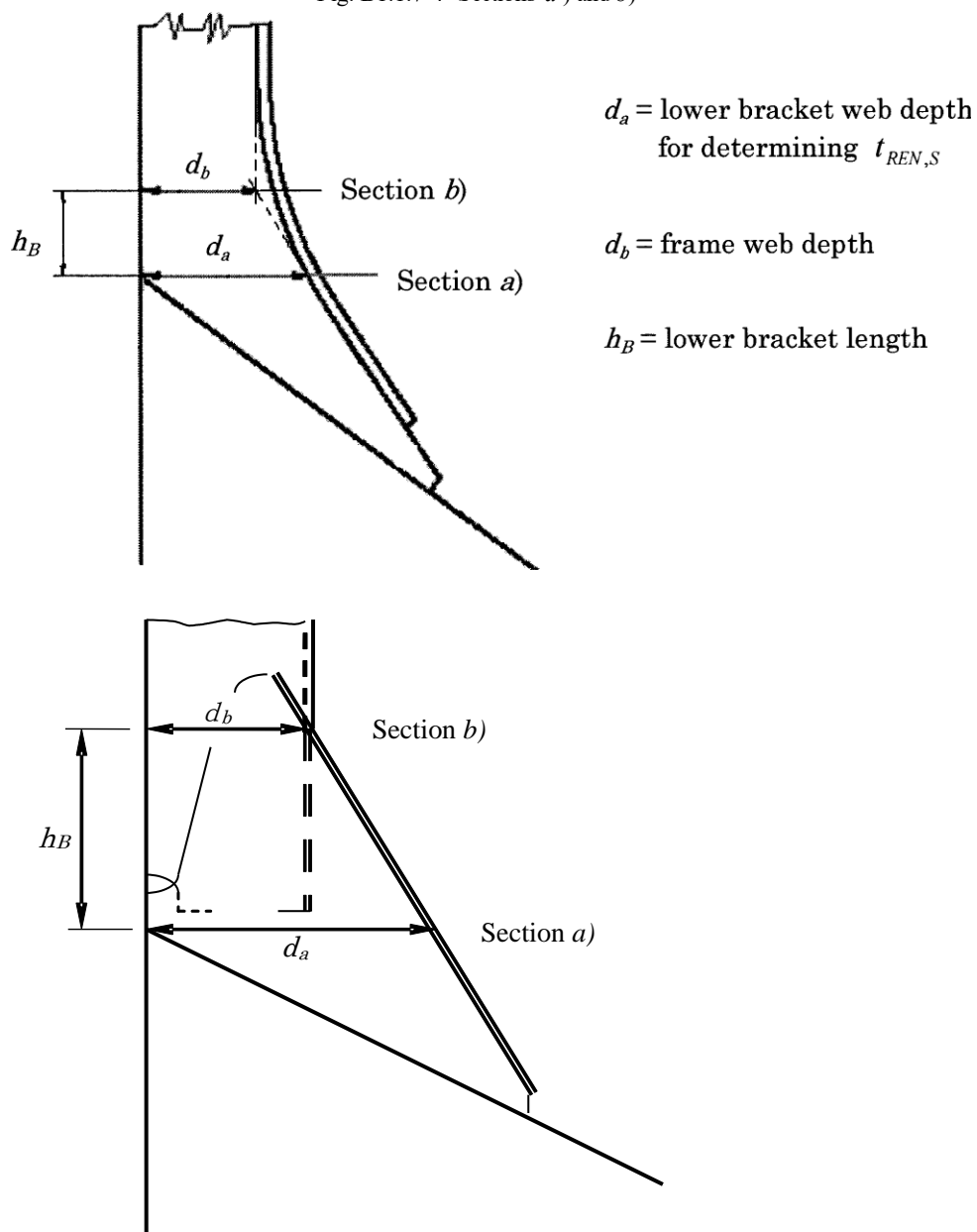
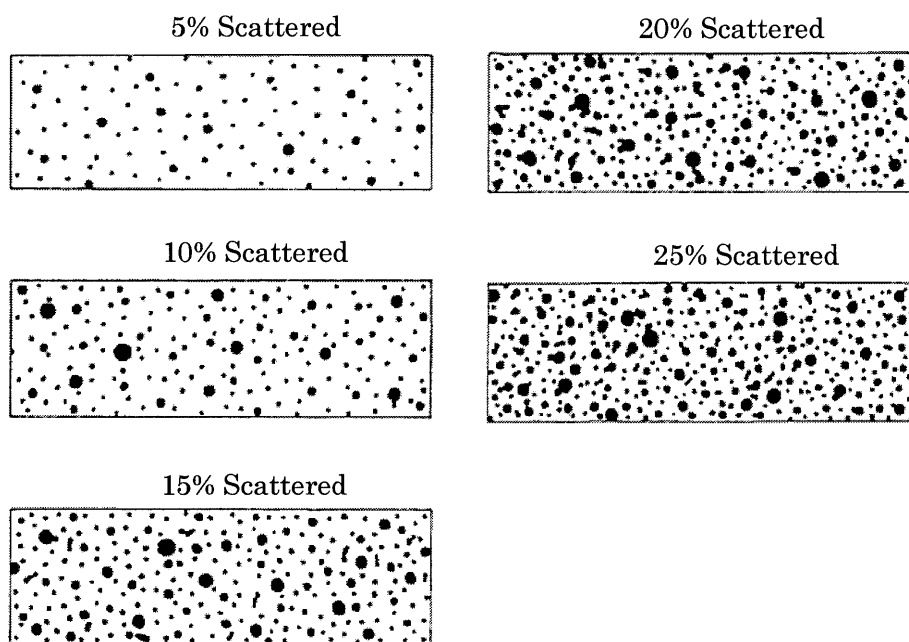


Fig. B1.1.7-5 Pitting Intensity Diagrams (from 5% to 25% intensity)

**B1.1.8 Laid-up Ships**

For the commencement of lay-up, the Owner is required to submit the three copies of the application form (**Form B1-1**) to the Society's local office.

**B1.1.10 Self-unloading Ships**

With respect to the provisions of **1.1.10, Part B of the Rules**, surveys for self-unloading ships are to be carried out in accordance with the requirements for bulk carriers except for the requirements specified in **2.3.1, Part B of the Rules**, **B1.1.3-9(5)**, **B1.3.1-3**, **B1.4.2-12**, **B3.2.3-5** and **B3.2.3-6**.

**B1.3 Definitions****B1.3.1 Terms**

1 "General dry cargo ships" as defined in **1.3.1(15), Part B of the Rules** does not include livestock carriers and dock/deck ships (such ships designed to carry cargo exclusively above deck without any access for cargo below deck).

2 "Ships primarily carrying log cargoes" as specified in **1.3.1(16), Part B of the Rules** refers to ships with provisions for loading of timber cargoes, such as eye plates, stanchions, etc.

3 "Hatch covers and hatch coamings for cargo holds of ships stipulated otherwise by the Society" in **1.3.1(6)(b), Part B of the Rules** is as specified in the following (1) to (5).

- (1) Hatch covers located forward of  $0.25 L_1$  from the forward end of  $L_1$  of bulk carriers which are contracted for construction on or after 1 July 1998 and prior to 1 January 2004 and are at a beginning stage of construction prior to 1 January 2005

Renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in the as built thickness, the value may be at the discretion of the Society.  $L_1$  is the length of ship specified in **2.1.2, Part A of the Rules** or 0.97 times the length of ship on the designed maximum load line, whichever is smaller ( $m$ ).

$$t_{\text{renewal}} = t_{\text{as-built}} - t_c + 0.5 \text{ (mm)}$$

$t_{\text{as-built}}$ : as built thickness (mm)

$t_c$ : Corrosion addition specified in **Table B1.3.1-1(a)**

- (2) Hatch covers and hatch coamings of bulk carriers not complying with the provisions of **Part CSR-B** or **Part CSR-B&T of the Rules**, and which are contracted for construction on or after 1 January 2004 or are at the beginning stage of construction on or after 1 January 2005; or ships other than bulk carriers which are at the beginning stage of construction on or after 1 January 2005 and that have the application for Classification Survey during Construction submitted to the Society prior to 10 June 2005
- Renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in the as built thickness, the

value may be at the discretion of the Society.

$$t_{\text{renewal}} = t_{\text{as-built}} - t_c + 0.5 \text{ (mm)}$$

$t_{\text{as-built}}$ : as built thickness (mm)

$t_c$ : Corrosion addition specified in **Table B1.3.1-1(b)**

- (3) Hatch covers and hatch coamings of ships other than bulk carriers that have the application for Classification Survey during Construction submitted to the Society on or after 10 June 2005

Renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in the as built thickness, the value may be at the discretion of the Society.

$$t_{\text{renewal}} = t_{\text{as-built}} - t_c + 0.5 \text{ (mm)}$$

$t_{\text{as-built}}$ : as built thickness (mm)

$t_c$ : Corrosion addition specified in **Table B1.3.1-1(c)**

Where corrosion addition  $t_c$  is 1.0 (mm), renewal thickness may be given by the formula  $t_{\text{renewal}} = t_{\text{as-built}} - t_c \text{ (mm)}$

- (4) Hatch covers and hatch coamings of ships which are contracted for construction on or after 1 July 2012 except bulk carriers defined in **1.3.1(13), Part B** (excluding those affixed with the notation “CSR”), self-unloading ships defined in **1.3.1(19), Part B** and ships other than ordinary bulk carriers with a single deck, and bilge hopper tanks, topside tanks and a double bottom for the length of the cargo area. Renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in as built thickness, the value may be at the discretion of the Society.

$$t_{\text{renewal}} = t_{\text{as-built}} - t_c + 0.5 \text{ (mm)}$$

$t_{\text{as-built}}$ : as built thickness (mm)

$t_c$ : Corrosion addition specified in **Table B1.3.1-1(d)**

Where corrosion addition  $t_c$  is 1.0 (mm), renewal thickness may be given by the formula  $t_{\text{renewal}} = t_{\text{as-built}} - t_c \text{ (mm)}$

- (5) Hatch covers and hatch coamings of ships which are contracted for construction on or after 1 July 2024 (excluding those affixed with the notation “CSR”). Renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in as built thickness, the value may be at the discretion of the Society.

$$t_{\text{renewal}} = t_{\text{as-built}} - t_c + 0.5 \text{ (mm)}$$

$t_{\text{as-built}}$ : as built thickness (mm)

$t_c$ : Corrosion addition specified in **Table B1.3.1-1(e)**

Where corrosion addition  $t_c$  is 1.0 (mm), renewal thickness may be given by the formula  $t_{\text{renewal}} = t_{\text{as-built}} - t_c \text{ (mm)}$

Table B1.3.1-1(a)

		Corrosion addition $t_c$ (mm)	
Steel Hatch Cover	Type of structure	For top, side and bottom plating	For internal structures
	Single plating type	2.0	
	Double plating type	2.0	1.5

Table B1.3.1-1(b)

		Corrosion addition $t_c$ (mm)	
Steel Hatch Cover	Type of structure	For top, side and bottom plating	For internal structures
	Single plating type	2.0	
	Double plating type	2.0	1.5
Hatch Coaming		1.5	



Table B1.3.1-1(c)

		Corrosion addition $t_c$ (mm)	
Steel Hatch Cover	Type of structure	For top, side and bottom plating	For internal structures
	Single plating type	2.0(*1)	
	Double plating type	1.5(*1)	1.0
Hatch Coaming		1.5	

(\*1) For steel hatch covers in way of cellular cargo holds: 1.0(mm)

Table B1.3.1-1(d)

Type of ship	Type of structural member		Corrosion addition $t_c$ (mm)
Container carriers and car carriers	Steel hatch cover		1.0
	Hatch coaming		1.5
Ships other than those specified above	Single plating type hatch cover		2.0
	Double plating type hatch cover	Top, side and bottom plating	1.5
		Internal structures	1.0
	Hatch coaming, hatch coaming stay and stiffeners		1.5

Table B1.3.1-1(e)

Type	Ship type	Framing system		$t_c$ (mm)
Type 1 ship	Ships other than the below	Single skin hatch covers		2.0
		Double skin hatch covers	Top, side and bottom plating	1.5
			Internal structural members	1.0
		Hatch coamings, hatch coaming stays and stiffeners		1.5
	Container carrier Car carrier	Hatch covers (in general)		1.0
		Hatch coamings		1.5
Type 2 ship	Ore carrier Combination carriers which are designed to carry either oil or solid cargoes in bulk, like ore/oil carriers. Self-unloading ships (Ships specified in 1.3.1(13), Part B(excluding those affixed with the notation "CSR") and (19))	Single skin hatch covers		2.0
		Double skin hatch covers	Top, side and bottom plating	2.0
			Internal structural members	1.5
		Hatch coamings, hatch coaming stays and stiffeners		1.5

## Notes

- (1) Corrosion additions for both sides of hatch covers and hatch coamings on non-exposed decks are to be as deemed appropriate by the Society.
- (2) The definitions of Type 1 ship and Type 2 ship are given 14.6.1.2, Part 1, Part C.

4 For transverse watertight bulkheads in cargo holds complying with the provision of **Annex 1.1, Part 2-2, Part C of the Rules**, as specified in **1.3.1(6)(c), Part B of the Rules**, the renewal thickness is given by the following (1) and (2).

- (1) For ships that have the application for Classification Survey during Construction submitted to the Society prior to 1 July 2007, renewal thickness ( $t_{\text{renewal}}$ ) is given by the following formula. If a voluntary addition is included in the as built thickness, the value may be at the discretion of the Society.

$$t_{\text{renewal}} = t_{\text{as-built}} - 3.0 \text{ (mm)}$$

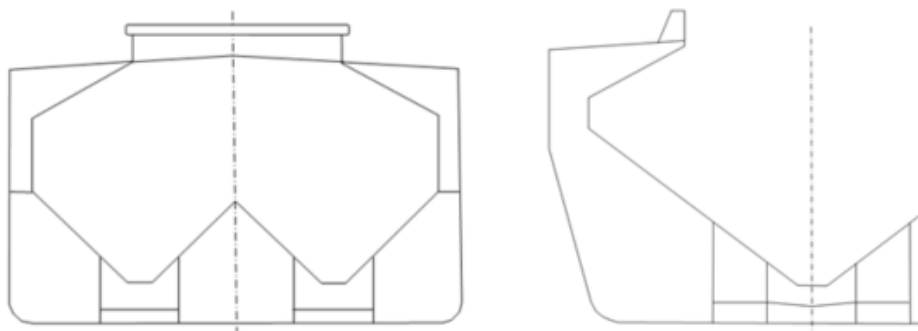
$t_{\text{as-built}}$ : as built thickness (mm)

- (2) For ships that have the application for Classification Survey during Construction submitted to the Society on or after 1 July 2007, renewal thickness ( $t_{\text{renewal}}$ ) is given by the value indicated in the structural drawings in accordance with the requirements in **An3.6, Annex 1.1, Part 2-2, Part C of the Rules**.

5 “Critical structural areas” as specified in **1.3.1(4), Part B of the Rules** means locations which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

6 An example of typical midship sections of the “Self-unloading ships” defined in **1.3.1(19), Part B of the Rules** is shown in **Fig. B1.3.1-6**.

Fig. B1.3.1-6 Typical Midship Sections of Self-unloading ships



## B1.4 Preparation for Survey and Other Items

### B1.4.2 Preparation for Surveys

1 The preparation for surveys specified in **1.4.2, Part B of the Rules** includes taking measures against present dangers. “Present dangers” used here includes improper arrangement of scaffolding, lack of lighting, fire, explosion, electric shock, falling objects, harmful gases and oxygen shortage.

2 The applicant is to make the necessary preparations so that tests and examinations to reveal corrosion, deformation, fractures, damage, or other structural deterioration can be conducted smoothly. This includes cleaning compartments; freeing water, scale, dirt, oil residues and gas; and providing means of access, sufficient lighting, non-destructive testing equipment and other necessary items. Furthermore, casings, ceilings or linings, and loose insulation, where fitted, are to be removed as required by the Surveyor. However, the areas of structural members already designated for renewal need only be cleaned and descaled to the extent necessary to determine the limits of renewal. The means of access to the survey area (e.g. temporary staging and rafts) is to comply with the requirements specified in Means of Access, **14.16, Part 1, Part C of the Rules** and the soundness of its construction is to be verified.

3 The applicant is to prepare the items indicated in (1) to (4) below in addition to the preparations specified in -1 and -2 above. Furthermore, where the preparations for the survey are made by the crew members of the ship, the applicant is to give necessary instructions to the crew members in order to assist the Surveyor.

- (1) A communication system between the survey party in the tank and the officer in charge on the deck
- (2) A portable gas detector, potable oxygen-meter, breathing apparatus, whistle, safety belts, and lifelines
- (3) Adequate and safe lighting and protective clothing
- (4) If breathing apparatus and/or other equipment is used as “Rescue and emergency response equipment” then it is recommended

that the equipment should be suitable for the configuration of the space being surveyed.

**4** Surveys of tanks by means of boats or rafts may only be made with the agreement of the Surveyor, who takes into account the safety arrangements provided, including weather forecasts and ship response under foreseeable conditions; and provided the expected rise of water within the tank does not exceed 0.25 m. In this case, in addition to preparations as specified in **-1** to **-3**, the applicant is to ensure the following.

- (1) A communication system is to be arranged between the survey party on the boats or rafts in the tank and the personnel in charge of ballast pump handling
- (2) Appropriate life jackets are to be available for all participants
- (3) The tank or space is to contain clean ballast water only.
- (4) The boat or raft is to be tethered to the access ladder and an additional person is to be stationed down the access ladder with a clear view of the boat or raft.
- (5) The surface of the water in the tank or hold is to be calm and the water level stationary. On no account is the level of the water to be rising while the boat or raft is in use.
- (6) At no time is the water level to be allowed to be within 1 m of the deepest under deck web face flat, so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses is only to be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times. Other effective means of escape to the deck may be considered.
- (7) If the tanks are connected by a common venting system, or inert gas system, the tank in which the boat or raft is used is to be isolated to prevent a transfer of gas from other tanks.

**5** Boats or rafts used in the survey specified in **-4** above are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. Moreover, the following conditions apply when using boats or rafts during a survey of tanks and spaces in the under deck areas of oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks.

- (1) Boats or rafts alone may be allowed if the depth of the webs is 1.5 m or less.
- (2) If the depth of the webs is more than 1.5 m, boats or rafts alone may be allowed when at least one of the following conditions is satisfied:
  - (a) The coating of the under deck structure is in GOOD condition and there is no evidence of wastage
  - (b) A permanent means of access as described below is provided in each bay to allow safe entry and exit
    - i) Direct access from deck via a vertical ladder and a small platform is to be fitted approximately 2 m below the deck; or
    - ii) Access to the deck from a longitudinal permanent platform which is to be of the full length of the tank and arranged in level with or above the maximum water level needed for rafting of under deck structures and to have ladders to the deck in each end of the tank. The maximum water level is to be assumed to be not more than 3 m from the deck plate measured at the midspan of the deck transverses and in the middle of the length of the tank.

If neither of the above conditions are met, then staging or another equivalent means is to be provided for the survey of the under deck areas.

- (3) The use of boats or rafts alone in **(1)** and **(2)** above does not preclude the use of boats or rafts to move about within a tank during a survey.

**6** In oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks, the following documents from **(1)** to **(9)** are to be kept on board the ship to be readily available for the Surveyor. In general dry cargo ships of not less than 500 gross tonnage, at least **(1)** and **(3)** of the following documents are to be kept on board the ship.

- (1) Records on structural surveys
- (2) Condition evaluation report. Where the language used in preparation of the report is not English, a translation into English is to be included. (and see the requirement in **B5.2.6-6(6)** for bulk carriers built under **Part CSR-B** or **Part CSR-B&T of the Rules** and all oil tankers)
- (3) Thickness measurement reports
- (4) Main structural plans for hull (for ships built under **Part CSR-B**, **Part CSR-T** or **Part CSR-B&T of the Rules**, these plans are to include both as-built and renewal thickness. Any thickness for voluntary additions is also to be clearly indicated on the plans. A midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional

properties for transverse sections in all cargo holds of bulk carriers or cargo tanks of double hull oil tankers specified in either **1.4 Section 2 Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **2.2, Section 2, Chapter 13, Part 1, Part CSR-B&T of the Rules**.)

- (5) Cargo and ballast history
- (6) Previous repair history
- (7) Records of inspections by ship's personnel with reference to structural deterioration in general, the leakage in bulkheads and piping and the condition of coating or corrosion prevention system, if any. An example of the format which can be used for such records is shown in Form B1-1, but other formats may be used instead.
- (8) In oil tankers and ships carrying dangerous chemicals in bulk, extent of use of inert gas plant and tank cleaning procedures
- (9) Any other information that will help identify Suspect Areas requiring inspection

However, ships which do not engage in international voyages and are classed for restricted service such as having class notation "Coasting Service", "Smooth Water Service", etc., as specified in **1.4.2-2, Part B of the Rules** need not keep on board the document of (2) above.

**7** The applicant is to submit a Survey Planning Questionnaire including the following information from **(1)** to **(6)** prior to the development of the Survey Programme referred to in **1.4.2-2, Part B of the Rules**.

- (1) Basic ship information and particulars
- (2) Information on access provision for close-up surveys and thickness measurement
- (3) Records of inspections by ship's personnel with reference to structural deterioration in general.
- (4) List of the reports of Port State Control inspections containing hull structural related deficiencies and relevant information on rectification of those deficiencies
- (5) List of non-conformities related to hull maintenance, including the associated corrective actions
- (6) Name, address and Approval Number of the approved thickness measurement company

**8** The Survey Programme referred to in **1.4.2-2, Part B of the Rules**, is to include the following information from **(1)** to **(15)**. The contents of the Survey Programme are to be agreed upon between the applicant and the surveyor prior to commencement.

- (1) Basic ship information and particulars
- (2) Plan of tanks/holds
- (3) List of tanks/holds to be surveyed with information on prevention and condition of coating
- (4) Nomination of tanks and areas for Close-up Survey
- (5) Nomination of tanks and sections for Thickness Measurement
- (6) Nomination of tanks for pressure testing (including pipes for ships carrying dangerous chemicals in bulk)
- (7) Safety conditions for survey (including provisions for access, etc.)
- (8) Equipment for surveys
- (9) Minimum thickness data of hull structures
- (10) Thickness measurement company (if changed from the one specified in the Survey Planning Questionnaire)
- (11) Damage and repair history
- (12) Areas identified with substantial corrosion from previous surveys
- (13) Critical structural areas and suspect areas (if such information is available)
- (14) Main structural plans for hull
- (15) Survey Planning Questionnaire specified in **-7** above

**9** For oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks, the documents of **-6(1)** to **(3)** above are to be kept in the owner's office.

**10** "Provisions of an easy and safe access" referred to in **1.4.2-1, Part B of the Rules** are as specified in **(1)** through **(4)**.

- (1) For close-up surveys of the hull structure, other than cargo hold shell frames of bulk carriers:
  - (a) Permanent staging and passages through structures
  - (b) Temporary staging and passages through structures
  - (c) Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms
  - (d) Boats or rafts for ballast tanks and cargo tanks

Boats or rafts may be applied to void spaces and other similar spaces provided the structural capacity of the space is

sufficient to withstand static loads at all levels of water.

- (e) Portable ladders
  - (f) Other equivalent means
- (2) For close-up surveys of the cargo hold shell frames of bulk carriers less than 100,000DWT:
- (a) Permanent staging and passages through structures
  - (b) Temporary staging and passages through structures
  - (c) Portable ladder restricted to not more than 5 m in length may be accepted for surveys of lower sections of shell frames including brackets
  - (d) Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms
  - (e) Boats or rafts provided the structural capacity of the hold (used for ballast) is sufficient to withstand static loads at all levels of water
  - (f) Other equivalent means
- (3) For close-up surveys of the cargo hold shell frames of bulk carriers of 100,000 DWT or more:
- (a) For Annual surveys, Intermediate surveys (ships under 10 years of age) and Special survey No.1:
    - i) Permanent staging and passages through structures
    - ii) Temporary staging and passages through structures
    - iii) Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms
    - iv) Boats or rafts provided the structural capacity of the hold (used for ballast) is sufficient to withstand static loads at all levels of water
    - v) Other equivalent means

Notwithstanding the above, the use of a portable ladder fitted with a mechanical device to secure the upper end of the ladder is acceptable for the close-up survey of side frames at Annual surveys. However, it is not acceptable for the close-up survey of suspect areas identified at the previous or current survey.
  - (b) For Subsequent Intermediate Surveys (ships not less than 10 years of age) and Special surveys:
    - i) Permanent staging and passages through structures
    - ii) Temporary staging and passages through structures
    - iii) Hydraulic arm vehicles such as conventional cherry pickers for surveys of lower and middle parts of side frames (However, the use of hydraulic arm vehicles or aerial lifts may be accepted by the attending surveyor for the close-up surveys of the upper parts of side shell frames or other structures in all cases where the maximum working height is not more than 17 m.)
    - iv) Lifts and movable platforms
    - v) Boats or rafts provided the structural capacity of the hold (used for ballast) is sufficient to withstand static loads at all levels of water
    - vi) Other equivalent means
- (4) For close-up surveys using remote inspection techniques:
- (a) Unmanned robot arms
  - (b) Remotely Operated Vehicles
  - (c) Unmanned Aerial Vehicles / Drones
  - (d) Other means acceptable to the Society

**11** As a rule, the following preparations in (1) to (4) are to be made for Special Surveys.

- (1) For the first Special Survey, the preparations specified in (a) to (d) below are to be made.
- (a) Coal and ballast, articles not permanently attached to the hull, and all limber boards are to be removed. Mud boxes are to be opened, strainers of bilge suction pipes exposed and interior of the hull cleared.
  - (b) For ships of single bottom construction, at least one strake of bottom ceilings is to be removed on each side of the centreline and in way of the bilge. Flooring plates are to be removed in machinery space where considered necessary.
  - (c) For ships of double bottom construction, the ceiling is to be removed as required by the Surveyor for examination of the condition of top plating.
  - (d) Water and oil residue in tanks and compartments are to be thoroughly cleaned. Gas inside fuel oil tanks and cargo tanks is

to be removed to ensure safety during examinations.

- (2) For the second Special Survey, in addition to the requirements in (1) above, the preparations specified in (a) and (b) below are to be made.
  - (a) In way of single bottoms, one strake of the ceilings on each side near the keelson is to be removed for the length of the entire ship.
  - (b) In way of double bottom and deep water or oil tanks, ceilings at the bilge (including limber), centreline parts, lower parts of pillars and bulkheads, shaft tunnels and any other parts considered necessary by the Surveyor are to be removed.
- (3) For the third Special Survey, in addition to the requirements in (1) and (2) above, the preparations specified in (a) to (e) below are to be made.
  - (a) Most ceilings and linings in holds and coal bunkers and flooring plates in machinery spaces are to be removed. Rust on the outside and inside of the ship is to be chipped off.
  - (b) Throughout the ship, an extensive number of ceilings in way of single bottom, double bottom and deep water or oil tanks are to be removed.
  - (c) Wood sheeting and deck composition on steel decks are to be removed as required by the Surveyor and part of the cement chocks on the ship's sides at the bilges and decks are to be removed.
  - (d) In way of cabin accommodations, the panelling below side scuttles is to be removed. More panels are to be removed where considered necessary by the Surveyor.
  - (e) Lubricating oil tanks are to be thoroughly cleaned out and gas freed to ensure safety during examinations.
- (4) For the fourth and subsequent Special Surveys, in addition to the requirements in (3) above, the preparations specified in (a) and (b) below are to be made.
  - (a) In way of single bottoms, one strake of ceilings on each side near the keelson is to be removed for the length of the entire ship.
  - (b) In way of double bottom and deep water or oil tanks, an extensive number of ceilings are to be removed.

**12** For bulk carriers as defined in **1.3.1(13), Part B of the Rules** and bulk carriers as defined in **An1.2.1(1), Annex 1.1, Part 2-2, Part C of the Rules** which are at the beginning stage of construction on or after 1 July 2006, the Surveyor is to confirm that the hatch covers on these ships are maintained in accordance with the resolution *MSC.169(79) "Standards for owner's inspection and maintenance of bulk carrier hatch covers"* by investigation of inspection records. Notwithstanding the above, this requirement may be waived for bulk carriers of less than 500 *gross tonnage* and those not engaged on international voyages with the Class Notation "*Coasting Service*", "*Smooth Water Service*".

**13** For ships not less than 500 *gross tonnage* which are engaged on international voyages, Surveyors are to confirm that the means of embarkation and disembarkation are maintained in accordance with Section 4 of *MSC.1/Circ.1331 "Guidelines for construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation"* by investigating the inspection records specified in **1.4.2-1, Part B of the Rules**.

**14** With respect to **1.4.2-4, Part B of the Rules**, the following items are to be agreed upon between thickness measurement company representative and owner's representative during Intermediate or Special Survey meetings. And, documented records of these agreements, including where and when the meeting took place and who attended, are to be maintained.

- (1) Reporting of thickness measurements on regular basis to the attending surveyor.
- (2) Prompt notification to the surveyor in case of following findings:
  - (a) excessive and/or extensive corrosion or pitting/grooving of any significance;
  - (b) structural defects like buckling, fractures and deformed structures;
  - (c) detached and/or holed structure; and
  - (d) corrosion of welds.

**15** With respect to **1.4.2-4, Part B of the Rules**, furthermore to **-14** above, the following items are to be confirmed during Intermediate or Special Survey meetings for oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks:

- (1) schedule of the vessel;
- (2) provision and arrangements for thickness measurements;
- (3) extent of the thickness measurements;

- (4) acceptance criteria;
- (5) extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
- (6) execution of thickness measurements;
- (7) taking representative readings of thickness measurement in general and where uneven corrosion/pitting is found;
- (8) mapping of areas of substantial corrosion; and
- (9) communication between attending surveyor, the thickness measurement company operators and owner representative concerning findings in survey.

#### **B1.4.4 Disposition when Repairs are Considered Necessary as a Result of Surveys**

Boilers, pressure vessels categorized in Group I and II and piping categorized in Group I and II that have undergone extensive repair are to be subjected to the hydrostatic tests in accordance with **2.2.2(2), Part B of the Rules** (the testing pressure may be reduced to the extent that the Surveyor considers appropriate). However, the hydrostatic test may be replaced by an appropriate non-destructive test.

#### **B1.4.5 Procedure for Tests, Wear and Tear, etc.**

With respect to **1.4.5-4, Part B of the Rules**, surveyors are to confirm at periodical surveys that asbestos-free declarations and supporting documents are provided for any replaced or newly installed fittings, equipment, parts, etc. The wording “materials containing asbestos” means that asbestos is present in the product/material above the threshold value stipulated in Appendix 1 of *IMO* resolution *MEPC.379(80)*.

#### **B1.4.6 Firms Engaged in Inspections, Measurements and Maintenance**

1 The wording “firm deemed appropriate by the Society” in **1.4.6-1, Part B of the Rules** refers to firms complying with the requirements of **Chapter 2, 3, 8 or 16, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society.

2 The wording “firm deemed appropriate by the Society” in **1.4.6-2 and -3, Part B of the Rules** refers to any of the following: firms complying with the requirements of **Chapter 6 or 15, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** respectively and approved by the Society; firms approved by the Administration; firms approved by duly authorized organizations acting on behalf of the Administration; or firms approved by other organizations which are acceptable to the Administration.

### **B1.5 Others**

#### **B1.5.1 Portable Atmosphere Testing Instruments for Enclosed Spaces**

The wording “suitable means are to be provided for the calibration of all such instruments” in **1.5.1, Part B of the Rules** refers to portable atmosphere testing instruments being calibrated on board or ashore in accordance with the manufacturer’s instructions together with corresponding calibration records being kept. In this regard, the calibration of portable atmosphere testing instruments does not include any pre-operational accuracy tests as recommended by the manufacturer.

Form B1-1

**OWNER'S INSPECTION REPORT****Structural condition**

Ship's name:

For tank No:

Grade of steel:      deck:      side:  
                          bottom:      longitudinal bulkhead:  
                          transverse bulkhead:

Elements	Cracks	Buckles	Corrosion	Coating condition	Pitting	Modification/repair	Other
Deck							
Bottom							
Side							
Longitudinal bulkhead							
Transverse bulkhead							

Repairs carried out due to:

Thickness measurements carried out  
 (dates):      Results in general:

Overdue surveys:

Outstanding conditions of class:

Comments:

Date of inspection:

Inspected by:

Signature:



## B2 CLASSIFICATION SURVEYS

### B2.1 Classification Survey during Construction

#### B2.1.7 Survey

1 In principle, the presence of the surveyor may be decreased as specified in **2.1.7-7(1), Part B of the Rules** provided that the place of manufacture has been surveyed and approved in accordance with the **Rules for Approval of Manufacturers and Service Suppliers**. Notwithstanding the principle, the presence of the surveyor may be decreased in cases where the Society deems it appropriate.

2 With respect to **2.1.7-1(9), Part B of the Rules**, the asbestos-free declarations and supporting documents specified in item 54, **Table B2.1, Part B of the Rules** are to be submitted to the Society. "Materials containing asbestos" means that asbestos is present in the product/material above the threshold value stipulated in appendix 1 of resolution *MEPC.379(80)*.

3 With respect to **2.1.7-5, Part B of the Rules**, the ship construction files are to be verified the items specified in (1) and (2) below upon completion of ship construction. In this context, "verify" is not to be intended to be an assessment of any plans or documents in order to verify their compliance with the applicable requirements.

(1) The ship construction files onboard are contained the required information.

(2) For the ship construction files in the onshore archive, the list of information is contained required information.

4 Among the particulars of stability stated in **2.1.7-7(1), Part B of the Rules**, the rolling period is to be determined by the oscillation test. However, upon special approval by the Society, the oscillation test may be dispensed with and the rolling period may be determined by an approximate calculation.

5 In applying **2.1.7-8(3) Part B of the Rules**, stability experiments may be dispensed with, provided the special approval of the Administration. In addition, a lightweight measurement is to be carried out, and it is to be confirmed that the deviation of lightweight between (1) and (2) below does not exceed a value specified in **Table B2.1.7-1**, and the deviation of lightship longitudinal centre of gravity between (1) and (2) does not exceed 0.5% of length for freeboard ( $L_f$ ), as applicable. For ships other than those of 500 *gross tonnage* and above engaged on international voyages, 0.5% of length of ship ( $L$ ) can be applied. For the purpose of this requirement, a sister ship is a ship built by the same yard from the same plan.

(1) Lightweight and lightship longitudinal centre of gravity determined by a lightweight check of the ship intended.

(2) Lightweight and lightship longitudinal centre of gravity of a lead sister ship or those values which are determined by detailed calculation regarding differences, where the ship is modified from a lead sister ship.

Table B2.1.7-1 Acceptable Deviation of Lightweight Regarding Dispensation of Inclining Tests

Length for freeboard ( $L_f$ )	$L_f < 50\text{ m}$	$50\text{ m} \leq L_f \leq 160\text{ m}$	$160\text{ m} < L_f$
Acceptable deviation, as given by a ratio of deviation to the lightweight of the lead ship subjected to the inclining test	2%	Obtained by linear interpolation	1%

6 Where the stability experiment was dispensed with in accordance with **2.1.7-8(3), Part B of the Rules** and 5 above, lightweight and lightship centre of gravity are to be determined in accordance with (1) and (2) below.

(1) Lightweight as well as lightship longitudinal centre of gravity and lightship transverse centre of gravity are to be derived from 5(1) above.

(2) Lightship vertical centre of gravity is to be the higher of either the lead sister ship's value or the calculated value for the considered ship.

7 The functional tests specified in **2.1.7-8(4), Part B of the Rules** are to be carried out in accordance with **Annex U1.2.2 "Guidance for Stability Computer", Part U of the Guidance**. "A computer for stability calculation is on board the ship as a supplement to the stability information booklet", specified in **2.1.7-8(4), Part B of the Rules**, refers to a computer for stability calculation or a computer in which software for stability calculation is installed that can be used at locations such as the navigation bridge and cargo control room.

8 With respect to the operation manuals and the functional tests for stability instruments specified in **2.1.7-8(4), Part B of the Rules**, reference is to be made to Chapter 4, Part B of *IMO resolution MSC.267(85) International Code on Intact Stability, 2008 (2008 IS Code)*.

## **B2.2 Classification Survey of Ship Not Built under Survey**

### **B2.2.1 General**

1 “In cases where appropriate by the Society” specified in **2.2.1-9, Part B of the Rules** means the cases ships intended to implement classification survey of ships not built under survey are maintained the registration of the societies belong to International Association of Classification Societies (IACS) until the implementation of such survey.

2 “Other equivalent survey methods” specified in **2.2.1-9, Part B of the Rules** means the methods specified in latest IACS Procedural Requirement (PR) 1A.

## **B2.3 Alterations**

### **B2.3.1 Examinations of Altered Parts**

In applying **2.3.1, Part B of the Rules**, in cases where single hull oil tankers are converted to double hull oil tanker or bulk carriers, except where specified by the Society or Administration, in addition to **2.3.1, Part B of the Rules**, (1) to (11) below are to be complied with:

- (1) With respect to the subdivision specified in **2.3, Part 1, Part C of the Rules**, the requirements in accordance with ship's type after conversion are to be complied with.
- (2) With respect to stability, the following requirements are to be complied with:
  - (a) In the case of a conversion to a double hull oil tanker, **3.2.2, Part 3 of Rules for Marine Pollution Prevention Systems** is to still be applied.
  - (b) In the case of a conversion to a bulk carrier, (5) below is to be applied.
- (3) The requirements on protective coating in seawater ballast tank, etc. specified in **3.3.5.3-1, Part 1, Part C of the Rules** are not required to be complied with, except in cases where the entire internal structure of the seawater ballast tank is newly made. However, **3.3.5.3-2, Part 1, Part C of the Rules** applies.
- (4) The requirements on towing and mooring equipment specified in **14.4, Part 1, Part C of the Rules** are to be applied.
- (5) In the case of conversion to a bulk carrier, **3.8.2.3, Part 1, Part C of the Rules** applies. However, the requirements on permanent means of access are to comply with (6) below.
- (6) The requirements on permanent means of access, except in the case of the addition of substantial new structures, are not required to be complied with. The wording “addition of substantial new structures” refers to hull structures that are entirely renewed or augmented by new double bottom and/or double side construction (e.g. replacing the entire structure within cargo areas or adding a new double bottom and/or double side section to existing cargo areas). In addition, an approved access manual is to be provided.
- (7) In the case of conversion to a bulk carrier, the requirements on dewatering arrangements and water level detection and alarm systems specified in **13.5.10** and **13.8.5, Part D of the Rules** apply.
- (8) The requirements on navigation bridge visibility specified in **2.1, Part W of the Rules** apply unless navigation bridge visibility at the ballast loading condition prior to the conversion is maintained after the conversion.
- (9) The requirements on fire protection, escape and fire fighting specified in **Part R of the Rules** may be applied only to those parts which are altered.
- (10) In the case of a conversion to a double hull oil tanker, the requirements related to assignment of freeboard specified in **2.2.1, Part V of the Rules** apply when the parameters used to determine the minimum freeboard are different before and after conversion or when there is a decrease in magnitude of freeboard assigned after the conversion.
- (11) The requirements specified in **3.8.1.1-1, 11.3.2.6, 11.3.3.3, 14.3.1.5, 14.6, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12** and **14.13, Part 1, Part C of the Rules**, and **13.4** and **13.6, Part D of the Rules** apply when structures or equipment are newly added, replaced or modified.

## B3 ANNUAL SURVEYS

### B3.1 General

#### B3.1.1 Surveys Equivalent to Special Surveys

For ships having tanks with no protective coating (excluding double bottom tanks), an internal examination is to be carried out on representative tanks at a level equivalent to Special Surveys at the time of the Annual Survey.

### B3.2 Annual Surveys for Hull, Equipment, Fire Extinction and Fittings

#### B3.2.1 Examination of Plans and Documents

1 The wording “For ships required to have a damage control plan on board in accordance with the requirements in [2.3.4, Part 1, Part C](#)” in [Table B3.1, Part B of the Rules](#) refer to the ships specified in the following (1) and (2).

- (1) Dry cargo ships of 500 *gross tonnage* and above engaged on international voyages, which were at the beginning stage of construction on or after 1 February 1992. Dry cargo ship is defined as a cargo ship that does not engage in carrying liquids.
- (2) Cargo ships of 500 *gross tonnage* and above engaged on international voyages, which were at the beginning stage of construction on or after 1 January 2009

2 The wording “Documents related to the surveys for bulk carriers, oil tankers and ships carrying dangerous chemicals in bulk with integral tanks” in [Table B3.1, Part B of the Rules](#) refers to the documents specified in [B1.4.2-6](#).

3 The record of maintenance and repair work, which is specified in No.10 of [Table B3.1, Part B of the Rules](#), is to be in accordance with the “*Guidelines for maintenance and repair of protective coatings*” (MSC.1/Circ.1330) or the “*Guidelines on procedures for in-service maintenance and repair of coating systems of cargo oil tanks of crude oil tankers*” (MSC.1/Circ.1399).

4 The record of maintenance and repair work for corrosion resistant steel, which is specified in No.10 of [Table B3.1, Part B of the Rules](#), is to be in accordance with IACS Unified Interpretation SC258 as amended.

5 “Noise survey report” in item 11, [Table B3.1 in 3.2.1, Part B of the Rules](#) refers to the report in [An4.2, Annex 2.3.1-2 “PROCEDURES FOR ON BOARD NOISE MEASUREMENTS” of the Rules](#).

6 Confirmation of the updating of the Ship Construction File as specified in [3.2.1-2\(3\), Part B of the Rules](#) is to be carried out in accordance with (1) and (2) below:

- (1) For a Ship Construction File stored on board the ship, in the case of any major event, including, but not limited to, substantial repair and conversion, or any modification to ship structures, the Surveyor is to verify that the updated information is kept on board the ship. If the updating of the Ship Construction File kept on board is not completed at the time of survey, the Surveyor is to records it and requires confirmation at the next periodical survey.
- (2) For a Ship Construction File stored in an onshore archive, in the case of any major event, including, but not limited to, substantial repair and conversion, or any modification to ship structures, the Surveyor is to verify that the updated information is stored in the onshore archive by examining the list of information included in the onshore archive or kept on board the ship. If the updating of the Ship Construction File Supplement stored in the onshore archive is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

7 Confirmation that the Ship Construction File is available as specified in [3.2.1-2\(5\), Part B of the Rules](#) is to be carried out in accordance with (1) and (2) below:

- (1) For a Ship Construction File stored on board the ship, the Surveyor is to confirm that the Ship Construction File is accessible.
- (2) For a Ship Construction File stored in an onshore archive, the Surveyor is to confirm that the service contract with of onshore archive is valid.

8 Confirmation of the management plans for inspection and maintenance of mooring equipment including mooring lines referred to in item 16, [Table B3.1, 3.2.1, Part B of the Rules](#) is required from 1 January 2024 and the contents of the plans are to be in accordance with [B2.1.6-10](#).

**B3.2.2 General Examination**

1 The General examination of “closing appliances of hatchways” stipulated in item 3 of **Table B3.2, Part B of the Rules** is to confirm that the items specified in **(1) to (5)** below are in good condition.

- (1) Where controlled atmosphere systems are installed on board, examination of controlled atmosphere zones in **D17.3(1)(a), Part D of the Guidance**
- (2) All hatch cover plating, hatch coaming plating, and structural members (e.g. stiffeners)
- (3) Stowage and securing in open condition, and proper fit and efficiency of sealing in closed condition for mechanically operated hatch covers. In addition, items **(a) to (k)** below of mechanically operated hatch covers
  - (a) Tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels)
  - (b) Clamping devices, retaining bars, and cleating
  - (c) Closed cover locating devices
  - (d) Chain or rope pulleys
  - (e) Guides
  - (f) Guide rails and track wheels
  - (g) Stoppers and other similar devices
  - (h) Wires, chains, gypsies, tensioning devices
  - (i) Hydraulic systems essential to closing and securing
  - (j) Safety locks and retaining devices
  - (k) End and internal hinges, pins and stools
- (4) Items through **(a) to (h)** below of portable hatch covers, wooden or steel pontoons
  - (a) Wooden covers and portable beams, carriers or sockets for portable beam, and their securing devices
  - (b) Steel pontoons
  - (c) Tarpaulins
  - (d) Cleats, battens and wedges
  - (e) Hatch securing bars and their securing devices
  - (f) Loading pads or bars and the side plate edge
  - (g) Guide plates and chocks
  - (h) Compression bars, drainage channels and drain pipes
- (5) For bulk carriers, where hatch covers or hatch coamings undergo substantial repairs, the strength of securing devices is to be upgraded to comply with **7.3, Section 5, Chapter 1, Part 2, Part CSR-B&T of the Rules**.

2 For item 6 of **Table B3.2, Part B of the Rules**, particular attention is to be paid to the condition of the weld connections between air pipes and deck plating.

3 The examination stipulated in items 14 and 15 of **Table B3.2, Part B of the Rules** is to be carried out in accordance with following **(1) to (15)**:

- (1) Fire pumps, fire main, hydrants, hoses and nozzles and the international shore connection are to be examined.
- (2) For ships designed to carry containers on or above the weather deck, water mist lance, and as appropriate, the mobile water monitors and all necessary hoses, fittings and required fixing hardware are to be examined.
- (3) Provision of the portable and non-portable fire extinguishers is to be checked, and the condition of these is to be randomly examined.
- (4) For the firefighters’ outfits, examinations for the following **(a) to (c)** are to be carried out.
  - (a) It is to be confirmed that firefighters’ outfits including its self-contained compressed air breathing apparatus are complete and in good condition.
  - (b) It is to be confirmed that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged, and that on board means of recharging breathing apparatus cylinders used during drills or a suitable number of spare cylinders to replace those used are provided.
  - (c) Provision of two-way portable radiotelephone apparatus of an explosion-proof type or intrinsically safe specified in **10.10.4, Part R of the Rules** is to be confirmed.

- (5) Operational readiness and maintenance of firefighting systems are to be checked.
- (6) The fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces is to be examined, and it is to be confirmed that its means of operation is clearly marked.
- (7) The fire-extinguishing and special arrangements in the machinery spaces (such as skylights, funnel, ventilation openings, power operated and other doors, stopping devices for ventilators, boiler forced and induced draft fans and the oil fuel pumps and other pumps that discharge flammable liquids) are to be examined.
- (8) It is to be confirmed that that fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms, where applicable, are provided with two separate controls, one for opening of the gas piping and one for discharging the gas from the storage container, each of them located in a release box clearly identified for the particular space.
- (9) Any fire detection and alarm system (including manually operated call points) and any sample extraction smoke detection system are to be examined, as far as possible.
- (10) The fire-extinguishing systems for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces are to be examined.
- (11) General emergency alarm system is to be examined.
- (12) The fire protection arrangements (such as closing appliance, ventilation system, portable fire extinguisher) in cargo, vehicle and ro-ro spaces are to be examined. This includes the fire safety arrangements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo, where applicable.
- (13) Any manual and automatic fire doors are to be examined, as far as practicable.
- (14) It is to be confirmed that the means of escape from accommodation, machinery and other spaces are satisfactory.
- (15) Overhaul inspections of the self priming pump and associated equipment, etc. of emergency fire pumps are conducted at least once every five years, and are to be confirmed to be maintained in good working order.

4 With regard to item 20 of **Table B3.2, Part B of the Rules**, the general examinations for the means of embarkation and disembarkation installed on ships not less than 500 *gross tonnage* engaged on international voyages are to be carried out in accordance with (1) to (5) below.

- (1) The following items (a) to (f) of accommodation ladders are to be thoroughly examined and confirmed to be in good condition:
  - (a) steps;
  - (b) platforms;
  - (c) all support points such as pivots, rollers, etc;
  - (d) all suspension points such as lugs, brackets, etc;
  - (e) stanchions, rigid handrails, hand ropes and turntables (including pins); and
  - (f) davit structure, wire and sheaves, etc.
- (2) The following items (a) to (d) of gangways are to be thoroughly examined and confirmed to be in good condition:
  - (a) treads;
  - (b) side stringers, cross-members, decking, deck plates, etc;
  - (c) all support points such as wheel, roller, etc; and
  - (d) stanchions, rigid handrails, hand ropes.
- (3) The following items (a) to (c) of winches are to be confirmed to be in good condition:
  - (a) brake mechanism including condition of brake pads and band brake;
  - (b) remote control system; and
  - (c) power supply system (in cases where motor is used).
- (4) All fittings and davits on the ship deck associated with accommodation ladders and gangways are to be confirmed to be in good condition.
- (5) The fittings or structures for the means of access to decks such as handholds in a gateway or bulwark ladder and stanchions are to be confirmed to be in good condition.

5 The general examination of “bow doors, inner doors, side shell doors and stern doors (hereinafter collectively referred to as “door(s)”)” stipulated in item 21 of **Table B3.2, Part B of the Rules** is to confirm that the items specified (1) to (7) below are in good condition. Non-destructive testing may be required when deemed necessary by the Surveyor as a consequence of the examination specified in **Table B3.2, Part B of the Rules**.

- (1) Structural members such as plating and stiffeners and related welded parts of the door(s)
- (2) Structural members such as plating and stiffeners of the surrounding hull structure
- (3) Items **(a)** to **(h)** below for the door(s)
  - (a) Securing, supporting and locking devices
  - (b) Hinges, bearings and thrust bearings
  - (c) Interlock systems for opening/closing systems and the securing and locking devices
  - (d) Sealing arrangements
  - (e) Electric devices for operating
  - (f) Drainage systems and arrangements
  - (g) Hydraulic devices
  - (h) Any other devices which are required for the ship in accordance with **14.10, Part 1, Part C of the Rules** and **Chapter 21, Part CS of the Rules**
- (4) In addition to **(3)** above, clearance measurements for the hinges, bearings and thrust bearings of doors are to be carried out in cases where no dismantling is required. If the results of the function test are not satisfactory, dismantling may be required to measure clearances in cases where deemed necessary by the Surveyor. If dismantling is carried out, a visual examination of hinge pins and bearings together with non-destructive testing of the hinge pin is to be carried out. Clearance measurements of securing, supporting and locking devices are to be taken in cases where indicated in the Operating and Maintenance Manual.
- (5) Items **(a)** to **(f)** below for indication / monitoring systems, where fitted.
  - (a) Visible indication and audible alarms (hereinafter referred to as “indication and alarm system”) at the navigation bridge panel and on the operating panel
  - (b) Lamp test function at the navigation bridge panel and on the operating panel
  - (c) Mode selecting function that allows selection between “harbour” and “sea voyage”
  - (d) Power supply for the indication and alarm system
  - (e) Sensor for the indication and alarm system
  - (f) Any other systems which are required for the ship in accordance with **14.10, Part 1, Part C of the Rules** and **Chapter 21, Part CS of the Rules**
- (6) Where fitted, water leakage detection systems are to be tested including the proper audible alarms on the navigation bridge panel and on the engine control room panel, according to the procedures specified in the Operating and Maintenance Manual.
- (7) Where fitted, television surveillance systems are to be tested including the proper indications on the navigation bridge monitor and on the engine control room monitor.

**6** “Hearing protectors” in item 22, **Table B3.2 in 3.2.1, Part B of the Rules** refers to the hearing protectors in **An6.1** and **An6.2, Annex 2.3.1-2 “PROCEDURES FOR ON BOARD NOISE MEASUREMENTS” of the Rules**.

**7** When applying the requirements of item 27 and item 28 of **Table B3.2, Part B of the Rules**, resistance testing is to be carried out for all electrical bonding to confirm that resistance is not greater than 1 MΩ in cases where bonding straps are not provided as electrical bonding between fuel storage tanks or fuel piping and hull structures, or in cases where the Surveyor deems such testing to be necessary. However, such measurements may be omitted at the discretion of the Surveyor in cases where accurate measurement records are maintained and can be verified.

### **B3.2.3 Performance Tests**

**1** The hose test stipulated in items 1 and 2 of **Table B3.3, Part B of the Rules** is to be in accordance with **An1.4.4-3, Annex 2.1.5 “Testing Procedures of Watertight Compartments” of the Rules**.

**2** With regard to item 3 of **Table B3.3, Part B of the Rules**, operation tests for the following **(1)** to **(5)** are to be carried out as far as practicable:

- (1) Various systems specified in **5.2.2, 8.3.1-3** and **9.5.2-3, Part R of the Rules**
- (2) The means of control provided for closing the various openings in cargo, vehicle and ro-ro spaces
- (3) Any manual and automatic fire doors
- (4) The fire dampers of ventilation ducts, and the means of closing the main inlets and outlets of all ventilation systems
- (5) The means of stopping power ventilation systems from outside the space served

**3** For details on the examinations stipulated in items 4, 5 and 6 of **Table B3.3, Part B of the Rules**, refer to **2.1.7, Part B of the**

rules.

4 “Computers for stability calculation that are installed as a supplement to the stability information booklet” stipulated in item 8 of **Table B3.3, Part B of the Rules**, refers to a computer for stability calculation or a computer in which software for stability calculation is installed that can be used at locations such as the navigation bridge and cargo control room.

5 The performance test stipulated in item 8 of **Table B3.3, Part B of the Rules** is to be carried out in the presence of the Surveyor according to the procedures in (1) to (4) below, so as to ensure that the stability computer is working correctly. Where a copy of prior computer checks which were carried out in accordance with procedures (1) to (3) or (1) and (4) is available and on board, and the Surveyor is able to verify that the computer is working properly, the confirmation of such results may substitute for the performance test.

- (1) Retrieve at least one of the test loading conditions which were used for the accuracy check and are specified in the operation manual, carry out a stability calculation and compare stability results with those in the operation manual.
- (2) Change several items of input data sufficiently to change the draught or displacement by at least 10%. The results are to be reviewed to ensure that they differ in a logical way from those of the test condition as mentioned in (1) above.
- (3) Revise the modified load condition as mentioned in (2) above to restore the initial test condition as mentioned in (1) above and compare the results.
- (4) As an alternative to the provisions of (2) and (3) above, select one or more test loading conditions which were used for the accuracy check, other than the one mentioned in (1) above, and perform a test calculation by entering all the deadweight data as if it were a proposed loading. The results are to be verified as identical to the results of the test conditions in the operation manual.

6 Inspection of water level detection and alarm systems (refer to **13.8.5, 13.8.6 and 13.8.7, Part D of the Rules**) specified in item 9 of **Table B3.3, Part B of the Rules**, is to be carried out on the items installed on the following ships.

- (1) Cargo ships of 500 *gross tonnage* and above engaged on international voyages, which have a single cargo hold below the freeboard deck or cargo holds below the freeboard deck which are not separated by at least one bulkhead made watertight up to that deck and specified in the following (a) or (b):
  - (a) Cargo ships having a length ( $L_f$ ) of less than 100 m, which had been at the beginning stage of construction before 1 July 1998
  - (b) Cargo ships having a length ( $L_f$ ) of less than 80 m, which had been at the beginning stage of construction on and after 1 July 1998
- (2) Cargo ships of 500 *gross tonnage* and above engaged on international voyages and specified in the following (a) or (b):
  - (a) Bulk carriers defined in **1.3.1(13), Part B of the Rules**, which had been at the beginning stage of construction before 1 July 2006
  - (b) Bulk carriers defined in **An1.2.1(1), Annex 1.1, Part 2-2, Part C of the Rules**, which had been at the beginning stage of construction on or after 1 July 2006
- (3) Cargo ships of 500 *gross tonnage* and above engaged on international voyages, which have multiple cargo holds (excluding bulk carriers defined in **An1.2.1(1), Annex 1.1, Part 2-2, Part C of the Rules** and tankers) that fall under any of the following.
  - (a) for which the building contract is placed on or after 1 January 2024;
  - (b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2024; or
  - (c) the delivery of which is on or after 1 January 2028

7 Inspection of Dewatering Arrangements (refer to **13.5.10, Part D of the Rules**) specified in item 10 of **Table B3.3, Part B of the Rules**, is to be carried out on the items installed on the following ships.

- (1) Cargo ships of 500 *gross tonnage* and above engaged on international voyages and specified in the following (a) or (b):
  - (a) Bulk carriers defined in **1.3.1(13), Part B of the Rules**, which had been at the beginning stage of construction before 1 July 2006
  - (b) Bulk carriers defined in **An1.2.1(1), Annex 1.1, Part 2-2, Part C of the Rules**, which had been at the beginning stage of construction on or after 1 July 2006

#### **B3.2.4 Internal Examinations of Spaces and Tanks**

When internal examinations are carried out, the means of access provided for the examinations are also to be examined.

**B3.3 Annual Surveys for Machinery****B3.3.1 General Examinations**

1 Where controlled atmosphere systems are installed onboard, the general examination of gas freeing equipment as well as control, alarm and monitoring equipment of controlled atmosphere systems specified in **D17.3(1)** and **(3)**, **Part D of the Guidance** is to be included in the general examination. Furthermore, where rubber couplings are installed, a visual inspection and measurements of surface hardness or permanent deformation of rubber elements are to be conducted.

2 The “reference standards deemed appropriate by the Society” referred to in **3.3.1-1(4)**, **Part B of the Rules** refer to the following **(1)** and **(2)**:

- (1) those specified in item 11(1)(b) of **Table B8.3, Part B of the Rules** for oil lubricated shafts; and
- (2) those specified in item 11(1)(b) of **Table B8.4, Part B of the Rules** for freshwater lubricated shafts.

3 In general examinations specified in **3.3.1-1, Part B of the Rules**, for ships where harmonic filters are installed on the main busbars of electrical distribution systems, except in cases where the filters are installed for single application frequency drives such as pump motors, it is to be ascertained that the harmonic filters are placed in good order and either of the following **(1)** or **(2)** is to be verified.

- (1) For ships fitted with facilities to continuously monitor the Total Harmonic Distortion (THD) values experienced by the main busbars as specified in **2.3.13-1, Part H of the Rules**, records of THD values are to be verified.
- (2) For ships other than **(1)** above, correct operation of harmonic filters is to be confirmed by verifying that the maximum Total Harmonic Distortion (THD) value of the main busbar on board the ship is measured under typical seagoing conditions as close as possible to the date of the Annual Survey and the value does not exceed the acceptable limit.

4 In applying **3.3.1-1, Part B of the Rules**, the operation of the ventilation for the machinery spaces is to be confirmed.

5 In applying **3.3.1-1(1)**, **Part B of the Rules**, the following to **(1)** to **(9)** are also to be applied.

- (1) It is to be confirmed that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative.
- (2) The means for the operation of the main and auxiliary machinery essential for the propulsion and the safety of the ship are to be examined.
- (3) The arrangements to operate the main and other machinery from a machinery control room are to be examined.
- (4) It is to be confirmed that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected so as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards.
- (5) It is to be confirmed that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid.
- (6) The electrical installations, including the main source of power and the lighting systems are, as far as practicable, to be examined visually and in operation.
- (7) It is to be examined that the precautions provided against shock, fire and other hazards of electrical origin are being maintained.
- (8) The condition of any expansion joints in seawater systems are to be visually examined.
- (9) Arrangements for remote closing of valves for fuel oil tanks, lubricating oil tanks and other flammable oil tanks are to be examined.

6 In applying **3.3.1-1(2)**, **Part B of the Rules**, a general examination of the machinery, the boilers, all steam, hydraulic, pneumatic and other systems and their associated fittings is to be carried out to see whether they are being properly maintained and with particular attention to the fire and explosion hazards.

7 In applying **3.3.1-1, Part B of the Rules** referred to in **-2** of the said requirement, the following to **(1)** to **(4)** are also to be applied.

- (1) It is to be confirmed that the requisite arrangements to regain steering capability in the event of the single failure referred to in **15.6.1-2(1)**, **Part D of the Rules** are being maintained.
- (2) The cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pump rooms and the bunker system on deck are to be examined.
- (3) On tankers and chemical tankers, temperature sensing devices for bulkhead glands and alarms are to be checked.



(4) The emergency lighting in all cargo pump rooms of tankers constructed on or after 1 July 2002 is to be examined.

8 In applying **3.3.1-2(2), Part B of the Rules**, the following to (1) to (4) are also to be applied.

- (1) It is to be confirmed that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained.
- (2) It is to be confirmed that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition.
- (3) The cargo, bilge, ballast and stripping pumps are to be examined for undue gland seal leakage, as far as practicable.
- (4) It is to be confirmed that the pump room ducting is intact and screens are clean.

### **B3.3.2 Performance Tests**

1 In applying **3.3.2-1, Part B of the Rules, 2.3.2-2 of Rules for Automatic and Remote Control Systems** is also to be applied for surveys of periodically unattended machinery spaces.

2 In applying item 3 of **Table B3.7, Part B of the Rules**, the operation of the emergency source(s) of electrical power including their starting arrangements, the systems supplied and, when appropriate, their automatic operation are also to be confirmed as far as practicable.

3 In applying item 4 of **Table B3.7, Part B of the Rules**, the following (1) and (2) are also to be applied.

- (1) It is to be confirmed that the means of communication between the navigation bridge and steering gear compartment and the means of indicating the angular position of the rudder are operating satisfactorily.
- (2) It is to be confirmed that the engine room telegraph, the second means of communication between the navigation bridge and the machinery space and the means of communication with any other positions from which the engines are controlled are operating satisfactorily.

4 In applying item 5 of **Table B3.7, Part B of the Rules**, the following (1) to (4) are to be applied.

- (1) In addition to carrying out the following (a) to (e) performance tests for main and auxiliary steering arrangements, including their associated equipment and control systems, the said arrangements are to be examined.
  - (a) Operation tests for the power units including changeover from one to another;
  - (b) Operation tests for automatic and remote isolation of the power actuating systems specified in **15.6, Part D of the Rules**;
  - (c) Tests for supply of the alternative source of power specified in **15.2, Part D of the Rules**;
  - (d) Operation tests for the control system including the changeover system; and
  - (e) Operation tests for the alarm devices, rudder angle indicators and running indicators of power units specified in **Part D of the Rules**.
- (2) It is to be confirmed that with ships having emergency steering positions there are means of relaying heading information and, when appropriate, of supplying visual compass readings to the emergency steering position.
- (3) It is to be confirmed that the various alarms required for hydraulic power-operated, electric and electro-hydraulic steering gears are operating satisfactorily.
- (4) It is to be confirmed that the re-charging arrangements for hydraulic power-operated steering gears are being maintained.

5 Performance tests of the equipment stipulated in items 7-1(1)(a) and (2)(a) of **Table B3.7, Part B of the Rules** may be dispensed with provided the Surveyor is satisfied with the results of the general examination of that equipment.

6 In applying **3.3.2-1, Part B of the Rules**, the tests referred in **1.2.7, Annex 2.11.1-2, Part H of the Rules** are to be carried out for ships equipped with accumulator battery systems to which **Annex 2.11.1-2, Part H of the Rules** is applied.

7 In applying item 1 of **Table B3.8, Part B of the Rules**, the following (1) to (3) are also to be applied.

- (1) Proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system are to be verified.
- (2) It is to be confirmed that the pump room ventilation system is operational and dampers are operational.
- (3) Interlock between lighting and ventilation is to be checked.

## **B3.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk**

### **B3.4.1 General**

1 In applying **3.4.1, Part B of the Rules**, the cargo, bunker, ballast and vent piping systems, (including PRVs, vacuum relief

valves, vent masts and protective screens) are to be examined as far as practicable.

2 Where applicable, alternative design and arrangements, if any, for the segregation of the cargo area are to be examined in accordance with the test, inspection and maintenance requirements specified in the approved documentation.

#### **B3.4.2 Examinations**

1 The Examinations stipulated in item 1 of **Table B3.9, Part B of the Rules** to be carried out at the first Annual Survey after construction for ships carrying liquefied gases in bulk, may be dispensed with provided the ship complies with the provisions specified in (1) to (3) below:

(1) The cargo containment system has enough records of good performance

However, where the system has sustained substantial damage (e.g. fracturing or deformation in tanks) or is the first of its type made by the manufacturer, the examination cannot to be omitted.

(2) The records specified in (a) to (c) are available on board

(a) Records of gas detection and temperature measurement in hold spaces

(b) Running record of reliquefaction plants

(c) Records of cargo tank pressure

(3) It is possible to confirm the cargo containment system has not malfunctioned from checking the records specified in (2) above and interviewing the master

2 In applying item 3(1)(b) of **Table B3.9, Part B of the Rules**, cargo and process piping (including the expansion arrangements, insulation from the hull structure, pressure relief and drainage arrangements, and water curtain protection as appropriate) are also to be examined.

3 In applying item 4 of **Table B3.9, Part B of the Rules**, the examination of high level alarms on ships at beginning stage of construction on or after 1 July 2017 is to include the functional test as specified in **13.3.6, Part N of the Rules**.

4 In applying item 5 of **Table B3.9, Part B of the Rules**, for membrane containment systems, proper operation of the nitrogen control system for insulation and interbarrier spaces is to be confirmed to the Surveyor by the Master.

5 With respect to the functional tests specified in item 8 of **Table B3.9, Part B of the Rules**, reference is to be made to the requirements related to annual surveys specified in Chapter 4, Part B of *IMO resolution MSC.267(85) "International Code on Intact Stability, 2008 (2008 IS Code)"*.

6 "Alternative examinations considered appropriate by the Society" stipulated in item 9 of **Table B3.9, Part B of the Rules** refers to performance tests of cross flooding equipment to confirm whether the equipment is in good working order.

7 In applying item 9(1)(c) of **Table B3.9, Part B of the Rules**, examination of the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations need only be carried out as far as practicable.

8 In applying item 9(1)(g) of **Table B3.9, Part B of the Rules**, it is to be confirmed that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing.

9 In applying item 9(1)(i) of **Table B3.9, Part B of the Rules**, it is to be confirmed that electrical equipment in hazardous areas is in a satisfactory condition and is being properly maintained.

### **B3.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk**

#### **B3.5.1 General**

In applying **3.5.1, Part B of the Rules**, the following (1) to (3) are also to be applied.

(1) The cargo transfer arrangements are to be examined.

(2) The cargo tank vent system (including the pressure/vacuum valves and secondary means to prevent over- or under-pressure and devices to prevent the passage of flame) and the arrangements of cargo tank purging with inert gas, where provided, are to be examined as far as practicable.

(3) The gauging devices, high-level alarms and valves associated with overflow control are to be examined.

#### **B3.5.2 Examinations**

1 With respect to the functional tests specified in item 7 of **Table B3.10, Part B of the Rules**, reference is to be made to the requirements related to annual surveys specified in Chapter 4, Part B of *IMO resolution MSC.267(85) "International Code on Intact Stability, 2008 (2008 IS Code)"*.

2 “Alternative examinations considered appropriate by the Society” stipulated in item 8(1)(a) of **Table B3.10, Part B of the Rules** refers to performance tests of cross flooding equipment to confirm whether the equipment is in good working order.

3 In applying item 8(1)(g) of **Table B3.10, Part B of the Rules**, it is to be confirmed that any hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing.

4 In applying item 8(1)(i) of **Table B3.10, Part B of the Rules**, when applicable, the cargo heating or cooling systems, including any sampling arrangements, are also to be applied in addition to confirming that the means for measuring the temperature and associated alarms are operating satisfactorily.

5 In applying item 8(1)(j) of **Table B3.10, Part B of the Rules**, the following (1) and (2) are also to be applied.

(1) It is to be confirmed that all electrical equipment in dangerous zones is suitable for such locations, is in satisfactory condition and has been properly maintained.

(2) It is to be confirmed, as far as practicable, that the intrinsically safe systems and circuits used for measurement, monitoring, control and communication purposes in all hazardous locations are being properly maintained.

6 In applying item 8(1)(m) of **Table B3.10, Part B of the Rules**, general examination of the arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area need only be carried out as far as practicable.

### **B3.6 Special Requirements for Ships Using Low-flashpoint Fuels**

#### **B3.6.1 General**

The requirements of **3.6, Part B of the Rules** need not be applied to ships examined in accordance with **3.4, Part B of the Rules**.

#### **B3.6.2 Examinations**

1 When applying the requirements of item 6 of **Table B3.11, Part B of the Rules**, it is to be verified that ship masters have checked the inert gas control system for each thermal insulation layer of membrane tanks to verify proper operation.

2 When applying the requirements of item 9(1)(f) of **Table B3.11, Part B of the Rules**, resistance testing is to be carried out for all electrical bonding to confirm that resistance is not greater than 1 MΩ in cases where bonding straps are not provided as electrical bonding between fuel storage tanks or fuel piping and hull structures, or the Surveyor deems such testing to be necessary. However, such measurements may be omitted at the discretion of the Surveyor in cases where accurate measurement records are maintained and can be verified.

3 When applying the requirements of item 5(1)(b) of **Table B3.11, Part B of the Rules**, general examinations and performance testing for high level alarms are included functional test specified in **15.4.2-4, Part GF of the Rules**.

### **B3.9 Special Requirements for Ships Affixed with the Notation “CybR”**

#### **B3.9.3 Surveys**

The wording “upon request by the Society” in item 2(1) of **Table B3.12, Part B of the Rules** includes the case where the shipowners (or ship management companies) were changed.

## B4 INTERMEDIATE SURVEYS

### B4.1 General

#### B4.1.1 Surveys Equivalent to Special Surveys

1 For ships having tanks with no protective coating (excluding double bottom tanks), an internal examination is to be carried out on representative tanks at a level equivalent to Special Surveys at the time of Intermediate Surveys.

2 For ships 15 years old and over, limber boards are to be removed at least at two locations on each side of the ship as well as the cement chocks, and the connections between the frames and tank side brackets are to be examined carefully. When any defect is found, the extent of the survey is to be expanded accordingly.

#### B4.1.3 Survey Results

“Surveys and thickness measurements of spaces” specified in 4.1.3, Part B of the Rules means internal examinations, close-up surveys and thickness measurements of spaces and tanks.

### B4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction and Fittings

#### B4.2.1 Examination of Plans and Documents

1 Confirmation of the updating of the Ship Construction File as specified in 4.2.1-2(3), Part B of the Rules is to be carried out in accordance with B3.2.1-6.

2 Confirmation that the Ship Construction File is available as specified in 4.2.1-2(5), Part B of the Rules is to be carried out in accordance with B3.2.1-7.

#### B4.2.2 General Examination

“Examinations considered appropriate by the Society” stipulated in 4.2.2, Part B of the Rules refers to performance tests of cross flooding equipment to confirm whether said equipment is in good working order.

#### B4.2.3 Performance Tests

1 With respect to item 1 in Table B4.1, Part B of the Rules, in cases where an air quality control system is provided in accordance with 20.3.1-2(3), Part R of the Rules, the performance of the air quality control system is to be confirmed in conjunction with the performance test of ventilation system specified in item 7 in Table B3.3, Part B of the Rules.

2 The hose test stipulated in items 2 and 14 of Table B4.1, Part B of the Rules is to be in accordance with An1.4.4-3, Annex 2.1.5 “Testing Procedures of Watertight Compartments” of the Rules.

3 For details on the examinations stipulated in items 4 through 11 in Table B4.1, Part B of the Rules, refer to 2.1.7, Part B of the rules.

#### B4.2.4 Internal Examinations of Spaces and Tanks

1 When internal examinations are carried out, the means of access provided for the examinations are also to be examined.

2 “Coating condition” as referred to in 4.2.4 Part B of the Rules is as specified in the following (1) to (3).

(1) The coating conditions are classified into (a) to (c) below,

(a) “GOOD” is the condition that satisfies i) and ii) below.

i) Spot rusting on less than 3% of the area under consideration without visible failure of coating

ii) Rusting at edges or welds, must be on less than 20% of edges or weld lines in the area under consideration

(b) “FAIR” is the condition that satisfies any of the following i) to iii).

i) Breakdown of coating or rust penetration on 3% or more and less than 20 % of the area under consideration

ii) Hard rust scale rust penetration must be less than 10 % of the area under consideration

iii) Rusting at edges or welds must be on 20% or more and less than 50 % of edges or weld lines in the area under consideration.

(c) “POOR” is the condition that satisfies any of the following i) to iii).

i) Breakdown of coating or rust penetration on more than 20 %.

- ii) Hard rust scale on more than 10 % of the area under consideration.
  - iii) Local breakdown concentrated at edges or welds on more than 50 % of edges or weld lines in the area under consideration.
- (2) The term “areas under consideration” in (1) above refers to the areas in the ballast tank specified in the following (a) to (d). Plating and attached structural members are included.
- (a) Oil tankers other than Double hull oil tankers as defined in **B1.3.1(12)**
    - i) One area each of the deck and bottom plating with attached structures
    - ii) Three areas (lower, middle, and upper thirds) each of the side shell, longitudinal bulkheads and transverse bulkheads (forward and aft) with attached structures
  - (b) Double hull tankers and Ships carrying Dangerous Chemicals in bulk
    - i) Areas of Double bottom ballast tank boundaries and attached structure, in lower and upper half of tank (two (2) areas to consider).
    - ii) Areas of Double hull side tank deck and bottom plating with attached structure (one (1) area to consider for deck and one (1) area to consider for bottom).
    - iii) Areas of Double hull side tank side shell, longitudinal bulkheads and transverse bulkheads (forward and aft) with attached structure, in lower, middle and upper third (three (3) areas to consider for side shell, longitudinal bulkhead forward transverse bulkhead and aft transverse bulkhead).
  - (c) Fore peak tanks
    - i) Areas of tank boundaries and attached structure, in upper, middle and lower thirds of tank (three (3) areas to consider).
  - (d) After peak tanks
    - i) Areas of tank boundaries and attached structure, in lower and upper halves of tank (two (2) areas to consider)
- (3) The coating condition of each ballast tank is determined by the poorest coating condition found from the areas specified in (2) above.

#### **B4.2.7 Pressure Test**

In applying **4.2.7, Part B of the Rules**, particular attention is to be paid to repairs.

### **B4.3 Intermediate Surveys for Machinery**

At Intermediate Surveys, the requirements of **B5.3.2-3** are also to be complied with.

#### **B4.3.1 General Examinations**

1 Where controlled atmosphere systems are installed onboard, the general examination of safety devices for refrigerating machinery specified in item 1 of **Table B4.5, Part B of the Rules** is to be conducted on the gas freeing equipment, and control, alarm and monitoring equipment of the controlled atmosphere systems.

2 The wording “hazardous areas” of Requirements for Tankers in **Table B4.5, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-1, -4** and **-5, Part H of the Rules**.

3 In applying **4.3.1, Part B of the Rules**, the conditions of accumulator battery systems are to be examined in detail with measuring the insulation resistance of main circuit of accumulator battery systems and associated equipment. In addition, it is to be confirmed that the maintenance, management, etc. of such systems are properly carried out in accordance **1.2.8, Annex 2.11.1-2, Part H of the Rules for ships equipped with accumulator battery systems to which Annex 2.11.1-2, Part H of the Rules** is applied.

### **B4.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk**

#### **B4.4.2 Examinations**

1 In the examination of non-metallic membranes required for item 2 of **Table B4.6, Part B of the Rules**, the following are to be confirmed.

- (1) Cracks and deterioration are not found by visual examination
- (2) Membranes are renewed at intervals not exceeding 3 years

Where the membranes are those approved for usage exceeding 3 years in accordance with **6.4.1-3, Annex 1, Part N of**

“GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK”, these are renewed at the approved intervals.

(3) Pressure relief valves are adjusted and function tested.

2 The wording “hazardous areas” in item 3 of **Table B4.6, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-3, -4** and **-5, Part H of the Rules** as well as in **1.1.5(23), Part N of the Rules**. In applying this item, it is to be checked for defective equipment, fixtures and wiring is to be checked.

## **B4.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk**

### **B4.5.2 Examinations**

The wording “hazardous areas” in item 1 of **Table B4.7, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-2, -4** and **-5, Part H of the Rules**. In applying this item, it is to be checked for defective equipment, fixtures and wiring.

## **B4.6 Special Requirements for Ships Using Low-flashpoint Fuels**

### **B4.6.1 General**

The requirements of **4.6, Part B of the Rules** need not be applied to ships examined in accordance with **4.4, Part B of the Rules**.

### **B4.6.2 Examinations**

1 The sentence “it is to be confirmed that such non-metallic membranes are maintained in good condition” in item 2 of **Table B4.8, Part B of the Rules** means the following: visual examinations are to be carried out to verify no cracks and deterioration; and it is to be confirmed membranes are renewed at intervals not exceeding 3 *years*, have been properly adjusted, and have been tested for performance. In cases where relief valves are approved for use for membranes whose renewal intervals exceed 3 *years* in accordance with **6.4.1-3, Annex 1 “Guidance for Equipment and Fittings of Ships Using Low-flashpoint Fuels”, Part GF of the Guidance**, it is to be confirmed that they are renewed at approved intervals.

2 The term “hazardous areas” in item 3 of **Table B4.8, Part B of the Rules** means the hazardous areas specified in **12.5, Part GF**, and **4.2.3-4** and **-5, Part H of the Rules**.

## B5 SPECIAL SURVEYS

### B5.1 General

#### B5.1.4 Survey Results

“Surveys and thickness measurements of spaces” specified in **5.1.4, Part B of the Rules** means internal examinations, close-up surveys and thickness measurements of spaces and tanks.

### B5.2 Special Surveys for Hull, Equipment, Fire Extinction and Fittings

#### B5.2.1 Examination of Plans and Documents

**1** Confirmation of the updating of the Ship Construction File as specified in **5.2.1-2(3), Part B of the Rules** is to be carried out in accordance with **B3.2.1-6**.

**2** Confirmation that the Ship Construction File is available as specified in **5.2.1-2(5), Part B of the Rules** is to be carried out in accordance with **B3.2.1-7**.

#### B5.2.2 General Examination

**1** In addition to the general examination, automatic air pipe heads which are installed on the exposed deck are to be completely examined (both externally and internally) at special surveys as specified below. Where the inner parts cannot be properly inspected from the outside, the head is to be removed from the air pipe.

(1) Special Survey for ships up to 5 years of age (Special Survey No.1)

- (a) Two air pipe heads, one port and one starboard, located on the exposed decks in the forward 0.25L, preferably air pipes serving ballast tanks
- (b) Two air pipe heads, one port and one starboard, on the exposed decks, serving spaces aft of 0.25L, preferably air pipes serving ballast tanks
- (c) Other air pipe heads selected by the attending Surveyor
- (d) According to the results of the above inspection, other air pipe heads located on the exposed decks required by the Surveyor

(2) Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)

- (a) All air pipe heads located on the exposed decks in the forward 0.25L
- (b) At least 20% of air pipe heads on the exposed decks serving spaces aft of 0.25L, preferably air pipes serving ballast tanks
- (c) Other air pipe heads selected by the attending Surveyor
- (d) According to the results of the above inspection, other air pipe heads located on the exposed decks required by the Surveyor

(3) Special Survey for ships over 10 years (Special Survey No.3 and subsequent Special Surveys)

- (a) All air pipe heads located on the exposed decks
- (b) Notwithstanding the preceding (a), air pipe heads that show substantiated evidence of replacement within the previous five years may be exempted; however, the number is not to be less than that required in (1) above

**2** Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.

**3** With respect to the provisions of **5.2.2-1, Part B of the Rules**, in addition to the general examination, ventilators for machinery and cargo spaces are to be examined internally at special surveys as specified below.

(1) Special Survey for ships up to 5 years of age (Special Survey No.1)

- (a) One ventilator for machinery spaces
- (b) One ventilator for cargo spaces
- (c) Ventilators to be examined are selected by the attending Surveyor.
- (d) According to the results of the above inspection, other ventilators as required by the Surveyor

(2) Special Survey for ships over 5 years and up to 10 years of age (Special Survey No.2)

- (a) All ventilators for machinery spaces
- (b) At least 20% of the ventilators for cargo spaces

- (c) Ventilators to be examined are selected by the attending Surveyor.
- (d) According to the results of the above inspection, other ventilators as required by the Surveyor
- (3) Special Survey for ships over 10 *years* (Special Survey No.3 and subsequent Special Surveys)
  - (a) All ventilators for machinery and cargo spaces
  - (b) Notwithstanding the preceding (a), ventilators that show substantiated evidence of the replacement of closing appliances within the past five years may be exempted; however, the number is not to be less than that required in (1) above.

4 In applying item 2 of **Table B5.25, Part B of the Rules**, the conditions of accumulator battery systems are to be examined in detail with measuring the insulation resistance of main circuit of accumulator battery systems and associated equipment. In addition, it is to be confirmed that the maintenance, management, etc. of such systems are properly carried out in accordance with **1.2.8, Annex 2.11.1-2, Part H of the Rules for ships equipped with accumulator battery systems to which Annex 2.11.1-2, Part H of the Rules** is applied.

### **B5.2.3 Performance Test**

1 The performance test of computers for stability calculation which are fitted on board the ship as a supplement to stability information booklets is to be carried out in the presence of the Surveyor according to the procedures specified in (1) to (3) below, so as to ensure that the stability computer is working correctly.

- (1) Retrieve all of the test loading conditions which were used for the accuracy check and are specified in the operation manual, carry out a stability calculation and compare stability results with those in the operation manual.
- (2) Change several items of input data sufficiently to change the draught or displacement by at least 10%. The results are to be reviewed to ensure that they differ in a logical way from those of the test condition as mentioned in (1) above.
- (3) Revise the modified load condition as mentioned in (2) above to restore the initial test condition as mentioned in (1) above and compare the results.

2 The hose test stipulated in **5.2.3-2(2) and (5), Part B of the Rules** is to be in accordance with **An1.4.4-3, Annex 2.1.5 “Testing Procedures of Watertight Compartments” of the Rules**.

3 Operational tests specified in **5.2.3-2(3) and (5), Part B of the Rules** are to be carried out to the working pressure of all bilge and ballast piping systems.

4 The performance test specified in **5.2.3-2(10), Part B of the Rules** is to be in accordance with the following:

- (1) The accommodation ladder, gangway and winch are to be operationally tested with the specified maximum operational load.
- (2) The load used for the test is to be the following:
  - (a) the design load;
  - (b) the maximum operational load, if this is less than the design load; and
  - (c) the load nominated by the shipowner or operator only in those cases where the design load or maximum operational load is not known.
- (3) The tests are to be carried out with the load applied as uniformly as possible along the length of the accommodation ladder or gangway, at an angle of inclination corresponding to the maximum bending moment on the accommodation ladder or gangway.
- (4) Following satisfactory completion of the applicable test without permanent deformation or damage to the tested item, the load used for that test is to be marked as the maximum operational load on the plate specified in **14.14.1.1-2(6), Part 1, Part C of the Rules**.

### **B5.2.4 Internal Examinations of Spaces and Tanks**

1 At Special Surveys for oil tankers, bulk carriers and ships carrying dangerous chemicals in bulk with integral tanks, reference is to be made to the plans and documents specified in **B1.4.2-6**.

2 When internal examinations are carried out, the means of access provided for the examinations are also to be examined.

3 “Coating condition” referred to in **5.2.4-3 Part B of the Rules** is in accordance with **B4.2.4-2**.

4 With respect to **Table B5.1, Part B of the Rules**, if a selection of tanks is accepted to be examined, then different tanks are to be selected so as to examine all tanks on a rotational basis.

### **B5.2.5 Close-up Surveys**

1 Non-destructive testing may be required to detect fractures when deemed necessary by the Surveyor.

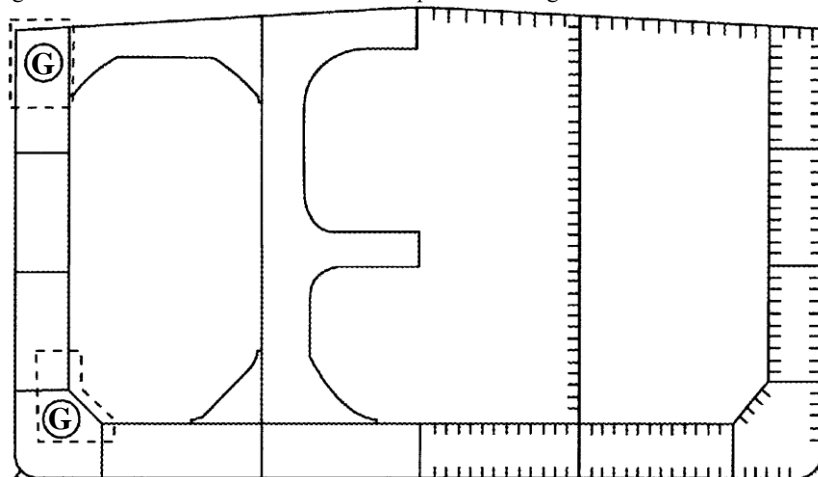
2 Thickness measurements are to be carried out on the securing, supporting and locking devices of bow doors, inner doors, side shell doors and stern doors to the extent considered necessary by the Surveyor. The maximum thickness diminution of such



securing, supporting and locking devices is not to be more than 15% of the as-built thickness.

- 3 For the areas described in (G) in **Table B5.5-1, Part B of the Rules**, refer to **Fig.B5.2.5**.
- 4 Close-up surveys are to be carried out for the accessible parts of cargo hold hatch covers whose internals are impossible to structurally access.

Fig. B5.2.5 The Knuckle Area and the Top Part of Wing Ballast Tanks of Double Hull



#### B5.2.6 Thickness Measurements

1 The thickness measurement record specified in **5.2.6-1(4), Part B of the Rules** is to give the position of each measuring point, the thickness measured as well as the corresponding original thickness, the allowable diminution, and extent of use of high tensile steels, if used. Furthermore, the record is to give the date when the measurement was carried out, the type of measuring equipment used, and names of the personnel and their qualifications with their signatures. In oil tankers, bulk carriers, double hull oil tankers built under **Part CSR-T of the Rules** or **Part CSR-B&T of the Rules**, bulk carriers built under **Part CSR-B of the Rules** or **Part CSR-B&T of the Rules** and ships carrying dangerous chemicals in bulk with integral tanks, the record is to be made in the approved format. The surveyor verifies and countersigns the thickness measurement record.

2 Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements. Where two or more transverse sections are required to be measured, one of them, at least, is to be a part of the water ballast tanks arranged just below upper deck within 0.5 *L* amidships.

3 As for thickness measurements on frames and brackets, the measuring points are to be generally within 30 mm from fillet welding with shell or slant plates.

4 “Where deemed appropriate by the Society” stipulated in **5.2.6-3, Part B of the Rules** refers to cases where any general wear down was not found in stainless steel (excluding clad steel) hull structure and piping as a result of an internal examination for tanks and spaces.

5 “The criteria for each type of corrosion” stipulated in **5.2.6-7(3), Part B of the Rules** refers to the following (1) to (3):

(1) Criteria for pitting corrosion are to be in accordance with following (a) to (c):

- (a) For plates with a pitting intensity of less than 20%, the measured thickness,  $t_m$ , of any individual measurement is to meet the lesser of the following criteria:

$$t_m \geq 0.7 (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 1 \text{ mm}$$

$t_{as-built}$ : As built thickness of the member under consideration (mm)

$t_{vol add}$ : Voluntary thickness addition (mm) which is voluntarily added as the Owner’s extra margin for corrosion wastage in addition to  $t_c$

$t_{ren}$ : Renewal criteria for general corrosion (mm) as defined in **Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **Chapter 13, Part 1, Part CSR-B&T of the Rules** depending on the applied Rule

$t_c$ : Corrosion addition (mm) as defined in **Section 3 Chapter 3, Part CSR-B, 3 Section 6, Part CSR-T** or **Section 3, Chapter 3, Part 1, Part CSR-B&T of the Rules** depending on the applied Rule

$t_m$ : Measured thickness ( $mm$ ) on one item, i.e. average thickness on one item using various measurements taken for this same item during the ship's periodical in-service surveys.

- (b) The average thickness across any cross section of the plating is not to be less than the renewal criteria for general corrosion as specified in **Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **Chapter 13, Part 1, Part CSR-B&T of the Rules** depending on the applied Rule.
- (c) For the side structures of bulk carriers built under **Part CSR-B** or **Part CSR-B&T of the Rules**, notwithstanding provisions (a) and (b) above, criteria for pitting corrosion are to be in accordance with following i) and ii):
  - i) If the pitting intensity in an area where coating is required, according to **Section 5, Chapter 3, Part CSR-B** or **Section 2, Chapter 1, Part 2 Part CSR-B&T of the Rules**, is higher than 15%, an area of 300  $mm$  or more, at the most pitted part of the plate, is to be cleaned to bare metal and the thickness is to be measured in way of the five deepest pits within the cleaned area in order to check the extent of the pitting corrosion. The smallest thickness measured in way of any of these pits is to be taken as the thickness to be recorded.
  - ii) The minimum remaining thickness in pitting corrosion, grooving corrosion or other local areas is to be greater than the criteria below, without being greater than  $t_{ren}$ .
    - 75% of the as-built thickness, in the frame and end bracket webs and flanges
    - 70% of the as-built thickness, in the side shell, hopper tank and topside tank plating attached to the each side frame, over a width up to 30  $mm$  from each side.

(2) Criteria for edge corrosion are to be in accordance with following (a) to (c):

- (a) Provided that the overall corroded height of the edge corrosion of a flange, or web in the case of flat bar stiffeners, is less than 25% of the stiffener flange breadth or web height, as applicable, the measured thickness,  $t_m$ , is to satisfy the lesser of the following criteria:

$$t_m \geq 0.7 (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 1 \text{ mm}$$

- (b) The average measured thickness across the breadth or height of the stiffener is not to be less than that defined in **Chapter 13, Part CSR-B** or **Section 12, Part CSR-T of the Rules**.
- (c) Plate edges at openings for manholes, lightening holes etc. may be less than the minimum thickness as specified in **Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **Chapter 13, Part 1, Part CSR-B&T of the Rules** depending upon the applied Rule subject to be in accordance with i) and ii) below:
  - i) The maximum extent of the reduced plate thickness, below the minimum thickness defined in **Chapter 13, Part CSR-B, Section 12, Part CSR-T of the Rules** or **Chapter 13, Part 1, Part CSR-B&T**, from the opening edge is not more than 20% of the smallest dimension of the opening and does not exceed 100  $mm$ .
  - ii) Rough or uneven edges may be cropped-back provided that the maximum dimension of the opening is not increased by more than 10% and the remaining thickness of the new edge is not less than  $t_{ren} - 1$  ( $mm$ )

(3) Criteria for grooving corrosion are to be in accordance with following (a) and (b):

- (a) Where the groove breadth is a maximum of 15% of the web height, but not more than 30  $mm$ , the measured thickness,  $t_m$ , in the grooved area is to satisfy the lesser of the following criteria, but is not to be less than 6  $mm$ :

$$t_m \geq 0.75 (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 0.5 \text{ mm}$$

- (b) Structural members with areas of grooving corrosion greater than those in (a) above are to be assessed based on the criteria for general corrosion as defined in **Chapter 13, Part CSR-B, Section 12, Part CSR-T** or **Chapter 13, Part 1, Part CSR-B&T of the Rules** depending upon the applied Rule using the average measured thickness across the plating/stiffener.

6 “Ship’s longitudinal strength evaluation” required in **5.2.6-8, Part B of the Rules** is to be carried out in accordance with the following.

- (1) Transverse sectional areas of deck flanges (deck plating and deck longitudinals) and bottom flanges (bottom shell plating and bottom longitudinals) of the ship’s hull girder are to be calculated by using the thickness of structural members measured in transverse sections specified in **Table B5.8, Table B5.10, Table B5.15** and **Table B5.21, Part B of the Rules**. It is to be confirmed that the diminution of the transverse sectional area does not exceed 10% of the as-built area.

- (2) Where the diminution of sectional areas of either deck or bottom flange exceeds 10% of the respective as-built area, it is to be confirmed that the actual section moduli, which are calculated by using the thicknesses mentioned above, is not less than those specified in **Table B5.2.6-1**.
- (3) For double hull oil tankers built under **Part CSR-T** or **Part CSR-B&T of the Rules**, notwithstanding provisions (1) and (2) above, it is to be confirmed that the condition of the ship satisfies the criteria specified in **1.5, Section 12, Part CSR-T** or **Section 2, Chapter 13, Part 1, Part CSR-B&T of the Rules** by using the thickness of structural members measured in the transverse sections specified in **Table B5.10** and **Table B5.31, Part B of the Rules**.
- (4) For bulk carriers built under **Part CSR-B** or **Part CSR-B&T of the Rules**, notwithstanding provisions (1) and (2) above, it is to be confirmed that the condition of the ship satisfies the criteria specified in **1.4, Section 2 Chapter 13, Part CSR-B** or **2.2, Section 2, Chapter 13, Part 1, Part CSR-B&T of the Rules** by using the thickness of structural members measured in the transverse sections specified in **Table B5.15** and **Table B5.30, Part B of the Rules**.
- (5) Where repairs are carried out to satisfy the requirements of the preceding (1) to (4), the ship's longitudinal strength for other transverse sections is to be evaluated by using the result of additional thickness measurements.
- (6) For bulk carriers built under **Part CSR-B** or **Part CSR-B&T of the Rules** and oil tankers of not less than 130 *m* in length for freeboard, the result of the final evaluation of the ship's longitudinal strength carried out after the ship reaches 10 *years* of age is to be reported as a part of the condition evaluation report specified in **B1.4.2-6(2)**.
- 7 Thickness measurements are to be carried out for the accessible parts of cargo hold hatch covers whose internals are impossible to structurally access.
- 8 Thickness measurement locations are to be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

Table B5.2.6-1

Ship's length for freeboard $L_f$ (m)	Hull section modulus			
	Applied rule			
	1964 version to 1972 version (except ships complying with “ <i>f/dB</i> ”)		1973 version to 1986 version	1987 version and later
	Oil tanker	Other ships		
$L_f \leq 60$	As stipulated in rule requirements	As stipulated in rule requirements	80% of rule requirements (77% for oil tankers and ships carrying dangerous chemicals in bulk)	80% of rule requirements
$60 < L_f < 130$			To be determined by interpolation	To be determined by interpolation
$L_f \geq 130$	As stipulated in rule requirements or $0.9Z_{gr\_min} \times K$ , whichever is greater where: $Z_{gr\_min}$ : Hull section modulus specified in <b>5.2.1.3-1, Part 1, Part C of the Rules</b> $K$ : Material factor specified in <b>3.2.1.2-2, Part 1, Part C of the Rules</b>		90% of rule requirements (87% for oil tankers and ships carrying dangerous chemicals in bulk)	90% of rule requirements

**B5.2.7 Pressure Tests**

1 With respect to **5.2.7. Part B of the Rules**, bilge, sludge and other similar tanks are to comply with the requirements for fresh water tanks.

2 Pressure tests of air pipes, sounding pipes, and other pipes may be required where deemed necessary by the Surveyor as a result of examinations.

3 In oil tankers, all bulkheads which form the boundaries of each cargo tank are to be tested with pressure from either side without fail at Special Survey No. 2 and subsequent Special Surveys.

4 “In cases where deemed appropriate by the Society stipulated in **Table B5.22 to B5.24, Part B of the Rules**” means that satisfactory external examinations of tank boundaries and confirmations from Masters stating that all pressure testing has been carried out according to the requirements with satisfactory results.

**B5.3 Special Surveys for Machinery****B5.3.1 General Examinations**

1 Where controlled atmosphere systems are installed onboard, the general examination of safety devices for refrigerating machinery specified in item 3 of **Table B5.25 of the Rules** is to be conducted on the gas freeing equipment, and control, alarm and monitoring equipment of the controlled atmosphere systems.

2 The wording “hazardous areas” of Requirements for Tankers in **Table B5.25, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-1, -4 and -5, Part H of the Rules**.

**B5.3.2 Performance Tests and Pressure Tests**

1 “As deemed appropriate by the Society” stipulated in item 2 of **Table B5.26 of the Rules** refers to conditions that satisfy the criteria below. “Other means” refers to non-destructive inspections such as ultrasonic tests which can detect cracks of at least 5 mm in length on the inside of vessels.

- (1) Straight flange parts (skirt parts) of receivers are to have been hot formed.
- (2) As installed, straight flange parts are to have adequate surface area for an ultrasonic angle beam test.

2 “Where deemed necessary by the Surveyor” in item 3 of **Table B5.26 of the Rules** refers to the following.

- (1) For parts exposed to pressure, where wastage such as corrosion or abrasion that affect the strength of those parts is found.
- (2) For boilers, pressure vessels or main steam piping, where the condition of internal wastage is impossible to be checked.

3 The following examinations are to be carried out on the rubber hoses used for contact freezers of direct ammonia expansion type as shown in **Table B5.3.2-3**.

- (1) Rubber hoses and their fitting attachments are to be generally examined yearly at periodical surveys.
- (2) In addition to (1) above, at the first periodical survey after the rubber hoses have been in use for two *years* and yearly at periodical surveys after four *years*, the hoses are to be cut open longitudinally and examined to verify that there is no internal cracking or lubricant present. Where deemed necessary by the attending Surveyor, tensile tests of the internal rubber may be requested. At this time, the breaking stress is to be not less than 8 N/mm<sup>2</sup>.
- (3) In addition to being in compliance with (1) and (2) above, bursting tests at 6 MPa are to be carried out on the rubber hoses yearly at periodical surveys after they have been in use for four *years*.
- (4) All rubber hoses are, as a rule, to be replaced with new ones after they have been in use for eight *years*.
- (5) For the tests specified in (2) and (3) above, one representative rubber hose is to be taken as a test specimen for every five sets of contact freezers, and where that hose fails either the tensile test (2) or the bursting test (3), all the hoses it represents are assumed to have the same results and therefore are to be replaced with new ones.
- (6) The chief engineer is to check the hoses and their fitting attachments before taking them into use, and to replace substandard ones as necessary. In addition, he is to keep a record of the following items in a maintenance book and present it to the attending Surveyor at periodical surveys.
  - (a) List of service histories of each hose
  - (b) Maintenance results (inspected dates, conditions of the hoses and their fitting attachments, disposition, etc.)
  - (c) Location number, manufacturer, type, manufacture date of renewed hoses

4 The “Performance tests of electric generator sets and important auxiliaries” mentioned in item 5 of **Table B5.26, Part B of the**

**Rules** are to verify the following for the electric generator sets specified in **3.2.1-3, Part H of the Rules**.

- (1) Where only one electric generating set is normally used, the standby generator, air circuit breakers, and important auxiliary machinery start up automatically when the main source of electrical power is stopped by tripping a circuit breaker.
- (2) Where two electric generating sets are normally used, preference tripping of unnecessary loads is performed when the circuit breaker of one of the sets is tripped.

5 The “electric generating sets specified in **3.2.1-3, Part H of the Rules**” mentioned in -4 above, refer to the application of **6.2.11-1** and **-3, Part H of the Rules** for the ships specified in **6.1.1, Part H of the Rules**.

Table B5.3.2-3 Examinations of rubber hoses used for contact freezers of direct ammonia expansion type

Survey item Served year	Visual examination (outside)	Visual examination (inside)	Bursting test (6 MPa)	Tensile test (8N/mm <sup>2</sup> )
1 year	○			
2 years	○	○		△
3 years	○			
4 years	○	○	○	△
5 years	○	○	○	△
6 years	○	○	○	△
7 years	○	○	○	△
8 years	To be renewed.			

○ : To be carried out.

△ : To be carried out in case where deemed necessary by the attending Surveyor.

## B5.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk

### B5.4.2 Examinations

1 The wording “programs and acceptance criteria approved in advance” in item 2 of **Table B5.27, Part B of the Rules** refers to the programs and acceptance criteria prepared by cargo containment systems’ designers and approved by the Society in accordance with the provisions of **4.6.2(4), Part N of the Rules**.

2 The wording “hazardous areas” in item 6 of **Table B5.27, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-3, -4** and **-5, Part H of the Rules** as well as in **1.1.5(23), Part N of the Rules**.

3 In applying **5.4.2, Part B of the Rules**, with respect to the functional tests specified in item 8 of **Table B3.9, Part B of the Rules**, reference is to be made to the requirements related to renewal surveys specified in Chapter 4, Part B of *IMO resolution MSC.267(85) “International Code on Intact Stability, 2008 (2008 IS Code)”*, notwithstanding the requirements of **B3.4.2-4**.

## B5.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

### B5.5.2 Examinations

1 The wording “hazardous areas” in item 5 of **Table B5.28, Part B of the Rules** refers to the hazardous areas specified in **4.2.3-2, -4** and **-5, Part H of the Rules**.

2 In applying **5.5.2, Part B of the Rules**, with respect to the functional tests specified in item 7 of **Table B3.10, Part B of the Rules**, reference is to be made to the requirements related to renewal surveys specified in Chapter 4, Part B of *IMO resolution MSC.267(85) “International Code on Intact Stability, 2008 (2008 IS Code)”*, notwithstanding the requirements of **B3.5.2-2**.

**B5.6 Special Requirements for Ships Using Low-flashpoint Fuels****B5.6.1 General**

The requirements of **5.6, Part B of the Rules** need not be applied to ships examined in accordance with **5.4, Part B of the Rules**.

**B5.6.2 Examinations**

**1** The phrase “programme and acceptance criteria approved” in item 2 of **Table B5.29, Part B of the Rules** means those prepared by fuel containment system designers and approved by the Society.

**2** The term “hazardous areas” in item 6 of **Table B5.29, Part B of the Rules** means the hazardous areas specified in **12.5, Part GF**, and **4.2.3-4** and **-5, Part H of the Rules**.

## B6 DOCKING SURVEYS

### B6.1 Docking Surveys

#### B6.1.1 Surveys in Dry Dock or on Slipway

1 The pressure test stipulated in item 2 of **Table B6.1, Part B of the Rules** refers to that specified in item 13 of **Table An1.4-1, Annex 2.1.5 “Testing Procedures of Watertight Compartments” of the Rules**.

2 “Mean diameter” as prescribed in item 7 of **Table B6.1, Part B of the Rules** refers to the average of the smallest diameter (the diameter measured in the direction with the most wear) found in one cross-section of the link and the diameter measured perpendicular to it in the same cross-section.

#### B6.1.2 In-water Surveys

1 The approval of application for the In-water Survey specified in **6.1.2-1, Part B of the Rules** is subject to the following conditions in (1) and (2).

(1) Application

In principle, In-water Surveys are applicable to ships under 15 *years* of age.

(2) Survey Conditions

The In-water Survey is to be carried out under the following conditions in (a) through (c) to ensure that the information obtained is as reliable as that obtained by surveys in a dry dock or on slipway.

(a) The ship is at its lightest possible draught and is in sheltered waters. The in-water visibility and the cleanliness of the hull below the waterline are to be good enough to permit a meaningful examination which allows the Surveyor and diver to determine the condition of the plating, appendages and welding, and the Surveyor is present.

(b) Diving and in-water survey operations are to be carried out by a company approved by the Society under the **Rules for Approval of Manufacturers and Service Suppliers** which is separately specified. The services of a diver well-experienced in using underwater cameras (still and live) in in-water surveying operations or Remotely Operated Vehicle are to be available.

(c) The Surveyor is to have access to a video display unit for viewing live footage and a means to keep good communication with the underwater diver or Remotely Operated Vehicle. Means for taking colour photographs is to be provided.

2 Approval of the consecutive In-water Surveys specified in **6.1.2-2, Part B of the Rules** is to be carried out with respect to each ship in reference to *IACS Recommendation No.133*.

#### B6.1.3 Other Surveys

The “reference standards deemed appropriate by the Society” referred to in **6.1.3-2, Part B of the Rules** refer to the following (1) and (2):

(1) those specified in item 11(1)(b) of **Table B8.3, Part B of the Rules** for oil lubricated shafts; and

(2) those specified in item 11(1)(b) of **Table B8.4, Part B of the Rules** for freshwater lubricated shafts.

## **B8 PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS**

### **B8.1 General**

#### **B8.1.2 Preventive Maintenance System of Shafts**

**1** The wording “borescope camera” in **8.1.2-2(2), Part B of the Rules** is to be capable of conducting inspections with clear images of 300,000 pixels or more and is to be equipped with a recording function.

**2** The wording “Remote monitoring devices for wear-down of shaft deemed appropriate by the Society” in **8.1.2-2(7), Part B of the Rules** means devices approved by the Society in accordance with **Chapter 1, Part 7 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.

**3** The wording “redundancy” in **8.1.2-2(7), Part B of the Rules** may be provided by having at least one set of spare sensors in cases where the design allows sensors to be replaced without drawing out the shafts and propellers.

**4** The wording “Grounding devices” in **8.1.2-2(9), Part B of the Rules** for slip rings and brushes are recommended to be made of silver alloy and silver-graphite combinations, respectively.

**5** The wording “grounding condition monitoring devices” in **8.1.2-2(9), Part B of the Rules** are to be capable of indicating values for voltage, current or resistance.



## B9 PLANNED MACHINERY SURVEYS

### B9.1 Planned Machinery Surveys

#### B9.1.1 Application

The Planned Machinery Survey generally applies to surveys of machinery and equipment that have had much use. However, it does not apply to the following machinery, equipment and survey items.

- (1) Propellers and propeller shafts
- (2) Sea valves below load water line
- (3) Boilers
- (4) Machinery and equipment (cargo handling appliances, refrigerating installations, bilge separators, pumps for bilge separators, etc.) that comply with rules other than the Rules for the Survey and Construction of Steel Ships, and that are required to have open-up surveys
- (5) Measurement of crankshaft deflections of reciprocating internal combustion engines used as main propulsion machinery and clearances of stern tubes or shaft bracket bearings at their aft ends
- (6) Machinery and equipment (electrical installations, spare parts, etc.) for which open-up surveys are not required (also performance tests, pressure tests, etc.)
- (7) In addition to the above, machinery, equipment, and survey items which are considered by the Society to be outside the application of the Planned Machinery Survey for the following reasons:
  - (a) Newly developed machinery and equipment that are not considered appropriate for application of the Planned Machinery Survey
  - (b) Machinery and equipment to which the Planned Machinery Survey applies, but are not considered to be appropriate for further application of the Planned Machinery Survey due to frequent occurrences of damage

#### B9.1.2 Continuous Machinery Surveys (CMS)

##### 1 Application of CMS

- (1) The survey items covered by the CMS are the open-up surveys of the equipment and machinery specified in **Table B9.1, Part B of the Rules**.
- (2) Auxiliaries prescribed in item 8 of **Table B9.1, Part B of the Rules** are as follows:
  - (a) Air compressors and blowers  
Main and auxiliary starting air compressors (excluding those for emergency use), air compressors for the control system, and forced draught fans for boilers (excluding those with a maximum evaporation rate of 3 tons/hr or less)
  - (b) Cooling pumps  
Circulating pumps for main steam turbine, piston cooling fresh water / oil pumps, cylinder jacket cooling fresh water / sea water pumps, turbocharger cooling fresh water / sea water pumps, fuel valve cooling fresh water / oil pumps, cooling sea water pumps for L.O. cooler, cooling sea water pumps for fresh water cooler, and cooling fresh water /sea water pumps for generator engine
  - (c) Fuel oil pumps  
F.O. supply pumps, F.O. service pumps, boiler burning pumps (excluding those with a maximum evaporation rate of 3 tons/hr or less), and F.O. transfer pumps
  - (d) Lubricating oil pumps  
L.O. pumps for main engine, L.O. pumps for camshaft, L.O. pumps for reduction gear, L.O. pumps for controllable pitch propeller (C.P.P.), stern tube L.O. pumps (excluding those where the lubricating oil can be supplied and circulated under the gravity tank system), thermal oil circulating pumps, and system oil pumps (pumps for feeding oil to hydraulic systems for control and adjustment of essential auxiliaries for propulsion)
  - (e) Feed water pumps, condensing pumps, drain pumps  
Feed water pumps, boiler water circulating pumps, condensing pumps (for main steam turbines, generator turbines, cargo

oil pump turbines, and ballast pump turbines), and drain pumps

- (f) Bilge pumps, ballast pumps, and fire pumps

Bilge pumps, ballast pumps, general service pumps, and fire pumps (excluding those for emergency use)

- (g) Condensers and feed water heaters

Main condensers, auxiliary condensers, gland condensers, atmospheric condensers, dirty steam condensers, vent condensers, drain cooler feed water heaters, and deaerators

- (h) Coolers

Main fresh water coolers (for cylinder jackets and pistons), F.O. valve cooling fresh water / oil coolers, fresh water coolers for turbochargers, cooling fresh water coolers for generator engines, F.O. coolers, main L.O. coolers, turbocharger L.O. coolers, camshaft L.O. coolers, reduction gear L.O. coolers, hydraulic oil coolers, coolers for C.P.P., stern tube L.O. coolers, and coolers for generator turbines

- (i) Oil heaters

F.O. heaters, L.O. heaters (excluding electric heaters with a capacity of 10 kW or less)

- (j) F.O. tanks (having a capacity of more than 1 m<sup>3</sup> which do not form part of the hull structure)

F.O. settling tanks and service tanks (for main and auxiliary machinery), and F.O. tanks for boilers

- (k) Air reservoirs (including those for main, auxiliary, control, general service and emergency use)

Air reservoirs and their essential valves

- (l) Cargo handling appliances (including cargo handling appliances, cooling and reliquefaction equipment for bulk liquid cargoes as necessary)

Cargo pumps (including chemical pumps, liquefied gas pumps), stripping pumps, tank cleaning pumps, gas compressors, gas blowers, heat exchangers, pressure vessels, vaporizers, tank cleaning heaters and drain coolers, drain coolers for cargo oil heaters, refrigerating equipment (refrigerant pumps and compressors), and inert gas systems

- (m) Deck machinery

Steering gears, windlasses and mooring winches (including their hydraulic pumps)

- (n) Distilling plants (for boilers used for driving steam turbines necessary for main propulsion or manoeuvring and personnel safety)

- (o) Other machinery and equipment which the Society considers to be covered by the Planned Machinery Survey

## 2 Application for CMS

- (1) To apply for CMS, the shipowner or agent is to submit three copies of the following documents in the prescribed format (one for the Society's files, the ship and the shipowner) to the Society before the first survey after the Classification Survey or the previous Special Survey.

- (a) Application form (**Form-CMS-1E**)

- (b) CMS Program

- (2) For existing ships (such as those subject to Classification Survey of ships not built under the Society's Survey), the survey items applicable to Planned Machinery Surveys are selected from among those surveyed by the previous Classification Society at the Classification Survey of ships not built under the Society's Survey. The procedures to be adopted after the Classification Survey are to be the same as in (1) above.

## 3 CMS Program

The CMS Program is to be prepared referring to the following (1) to (3). Each survey interval for items covered by the Planned Machinery Survey is not to exceed 5 years, and the Program is to be retained on board the ship so that it can be presented to the Surveyor whenever so requested.

- (1) All the items applicable for the CMS are to be included.
- (2) The interval between open-up examinations of identical items is not to exceed 5 years.
- (3) Preferably, the survey schedule for machinery and equipment is to be planned in such a way that the conditions of one set of machinery and equipment can be deduced from the results of an open-up examination of another set of machinery and equipment. Accordingly, when there are identical sets of machinery or equipment, the examinations should be conducted on an alternate set each time as far as practicable.

**4 Procedures for CMS**

- (1) Surveys under CMS are to be carried out in accordance with the CMS Program prescribed in -3 above. However, where partial changes are made to the maintenance plan of machinery and equipment while executing the CMS Program, the Program retained on board may be corrected upon approval by the Surveyor, and the subsequent surveys may be carried out according to the corrected Program.
- (2) When defects or failures are found in areas surveyed, a thorough examination may be required on similar parts despite the CMS Program prescribed in -3 above.

**5 Substitution for open-up examinations**

The machinery and equipment listed below may be exempt from open-up examinations if they are found to be in satisfactory condition by carrying out the examinations listed and examining records such as the logbooks. However, when defects are found during the examinations, or if the maintenance condition is judged to be questionable as a result of examining the logbooks or other records, open-up examinations may be required.

- (1) Oil pumps (excluding cargo pumps) and hydraulic deck machinery  
Visual examinations of general conditions by checking items such as the amount of fouling of oil strainers or the state of the oil  
Examination of the operating condition of the pumps
- (2) Oil tanks, F.O. coolers and oil heaters  
Visual examinations of general conditions
- (3) Cooling fresh water pumps and blowers  
Visual examinations under their operating conditions
- (4) Auxiliary reciprocating internal combustion engines that are not normally used at sea and those that have a total running time of less than 7,000 hrs counting from the last open-up examination  
Visual examinations under their operating conditions (However, an open-up examination is required when the total running time reaches 7,000 hrs counting from the last open-up examination)

**6 Confirmatory Survey**

In ships deemed by the Society as maintaining their machinery and equipment well, overhaul inspections according to the CMS Program specified in -3 by the shipowner (or the ship management company) may forgo the open-up examination performed in the presence of Surveyors by conducting the following confirmatory surveys, provided that the machinery and equipment are overhauled as part of the ship's maintenance practices and the records from such overhauls are kept in good order. In this case, the due date of the next open-up examination is 5 years from the date of its last overhaul and inspection.

- (1) Procedure of the confirmatory survey
  - (a) In the case of any machinery and equipment specified in (2) below overhauled and inspected by the Chief Engineer as routine maintenance work, one copy of the inspection report including the items mentioned below is to be submitted to, and reviewed by the attending Surveyor. Also, the Chief Engineer's profile is to be confirmed by the attending Surveyor.
    - i) Signature of the Chief Engineer and license number
    - ii) Date and place of the inspection
    - iii) Inspection items and their results
    - iv) Operating conditions before and after the inspection
  - (b) Parts replaced with spares or repaired are to be verified by visual examinations on by photographs.
  - (c) Visual examinations are to be carried out for main propulsion machinery, and examinations under operating conditions, as well as visual examinations are to be carried out for other machinery and auxiliary machinery, etc.
  - (d) Visual examinations of lubricating oil conditions are to be carried out through open-up inspections, etc. of the lubricating oil filters of crankshafts, main bearings, crankpin bearings, crankpin bolts as well as camshafts and camshaft driving devices of reciprocating internal combustion engines used as main propulsion machinery.
  - (e) Visual examinations to confirm the current conditions and the lubricating oil maintenance conditions of intermediate shafts, thrust shafts and bearings are to be carried out as far as possible.
  - (f) Confirmation of the open-up inspection and adjustment records of safety valves (excluding fusible plugs) is to be carried out for air reservoirs.
  - (g) As a result of the confirmatory survey stipulated in (a) to (f) above, open-up examinations and/or re-examinations may be

required when deemed necessary by the Surveyor.

(2) Items applicable to the confirmatory survey

Items of machinery and equipment applicable to the confirmatory surveys are as follows.

- (a) Reciprocating internal combustion engines used as main propulsion machinery
- (b) Reciprocating internal combustion engines used for driving generators, auxiliary machinery essential for main propulsion or auxiliary machinery for manoeuvring and safety of the ship
- (c) Intermediate shafts, thrust shafts and bearings
- (d) Auxiliary machinery (air compressors, pumps, turbines used for driving cargo oil pumps, heat exchangers, air reservoirs, deck machinery and distilling plants)

(3) Timing of the confirmatory survey

A confirmatory survey is to be carried out no later than the completion date of the first periodical survey (excluding those specified in (4) to (6) of **1.1.3-1, Part B of the Rules**, hereinafter the same in this (3)) on or after the day the item of machinery and equipment intended for the confirmatory survey was overhauled and inspected. Notwithstanding the above, if the shipowner (or the ship management company) applies for a survey, it may be allowed to carry out a confirmatory survey no later than the following (a) or (b) whichever is earlier.

- (a) Completion date of the second periodical survey on or after the day the item of machinery and equipment intended for the confirmatory survey was overhauled and inspected
- (b) The due date of the open-up examination

**7 Cancellation of CMS**

- (1) Where the shipowner or representative requests termination of the CMS, the machinery and equipment are to be subjected to all the surveys required for the CMS at Special Surveys henceforth. If there are any items of machinery or equipment that will not be covered by a Special Survey within 5 years of the previous survey, they are to be examined within those 5 years.
- (2) When non-compliance with this Guidance is found for machinery or equipment to which the CMS is applied, application of the CMS may be cancelled by the Society. The procedures to be taken henceforth are to be in accordance with the requirements in (1) above.
- (3) When the shipowner changes, the CMS is generally discontinued. Where the new shipowner wishes to continue CMS, a new application as prescribed in -3 above is to be made by the new shipowner.

**B9.1.3 Planned Machinery Maintenance Scheme (PMS)**

**1 Application of PMS**

PMS may apply to the open-up examinations of machinery and equipment prescribed in **B9.1.2-1**.

**2 Terms**

The definition of “maintenance management system” which appears in **B9.1.3** is a computer system for managing the maintenance and inspection plans of machinery and its components that are subject to the Planned Machinery Maintenance Scheme.

**3 Application Procedure for PMS**

To apply for PMS, the shipowner or ship management company or representative is to submit an application form (**Form-PMS-AP**) together with the following documents to the Society.

- (1) Documents for approval (3 sets: one each for the ship’s file, shipowner’s file and Society’s file)
  - (a) Machinery maintenance scheme
  - (b) Survey schedule table
  - (c) Function descriptions for maintenance management system
- (2) Documents for reference (1 set)
  - (a) Sample form of machinery maintenance records
  - (b) Organization chart identifying the section and the personnel responsibility for the machinery maintenance

**4 Approval of PMS**

Conditions for approval of PMS are as follows:

(1) Machinery maintenance scheme

The machinery maintenance scheme for PMS is to specify maintenance works such as overhaul inspection, replacement of parts and general inspection with their time schedule and/or running hours for each item of machinery and equipment including their

parts. The scheme is to be prepared based on the inspection and maintenance intervals recommended by the manufacturers of the machinery and equipment with input from the experience and knowledge of the shipowner and ship management company. The inspection intervals for all items covered by PMS are generally planned not to exceed 5 years. However, for the items whose overhaul intervals are specified on the basis of their running hours, longer intervals may be accepted as long as the intervals are based on the manufacturer's recommendations. When the machinery maintenance scheme is changed, the amended scheme is to be submitted to the Society for approval.

(2) Survey Schedule Table

Survey intervals of the survey items are not to exceed those specified in the machinery maintenance scheme. The following items are to be generally opened and examined in the presence of the Surveyor.

- (a) Rotors, casings, main bearings, couplings between turbine and reduction gear, nozzle valves and manoeuvring valves for main steam turbine
- (b) Auxiliary steam turbine for main generator
- (c) Reduction gears for main propulsion
- (d) Flexible couplings for main propulsion
- (e) Other items deemed necessary by the Society.

When this survey schedule table is amended, the amended survey schedule table is to be submitted to the Society for approval.

(3) Machinery Maintenance Records

Machinery maintenance records are to include at least the following items. These records are to be retained on board the ship at all times.

- (a) Date of maintenance work
- (b) Signature by the Chief Engineer
- (c) Details of maintenance work and results
- (d) Total running hours (parts replacement intervals and overhaul intervals)
- (e) Names of parts replaced
- (f) Measuring data (including original design dimensions and allowable tolerance)
- (g) The condition of damage and repair method
- (h) Results of visual examinations of lubricating oil conditions carried out through open-up examinations of the lubricating oil filters, etc. of crankpins, crank journals, thrust shafts and bearings of reciprocating internal combustion engines used as main propulsion machinery (in cases where the principle components of such engines were inspected through independent open-up surveys conducted by chief engineers)

(4) Chief Engineer

The Chief Engineer in charge of PMS is to be a person designated by the shipowner or ship management company.

(5) Computer

Computers used for maintenance management system are to satisfy the following requirements specified in (a) through (f):

- (a) Computers are to be configured so that the effects of a system failure in part of the circuits or devices can be limited to a certain range as far as possible.
- (b) Each system component is to be protected against overvoltages (electrical noise) likely to enter through input/output terminals.
- (c) Central processing units and important peripheral devices are to have a self-monitoring function.
- (d) Important programmes and data are not to be deleted in the event of a temporary failure of the external source of power supply.
- (e) Spare parts for important system components that require specialist services for repairs are to be supplied in readily replaceable part units.
- (f) It is recommended that the software is approved in accordance with **Annex 9.1.3 "Procedures for approval of PMS/CBM management software" of the Rules.**

**5 Surveys for PMS**

(1) Initial Survey

The initial survey is to be carried out by the Surveyor within 1 year from the date of approval for application of PMS, and it is

to be verified that planned machinery maintenance is being carried out in accordance with the approval scheme.

(2) Annual Survey

General examinations (including review of maintenance records) are to be carried out yearly to confirm that the planned machinery maintenance is being carried out by the designated Chief Engineer in accordance with the approved scheme on relevant machinery, equipment, and parts, and that these items are in good condition.

(3) Open-up Survey

The items prescribed in **-4(2)** above are to be opened and examined in the presence of the Surveyor in accordance with the survey schedule table.

(4) Occasional Survey

Any damage to items covered by PMS are to be reported to the Society immediately. Upon review of the reports, the Society may request an occasional survey when considered necessary.

**6** Surveys based on condition monitoring and diagnosis

The wording “requirements specified otherwise by the Society” in **9.1.3-2, Part B of the Rules** means the following:

(1) Annual Survey

It is to be verified that condition monitoring has been properly carried out and as a result of which, machinery, equipment and parts are in good order. Confirmation that the condition monitoring system and maintenance management system are being operated effectively and are also in good order is to be made. If as a result of this confirmation, the Society deems that proper maintenance has not been carried out, an open-up examination in the presence of the surveyor may be required. Condition monitoring data and the results of the diagnosis are to be evaluated by the Society before the survey and are to be retained on board at all times.

(2) Occasional Survey

Any damage to items covered by PMS or any abnormal conditions observed by the condition monitoring system are to be reported to the Society according to the approved machinery maintenance scheme without delay. Upon review of the reports, the Society may request an occasional survey when considered necessary.

**7** Cancellation of PMS

The Society may cancel approval for PMS when it is considered difficult to continue PMS for any of the following reasons.

- (1) It is found that PMS is not operated in accordance with the approved scheme
- (2) Damages or deficiencies found on items covered by PMS have not been rectified by the due date
- (3) When the shipowner or ship management company has been changed
- (4) When the class of the ship has been transferred
- (5) When the shipowner or ship management company requests cancellation of the approval

**B9.1.4 Condition Based Maintenance Scheme (CBM)**

**1** General

The purpose of a condition based maintenance scheme is to obtain maintenance efficiency by performing maintenance at the early stage of an abnormality detected by condition monitoring and diagnosis and by continuously using components when no abnormality is found. The condition monitoring systems are to be arranged to provide an equivalent or greater degree of confidence in the condition of the machinery to traditional survey techniques.

**2** Application of CBM

- (1) The wording “an established maintenance system” in **9.1.4, Part B of the Rules** refers to those which satisfy the requirements of **Rules for the Audit and Registration of Safety Management Systems** or their equivalent. In addition, all personnel involved in condition monitoring and diagnosis are to be properly qualified.
- (2) CBM may apply to items subjected to the open-up examinations of machinery and equipment prescribed in **B9.1.2-1**.

**3** Terms

The definitions of terms which appear in **B9.1.4** are as specified in the following (1) to (5).

(1) Condition monitoring

Acquisition and processing of information and data that indicate the state (The machine state deteriorates if faults or failures occur.) of machineries, equipment or its components over time

(2) Diagnostic

Examination of symptoms and syndromes to determine the nature of faults or failures

(3) Condition based maintenance

Maintenance performed as governed by **B9.1.4**.

(4) Condition monitoring system

A system which is composed of displays for diagnosing the deterioration trend of the machineries, equipment, and its components from data continuously or periodically measured by sensors and computers for saving and maintaining this data

(5) Maintenance management system

A computer system for managing the maintenance and inspection plans of machineries, equipment, and its components which are subject to the Condition Based Maintenance Scheme

#### 4 Application Procedure for CBM

To apply for CBM, the shipowner or ship management company or representative is to submit an application form (**Form-CBM-AP**) together with the following documents to the Society. The baseline data specified in **(1)(i)** may be submitted to the Society so as to be approved before the implementation survey specified in **-6(2)**.

(1) Documents for approval (3 sets: one each for the ship's file, shipowner's file and Society's file)

- (a) Machinery maintenance scheme for CBM
- (b) Survey schedule table
- (c) List of the machinery, etc. subject to the scheme
- (d) List of equipment comprising the condition monitoring system as well as function descriptions and maintenance instructions for the condition monitoring system
- (e) List of sensors
- (f) Kinds and contents of output information from the condition monitoring system (kinds of abnormalities, maintenance recommendations, remaining years of service life, etc.)
- (g) List of limiting parameters used in condition monitoring (alarms and warnings determined from manufacturer recommendations or international standards)
- (h) Procedures for changes to software systems and limiting parameters
- (i) Baseline data
- (j) Function descriptions for maintenance management system
- (k) Qualification of personnel and organizations responsible for analysing condition monitoring results

(2) Documents for reference (1 set)

- (a) Sample form of condition monitoring records
- (b) Sample form of machinery maintenance records
- (c) Organization chart identifying the section and the personnel responsibility for the condition monitoring and diagnosis

#### 5 Approval of CBM

Conditions for approval of CBM are as follows:

(1) Machinery maintenance scheme for CBM

The machinery maintenance scheme for CBM is to include maintenance and management of the records of machinery, equipment or associated components subject to the scheme and specify the following **(a)** to **(d)**. When the machinery maintenance scheme is changed, the amended scheme is to be submitted to the Society for approval.

- (a) The functions of the condition monitoring system
- (b) Procedures related to condition monitoring and diagnosis
- (c) Handling procedures in cases where an abnormality is found (including procedures for creating maintenance records and reporting to the Society)
- (d) Procedures for identifying defects and failures that were not prevented by condition monitoring and diagnosis and for modifying the machinery maintenance scheme for CBM accordingly

(2) Condition monitoring system

The condition monitoring system is to satisfy the following requirements specified in **(a)** to **(h)**. In cases where this system is modified, that modification is to be approved by the Society.

- (a) The computer collects data from sensors or centralized machinery monitoring and control systems. The sensors are to be

subject to the tests equivalent to those specified in **18.7.1, Part D of the Rules**.

- (b) The hardware and software of the computer is to comply with **B9.1.3-4(5)(a) to (e) of the Guidance** and **Chapters 1, 2 and 3, Part X of the Rules**.
  - (c) In addition to (b), the software is to have condition monitoring function specified in **Annex 9.1.3 “Procedures for approval of PMS/CBM management software” of the Rules** and be suited to diagnosing any deterioration of machinery, equipment or associated components on the basis of the data from the sensors or centralized machinery monitoring and control systems specified in (a). The software is to be suitable for diagnosing the condition of equipment or its components on the basis of independent or coalesced data, or their trends.
  - (d) The condition monitoring system is to produce condition monitoring records.
  - (e) In cases where condition monitoring and diagnosis are conducted on board ships, the condition monitoring system is to be such that no specialized knowledge of data analysis is required to use the system.
  - (f) In cases where remote condition monitoring and diagnosis are conducted (i.e. the data sent from the ship is analyzed remotely), the condition monitoring systems are to include a communication function to transfer the data collected by the sensors or centralized machinery monitoring and control systems specified in (a). Particular attention is to be paid to the cyber safety and security of said communication function. The system equipped on board is to be arranged to store the condition monitoring data in the event of loss of the communication function and transfer the data after the communication function is restored.
  - (g) In cases where limiting parameters are modified, such modifications are to be identified.
  - (h) The condition monitoring system is to include a method for backing up data at regular intervals.
- (3) Maintenance management system

The maintenance management system is to have the maintenance records function specified in **Annex 9.1.3 “Procedures for approval of PMS/CBM management software” of the Rules**. This function may be incorporated into the condition monitoring system specified in (2).

(4) Survey Schedule Table

Annual surveys are to be performed to confirm that the machinery maintenance scheme for CBM is being properly implemented. In cases where there is any damage to the machinery, equipment or associated components subject to the scheme or an abnormality is found in the results of condition monitoring and diagnosis, the shipowner (or ship management company) is to promptly report this to the Society and apply for an occasional survey if instructed to do so by the Society. When this survey schedule table is amended, the amended survey schedule table is to be submitted to the Society for approval.

(5) Condition monitoring record

Condition monitoring records are to include at least the following items.

- (a) Condition monitoring data, including all data since last open-up inspection, the original baseline data specified in **-6(2)** and relevant maintenance data.
- (b) Signature of the chief engineer
- (c) Contents and results of condition monitoring and diagnosis (including criteria for judgment)

(6) Machinery maintenance record

The machinery maintenance records are to include the items specified in **B9.1.3-4(3)** for the machinery, equipment or associated components subject to the scheme. Those records are to be created by the chief engineer and always to be available on board the ship.

(7) Chief engineer and other ship personnel

The machinery maintenance scheme for CBM is to be implemented by a chief engineer designated by the shipowner or ship management company. Access to the condition monitoring system and maintenance management system is to be permitted only to the chief engineer and other ship personnel who are designated by the shipowner or ship management company.

## 6 Surveys of CBM

(1) Installation survey

It is to be confirmed in the presence of the Surveyor that the equipment necessary for condition monitoring and diagnosis, e.g. sensors, are installed and available in accordance with the machinery maintenance scheme for CBM. In addition, a set of baseline readings is to be taken.



**(2) Implementation survey**

An implementation survey is to be carried out no earlier than 6 months after the installation survey and no later than the first periodical survey (i.e. the Annual Survey, Intermediate Survey or Special Survey specified in **1.1.3-1, Part B of the Rules**). At the implementation survey the following (a) to (f) are to be verified. At this implementation survey, a report which specifies the implementation status of these items is to be submitted to the Society. The baseline data are to be approved by the Society prior to the implementation survey

- (a) Baseline data are incorporated in the condition monitoring system.
- (b) Condition monitoring and maintenance are conducted in accordance with the machinery maintenance scheme for CBM (including a comparison of condition monitoring results to the baseline data).
- (c) Condition monitoring records and machinery maintenance records are available on board the ship and the contents of said records are sufficient as an alternative to the open-up surveys specified in **Table B9.1, Part B of the Rules**.
- (d) The familiarity of the chief engineer and other designated personnel with the operation of the machinery maintenance scheme for CBM.
- (e) Records of any limiting parameters that have been modified.
- (f) In cases where there is any failure on machinery, equipment or associated components subject to the scheme, appropriate modification of the machinery maintenance scheme for CBM has been undertaken to address said failure.

**(3) Annual survey**

An annual survey is to be carried out to verify that the scheme is being correctly operated and maintenance of machinery, equipment or associated components whose condition monitoring and diagnosis results were abnormal since the last survey has been carried out. At the annual survey the following (a) to (g) are to be verified. In cases where it is deemed necessary by the Surveyor (in consideration of the results of this verification) open-up examinations, function tests, confirmatory tests and readings of condition monitoring parameters may be required as far as practicable. In addition, condition monitoring records and maintenance records are to be available on board ships.

- (a) The results of condition monitoring and diagnosis (including confirmation of maintenance records and general inspections) of machinery, equipment and associated components subject to the scheme are good.
- (b) Condition monitoring systems and maintenance management systems work effectively and are in good condition.
- (c) Records of any limiting parameters that have been modified since the last survey
- (d) Written details of breakdowns or malfunctions
- (e) The familiarity of the chief engineer and other designated personnel with the operation of the machinery maintenance scheme for CBM.
- (f) In cases where there is a failure of machinery, equipment or associated components subject to the scheme, appropriate modification of the machinery maintenance scheme for CBM has been undertaken based to address said failure.
- (g) The following documents are available on board ships
  - i) Documents specified in **-4(1)** and **(2)**
  - ii) Maintenance instructions issued by manufacturers or shipyards
  - iii) Condition monitoring records and initial obtained baseline data specified in **-5(5)**
  - iv) Machinery maintenance records specified in **-5(6)**
  - v) Reference documents (trend investigation procedures, etc.)
  - vi) Records of changes to software systems and parameters
  - vii) Sensors calibration records / certification / status

**(4) Occasional Survey**

Any damage to machinery, equipment or associated components subject to the scheme or any abnormality observed by the condition monitoring and diagnosis is to be reported to the Society immediately according to an approved machinery maintenance scheme for CBM. Upon review of the reports, the Society may request an occasional survey if necessary. Any machinery part that is damaged and subsequently replaced by a spare part is to be retained on board where possible until examined by the Surveyor.

**7 Cancellation of CBM**

The Society may cancel all or part of approval for CBM scheme when it is considered difficult to continue CBM scheme for any of

the following reasons. In such cases, items which have been monitored under the scheme since the last survey are to be subjected to surveys deemed appropriate by the Society.

- (1) It is found that CBM scheme is not operated in accordance with the approved scheme
- (2) Damages or deficiencies found on items covered by CBM scheme have not been rectified by the due date
- (3) When the shipowner or ship management company has been changed
- (4) When the class of the ship has been transferred
- (5) When the shipowner or ship management company requests the cancellation of approval
- (6) When deemed appropriate by the Society (e.g. a critical deficiency in the condition monitoring system is not expected to be rectified.)

## **B10 SURVEYS FOR STEEL BARGES**

### **B10.4 Annual Survey**

#### **B10.4.2 Annual Survey for Hull, Equipment and Fire Extinction**

With respect to [3.2.2, Part B of the Rules](#), the requirements in [B3.2.2-4](#) need not to be applied.

### **B10.5 Intermediate Survey**

#### **B10.5.2 Intermediate Survey for Hull, Equipment and Fire Extinction**

With respect to [4.2.2, Part B of the Rules](#), the requirements in [B3.2.2-4](#) need not to be applied.

### **B10.6 Special Surveys**

#### **B10.6.2 Special Survey for Hull, Equipment and Fire Extinction**

With respect to [5.2.2, Part B of the Rules](#), the requirements in [B3.2.2-4](#) need not to be applied.

## **B11 SURVEYS OF SUBMERSIBLES**

### **B11.1 General**

#### **B11.1.2 General Requirements on Surveys**

**1** Where an Intermediate Survey was carried out in advance in accordance with **11.1.2-4, Part B of the Rules**, the anniversary date is to be amended to a date which is not to be more than 3 *months* later than the date on which the Intermediate Survey was completed. Subsequent Intermediate Surveys specified in **11.1.2-2(1)(a), Part B of the Rules** are to be carried out at intervals using the new anniversary date.

**2** The wording “firm deemed appropriate by the Society” in **11.1.2-5, Part B of the Rules** refers to firms complying with the requirements of **Chapter 2, 3 or 8, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society.

**3** The wording “firm deemed appropriate by the Society” in **11.1.2-6, Part B of the Rules** refers to any of the following: firms complying with the requirements of **Chapter 6, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society; firms approved by the Administration; firms approved by duly authorized organizations acting on behalf of the Administration; or firms approved by other organizations which are acceptable to the Administration.

### **B11.2 Classification Survey during Construction**

#### **B11.2.3 Presence of Surveyors**

The wording “items specified otherwise by the Society” in **11.2.3, Part B of the Rules** means surveys of the tests specified in **11.2.3(1)** and **(7), Part B of the Rules** as well as **7.2.1** and **7.2.2, Part T of the Rules**, and the wording “the Society may approve other survey methods which it considers to be appropriate” means to be in accordance with **B2.1.4-1(2)**.

## **B12 SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES**

### **B12.1 General**

#### **B12.1.1 Application**

1 Onshore installations specified in relevant chapters of **Part P of the Rules** are to be examined in accordance with the relevant requirements in **Chapter 12, Part B of the Rules**. However, onshore electrical installations are to comply with the following.

- (1) Any part of the installations owned by an electric power generating company is not subject to the survey for registration and class maintenance
- (2) Installations complying with the laws and regulations of the country where they are located and with safety standards equal to or better than those specified in the Rules may be given special consideration by the Society regarding surveys upon submission of such records

#### **B12.1.2 General Requirements on Surveys**

In cases where drilling derricks installed on board are detachable type, an Occasional Survey is to be carriage out when drilling derricks are detached and reinstalled. In addition, Periodical Surveys may substitute for the Occasional Surveys where the survey items of the Occasional Surveys are inspected as a part of the Periodical Surveys.

#### **B12.1.3 Postponement of Periodical Surveys**

- 1 “Low running hours” stipulated in **12.1.3, Part B of the Rules** refers to 700 *hours* or less in total running hours per year.
- 2 This postponement may be repeated within the specified total running hours in **12.1.3, Part B of the Rules**.

### **B12.2 Classification Survey during Construction**

#### **B12.2.1 General**

In the Classification Survey during Construction of the units specified in **12.1.1-3, Part B of the Rules** which are integrated into one system, the units are to be surveyed individually. However, where part or all of the installations are located onshore or equipment used for supporting a unit are provided in other unit, coupling tests between the unit and those installations and equipment are also to be carried out.

#### **B12.2.2 Submission of Plans and Documents**

1 A stability information booklet for the unit specified in **12.2.2-1(1)(j), Part B of the Rules** is to be prepared in accordance with **Annex U1.2.1 “GUIDANCE FOR STABILITY INFORMATION FOR MASTER”, Part U of the Guidance**.

2 Details of the docking plan and in-water inspection procedures specified in **12.2.2-1(1)(l), Part B of the Rules** are to include the following items.

- (1) Plans of shell plating below waterline  
These plans are to indicate the details of the location and sizes of shell openings, location of watertight and oil-tight bulkheads, location of bottom plugs, location of bilge keels, location of welded seems and butts and location of anodes
- (2) Detailed plans for in-water inspection of such construction and arrangements of equipment together with their colour photographs and detailed instructions for inspections of such operating procedures and maintenance
- (3) Painting plan and corrosion control procedure below waterline
- (4) Equipment for inspection (means for communication between the Surveyor and the diver, underwater camera (live/still), video display unit, etc.)
- (5) Other data or documents which may serve the in-water inspection

3 For units subject to the In-water Survey in lieu of a Docking Survey, a plan indicating the points on the hull where thickness measurements were to be taken at the Docking Survey is to be submitted to the Society for approval.

4 For units specified in **12.1.1-3, Part B of the Rules** which are integrated into one system, the plans specified in **12.2.2-1(2)(e), Part B of the Rules** are to include onshore installations.

5 For units specified in **12.1.1-3, Part B of the Rules**, the operating manual specified in **12.2.2-1(3), Part B of the Rules** is to include operating procedures of any onshore installations.

6 “Details of drilling derrick constructions” stipulated in **12.2.2-1(1)(p)i, Part B of the Rules**, refers to the following plans:

- (1) General arrangement
- (2) Details of the main structural members of the drilling derrick
- (3) Assembly plan of the drilling derrick
- (4) Foundations and anchor bolt plans of the drilling derrick

7 “Relevant documents” stipulated in **12.2.2-1(1)(p)i, Part B of the Rules**, refers to the following:

- (1) Results of structural analysis
- (2) Structural details
- (3) Structural analysis method
- (4) Design criteria
- (5) Technical specifications for equipment installed on the drilling derrick
- (6) Material specification of the drilling derrick
- (7) In cases where bolted connections are applied for the drilling derrick, the specifications, materials and torque procedures for said bolts
- (8) Painting plans for the drilling derrick
- (9) Rigging arrangement

### **B12.2.3 Presence of Surveyor**

1 Common onshore or offshore installations used by units specified in **12.1.1-3, Part B of the Rules** are to be examined in the presence of the Surveyor.

2 Confirmation that rupture hatches operate under the set pressure is to be made. Rupture tests are to be carried out on the first three sets of hatches manufactured at each manufacturing plant, and if the results are found to be satisfactory, the rupture tests of the remaining sets may be dispensed with unless considered necessary by the Surveyor. In either case, the test results of the material and accuracy control records during manufacture are to be investigated.

3 The following examinations for the fire extinguishing systems of the units specified in **12.1.1-3, Part B of the Rules** are to be carried out in the presence of the Surveyor.

- (1) Operation tests, performance test and verification of the fire extinguishing system in accordance with **2.1.7-2, Part B of the Rules**
- (2) Performance test of fire detection and alarm system and communication system
- (3) For large sized storage units, the following examinations
  - (a) Performance test of fixed deck foam systems and fixed foam systems in storage tank
  - (b) Performance test of filling systems of cofferdams and filling systems on deck
  - (c) Performance test of inerting system
  - (d) Performance test of remote control system of ventilator and stop valve of storage tank

4 For units adopting dolphin mooring systems, the properties of the fenders are to be verified.

5 Where the ship is approved by the Society to substitute a Docking Survey for an in-water survey, thickness measurement of the hull structure at the positions shown in the plan specified in **B12.2.2-3** is to be carried out at the Classification Survey during construction, and the records are to be submitted to the Surveyor. The records are to be kept on board as reference for subsequent Periodical Surveys.

6 For units specified in **12.1.1-3, Part B of the Rules** that have on-shore installations, the following examinations are to be carried out.

- (1) Performance test of detection, monitoring and alarm systems  
After these systems are installed on board, confirmation that they function with the main power supply and emergency power supply under set conditions is to be made.
- (2) Communication tests between the unit and the onshore central control station with the main power supply and emergency power supply
- (3) Switching tests of principal valves and shut-off tests of emergency shut-off valves with the main power supply and emergency

power supply

- (4) Operating tests of emergency manual operation devices for the automatic operation system
- (5) Lighting tests of emergency lighting arrangements with the emergency power supply and a temporary source of emergency power supply after installation in the following locations.
  - (a) Main control station, pump room and motor room of the unit
  - (b) Places where sources of emergency power supply are installed
  - (c) Other places necessary for safety and security
- (6) Performance tests of emergency bilge pump and other equipment related to the safety of the unit with the emergency power supply after installation.

7 The wording “items specified otherwise by the Society” in 12.2.3-1, Part B of the Rules means surveys of the tests specified in item 1, **Table B2.7, 12.2.3-1(2)** and **12.2.4, Part B of the Rules**, and the wording “the Society may approve other survey methods which it considers to be appropriate” means to be in accordance with item 1(3), **Table B2.7, Part B of the Rules**.

8 Surveys for drilling derricks stipulated in **12.2.3-1(7), Part B of the Rules** are to be in accordance with the following (1) to (3):

- (1) General examinations are to be carried out on drilling derricks including welded and bolted connections.
- (2) Non-destructive tests (ultrasonic tests or radiographic tests) are to be carried out on welded connections of main structural members and other parts liable to bear high stress.
- (3) It is to be confirmed that the drilling derrick is properly installed in its designed position and within the allowable design tolerance.

#### **B12.2.4 Hydrostatic Tests, Watertight Tests, and Relevant Tests**

1 The parameters of the “tests [that] may be altered as specified by the Society” stipulated in **12.2.4-2, Part B of the Rules** are to be at least the design pressure of the relevant areas (tanks, cofferdams, etc.). The hydrostatic test is to be carried out at the design pressure or at the pressures specified in (1) and (2) below, whichever is greater. The test procedure is to be submitted to the Society.

##### **(1) Tanks**

The Hydrostatic test is to be conducted at the set pressure of the pressure/vacuum relief valve provided in the storage tank or 0.014 MPa, whichever is greater. However, for oil storage units specified in **12.1.1-3, Part B of the Rules**, one representative tank from each unit is to be tested, and if the results are found to be satisfactory, the hydrostatic test for the rest of the tanks may be replaced with an airtightness test at a pressure not less than 0.014 MPa.

##### **(2) Cofferdams**

The Hydrostatic test of the head pressure corresponding to the height of the upper end of the overflow pipe or 1.4 m above the top plate, whichever is greater, is to be conducted. However, for oil storage units specified in **12.1.1-3, Part B of the Rules**, one representative cofferdam of each type of construction from each unit is to be tested, and if the results are found to be satisfactory, the hydrostatic test for the rest of the cofferdams may be replaced by an airtightness test at a pressure of not less than 0.014 MPa.

#### **B12.2.6 Sea Trials and Stability Experiments**

1 An example of when the demonstration test stipulated in **12.2.6-1(3), Part B of the Rules** is required would be when large scale storage units are subject to national regulations that require compatibility with those laws to be demonstrated. The test procedure of the demonstration test is to be submitted to the Society.

2 “Reliable stability data” stipulated in **12.2.6-2(2), Part B of the Rules** refers to results obtained by a deadweight survey that are reasonably close to the results obtained from a previous sister unit.

3 The functional tests specified in **12.2.6-2(3), Part B of the Rules** are to be carried out in accordance with **Annex U1.2.2 “GUIDANCE FOR STABILITY COMPUTER”, Part U of the Guidance**. “A computer for stability calculation is on board the units as a supplement to the stability information booklet,” stipulated in **12.2.6-2(3), Part B of the Rules**, refers to a computer for stability calculation or a computer in which software for stability calculation is installed that can be used at locations such as the navigation bridge and cargo control room.

#### **B12.2.7 Classification Survey of Units Not Built under Survey**

1 The treatment of the Classification Survey of Units not built under survey is to be in accordance with **2.2, Part B of the Rules**.

2 “Where deemed necessary by the Society” stipulated in **12.2.7-4, Part B of the Rules** refers to situations where the difference between the light ship displacement obtained from the lightweight survey specified in **12.5.2-4(3), Part B of the Rules** and the light

ship displacement obtained from a stability experiment is found to be greater than 1% of the displacement of the unit in full load condition. This excludes units constructed before 1 May, 1991.

### **B12.3 Annual Surveys**

#### **B12.3.2 Annual Surveys for Hull, Equipment, Fire Extinguishing Systems, and Fittings**

1 For self-elevating units and column-stabilized units, thorough examinations including a non-destructive test of essential structural members deemed necessary by the Society may be required at the first Annual Survey after the date of completion of Classification Survey during construction.

2 For mooring systems specified in **12.3.2-2(3)(j), Part B of the Rules** the following examinations are to be carried out.

(1) Chain cable

(a) Thorough examination of chain cables as far as accessible

Special attention is to be paid to the chain stopper and chain cables contacting pockets.

(b) Diameter measurement of chain links that are substantially corroded or whose mean diameters measured at the last Special Survey are less than 96% of the original

In addition, non-destructive tests, and measurement of the length of 3 links or 5 links and the bending angle of chain links are to be carried out as far as practicable.

Where the results come under the provisions of **B12.5.2-4**, such chain links are to be discarded, and connecting shackles inserted or replaced by new chain links.

(2) Wire ropes

Visual inspection as far as accessible

Particular attention needs to be paid to the parts that have become flat, where individual wires are broken, and are worm or corroded.

(3) Windlass, fairleads and winches

General inspection of pockets, gears and drums of windlasses, fairleads and winches as far as practicable

3 Surveys stipulated in **12.3.2-2(3)(k), Part B of the Rules** are to be in accordance with the following:

(1) The general condition, including the painting condition, of the drilling derricks is to be examined as far as accessible.

(2) Bolt tightness is to be examined as far as accessible.

(3) It is to be confirmed that escape routes are maintained in a safe condition and clear of obstacles.

(4) In cases where welded connections are repaired, repaired parts of welds are to be subject to non-destructive tests.

### **B12.4 Intermediate Surveys**

#### **B12.4.2 Intermediate Surveys for Hull, Equipment, Fire Extinguishing Systems, and Fittings**

1 Where survey items for the Intermediate Survey are carried out at the time of the Docking Survey, they may be dispensed with.

2 The performance test of the closing appliances specified in **12.4.2-2(2), Part B of the Rules** may be dispensed with if the closing appliances are in satisfactory condition.

3 The term “preload tank” in **12.4.2-3, Part B of the Rules** refers to a tank within the hull of a self-elevating unit which is periodically filled with salt water ballast and used to preload the footings of the unit prior to commencing drilling operations.

### **B12.5 Special Surveys**

#### **B12.5.2 Special Surveys for Hull, Equipment, Fire Extinguishing Systems, and Fittings**

1 The wording “deemed appropriate by the Society” in **12.5.2-1(b), Part B of the Rules** refers to cases where close-up inspections and thickness measurements are required to sufficiently confirm the actual average condition of the structure.

2 Internal examination and testing of void spaces, compartments filled with foam or corrosion inhibitors, and tanks used only for lubrication oil, light fuel oil, diesel oil, fresh water, drinking water or other non-corrosive products may be waived, provided that the Surveyor considers their condition to be satisfactory upon general examination.



3 The points on the hull structure where the thickness measurements are taken are to be determined in advance so that the same points are measured at each Special Survey.

4 For mooring systems specified in **12.5.2-2(6), Part B of the Rules** the following examinations are to be carried out.

(1) Chain cable

- (a) A thorough inspection of all chain links after cleaning, paying particular attention to large deformations, excessive corrosion, and loose studs
- (b) Diameter measurement and non-destructive test (such as magnetic particle test or ultrasonic test) on at least 5% of chain links

All chain links in contact with the windlass or fairleads during operation are to have non-destructive tests and diameter measurement carried out. In this case, the nominal diameter and looseness of the stud of the chain link are to be measured.

- (c) Non-destructive tests and measurement of the length of 3 links or 5 links of chain links found to have a mean diameter of less than 96% of the original diameter as a result of diameter measurement

Where the links have deformed, the bending angle of the chain links are to be measured as far as practicable (see **Fig. B12.5.2-1** and **-2**).

- (d) Where the results of (a) to (c) above comply with those specified in (i) to (vi) below, such chain links are to be discarded, and connecting shackles inserted or replaced by new chain links. The number of inserted connecting shackles is not to exceed one per 122 m of chain length.

i) The mean diameter of the chain link is less than 95% of the original diameter as a result of diameter measurement

ii) The stud (of the chain link) is lost

iii) The stud exceeds the values specified in 1) to 3) (For Grades R4, R4S and R5 chains, however, all these values are to be 1 mm)

1) Looseness of stud in longitudinal direction of chain link: 4 mm

2) Clearance between stud and chain link: 3 mm

3) Out of plane deformation of chain link (gap between the centreline of the stud and the centreline of the chain link): 3 mm

iv) The bending angle out of plane of the chain link exceeds 3 degrees

v) The elongation rate of 5 links or 3 links of chain exceeds 2.5%

vi) Other abnormal defects are found

- (e) Overhaul, measurement, and magnetic particle test of connecting shackles

The parts of the kenter shackles that are to be tested are shown in **Fig. B12.5.2-3**. Where any part of the connecting shackles is reduced by more than 5% of the original dimensions, the connecting shackle is to be replaced.

- (f) Where the depth of wear and grooving on chain links do not exceed 5% of the diameter of the chain link, these defects are to be removed by grinding the surface down. The new surface is not to be less than 95% of the original diameter and welding can be used to smooth the shape as shown in **Fig. B12.5.2-4**. However, welding is not to be used on Grades R4, R4S and R5 chains.

(2) Wire rope

- (a) A general inspection is to be carried out on all wire ropes, and the diameter of one section is to be measured every 100 m.
- (b) Where the wire rope is found to be in any of the following conditions, it is to be discarded: not less than 5% of the wires are broken in a section with a length equal to 10 times the diameter of the wire rope; the diameter of the wire rope is less than 7% of the original diameter; the wire rope has potentially hazardous flaws such as kinks; the wire rope has substantial corrosion on the surface and inside; or the wire rope falls under the scrapping standard for wire ropes specified by ISO Standards 4309 "Wire Ropes for Cargo Gears": An Execution Standard for Inspection and Scrapping.

(3) Anchor

- (a) A thorough examination of the anchor crown, palm, and shank is to be carried out. Where the bent palm and shank are repaired, the procedure for repair is to be submitted for approval by the Society, and a non destructive test is to be carried out upon repair.
- (b) Shackle pins and head pins are to be examined and renewed if excessively worn or bent.

(4) Windlass, fairlead and winch

- (a) A general inspection of all chain pockets, drums, gears, etc. is to be carried out.
- (b) A general inspection of the condition of fittings of chain links and pockets is to be carried out.
- (c) Non destructive tests of the connection between the hull and windlass, and fairlead and winch are to be carried out.

However, where their conditions are deemed satisfactory by the Surveyor, the non-destructive tests may be dispensed with.

- (5) The parts that require replacing such as chain cables, shackles, and wire ropes are to comply with the requirements on testing and examinations specified in **Part L of the Rules** or another standard equivalent thereto. However, where connecting shackles are inserted as a temporary measure, these shackles are to be examined according to the requirements in **(1)(e)** before insertion.
- (6) The continuous surveys system may be adopted for mooring systems. The continuous survey programme is to be submitted to the Society for approval.
- (7) For units that have been approved to have the In-water Survey in lieu of the Docking Survey the surveys specified in **(1)** through **(4)** or equivalent thereto are to be carried out at the appropriate times before the next Docking Survey and the record of the surveys reported to the Surveyor. However, in-water general examinations, non-destructive tests and measurement of dimensions of the mooring systems are to be carried out as far as practicable.

5 The surveys of units while afloat specified in **12.5.2-3, -4 and -5, Part B of the Rules**, only applies to units approved to have the In-water Survey in lieu of the Docking Survey. Moreover, the surveys required by Special Surveys or equivalent thereto are to be carried out at the appropriate times before the next Docking Survey and the record of the surveys reported to the Surveyor.

6 The result of the lightweight survey specified in **12.5.2-4(3), Part B of the Rules** is to be recorded in the Classification Survey Report. However, for units constructed before 1st May, 1991, the lightweight survey may be dispensed with.

- 7 In cases where welded connections are repaired, repaired parts of welds are to be subject to non-destructive tests.

Fig. B12.5.2-1 Measurement of Link Length

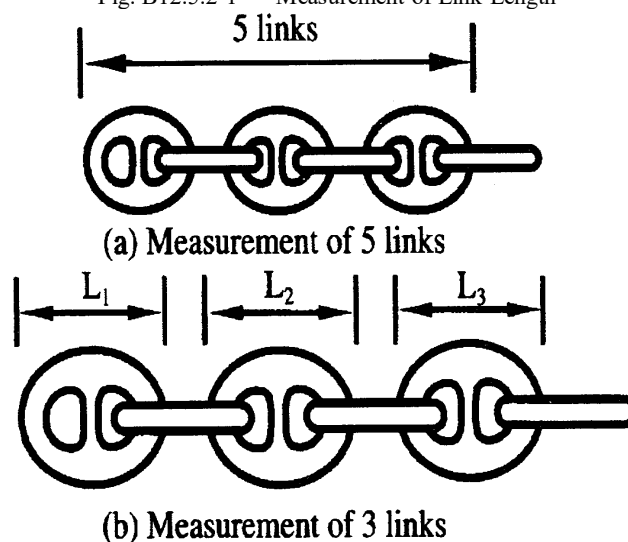


Fig. B12.5.2-2 Measurement of Degree of Bending of Chain Link

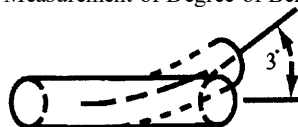


Fig. B12.5.2-3 Parts Applicable to Non-destructive Testing

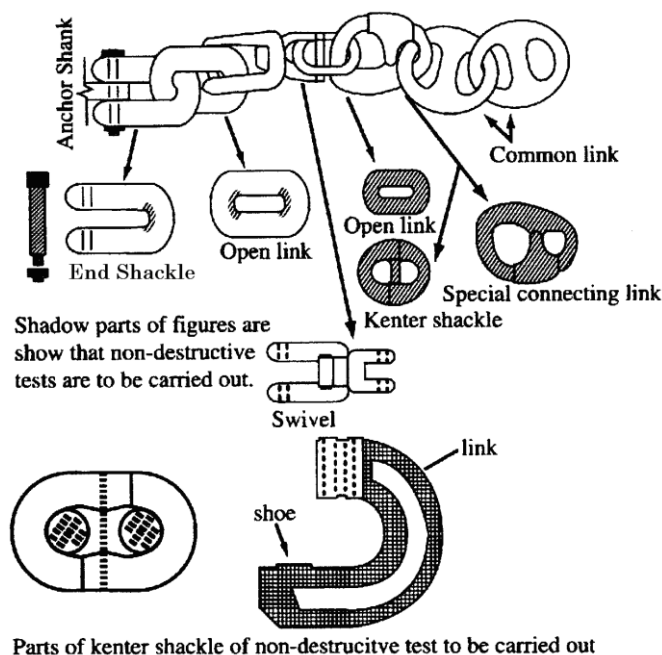
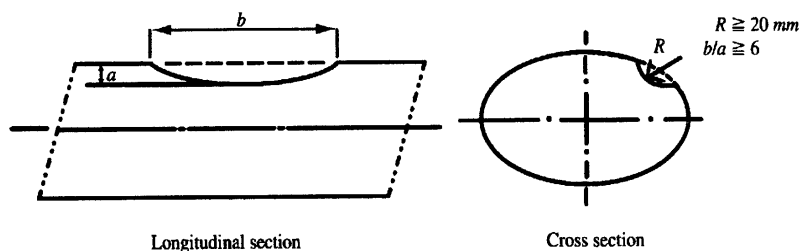


Fig. B12.5.2-4 Limitation of Repair Work of Chain Links



### B12.5.3 Special Surveys for Machinery and Electrical Installations

For support units of submersibles, thorough surveys and performance tests of supporting systems are to be carried out, and where deemed necessary by the Surveyor, an overhaul examination. Where the operation or performance tests of submersibles required by 11.4.1-1(7), Part B of the Rules are carried out in water, a performance test of the supporting systems is to be carried out.

## B12.6 Docking Surveys

### B12.6.1 General

1 Where a Docking Survey is replaced by an in-water survey, the plans and documents specified in 12.2.2-1(1)(i), Part B of the Rules, which include following information, are to be submitted to the Society for approval. In addition, said plans and documents are to be made available on board.

- (1) Areas to be surveyed;
- (2) Extent of underwater cleaning;
- (3) Non-destructive testing locations (including NDT methods);
- (4) Nomenclature; and
- (5) Forms for the recording of any damage or deterioration found.

2 The plans and documents specified in -1 above may be modified upon approval by the Society, based on the results of periodical surveys, in-water surveys, and other relevant surveys.

3 In-water surveys are to be carried out by a company approved by the Society, and the services of a diver well-experienced in using underwater cameras (still and live) in in-water surveying operations or robots for in-water inspection are to be available.

4 The company conducting the in-water survey is to be approved by the Society in accordance with the provisions of B6. Also, robots for in-water inspection are to be approved by the Society in accordance with the provisions of B6.

5 Units to undergo the in-water survey are to comply with the provisions of 6.1.2-4, Part B of the Rules relevant to their configuration/construction. Where the unit has a dynamic positioning system, a suitable means to allow inspection of the exterior of thrusters is to be provided.

#### **B12.6.2 Docking Surveys**

1 Where an internal inspection of the ballast compartments is conducted at the Intermediate Survey, internal inspection of these parts may be dispensed with at the Dock Survey considering the results and date of completion of these surveys.

2 In cases where a docking survey is replaced by an in-water survey, the following requirements are to be complied with:

- (1) In-water or internal thickness measurements of suspect areas may be required in conjunction with the in-water survey. In addition, in-water non-destructive testing may also be required for fracture detection.
- (2) In-water surveys are to be carried out under the condition that the in-water visibility and the cleanliness of the hull below the waterline is clear enough to permit a meaningful examination which allows the Surveyor and the diver or ROV pilot to determine the condition of the plating, appendages and the welding.

## **B13 SPECIAL REQUIREMENTS OF PERIODICAL SURVEYS FOR OFFSHORE STRUCTURES**

### **B13.1 General**

#### **B13.1.4 Inspection Level of Structural Members**

##### **1 Method for Level I inspection**

- (1) Visual inspections are to be carried out for structures above the water line.
- (2) Inspections by divers or in-water robots using video camera with tape are to be arranged for structures below the water line. The areas for video taping are to be so marked as to identify the position of the hull.
- (3) In-water inspections are to be carried out in calm seas with good visibility (standard visibility is such that the objectives two floor spaces or six *metres* away, whichever is further, can be identified).
- (4) When inspections cannot be carried out under the conditions specified in (3) above, any of the following items (a) to (c) is to be employed, in addition to those in (2) above.
  - (a) Measurement of potential difference of electrical corrosion control system
  - (b) Plate deflection measurements to verify the extent of major damage due to bending (large deflection extending one floor space) of the bottom plating or side shell plating
  - (c) Internal visual inspections where the structures are so arranged that the conditions of outer structures can be inferred from inside

##### **2 Method for Level II inspection**

- (1) Close-up inspections are to be carried out for structures above the water line.
- (2) Inspection areas are to be cleaned before conducting the inspections prescribed in -1 above. Detailed footage of inspection areas is to be taken at close range with the video camera.
- (3) Measurement of potential difference of electrical corrosion control system and inspections for electrical corrosion-control systems are to be carried out. When a cathodic protection system is employed, dimensions of sampled anodes are to be measured to obtain the reduction from original dimensions.
- (4) For mobile offshore structures which require inspections to monitor their structural conditions, thickness measurements are to be carried out in addition to the inspections specified in (3).

##### **3 Method for Level III inspection**

- (1) Thickness measurements and close-up visual inspections are to be carried out for structures above the water line. Furthermore, hydrostatic tests and other relevant tests are to be carried out as deemed necessary.
- (2) Inspection areas and surrounding areas are to be cleaned before conducting the inspections specified in -2(2) above.
- (3) For tanks, void spaces and cofferdams, detailed inspections are to be carried out from both the inside and outside.
- (4) Measurement of potential difference of electrical corrosion control system and inspections for electrical corrosion-control systems are to be carried out. When a cathodic protection system is employed, dimensions of sampled anodes are to be measured to obtain the reduction from original dimensions.
- (5) When deemed necessary by the Surveyor, diagnoses of paint coat deterioration are to be carried out in order to estimate service life of the coating.

### **B13.2 Preparation of Surveys and Inspections**

#### **B13.2.2 Inspection Companies Carrying Out Inspections, Measurements and Maintenance**

**1** The wording “firm deemed appropriate by the Society” in **13.2.2-1, Part B of the Rules** refers to firms complying with the requirements of **Chapter 2, 3 or 8, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society.

**2** The wording “firm deemed appropriate by the Society” in **13.2.2-2, Part B of the Rules** refers to any of the following: firms

complying with the requirements of **Chapter 6, Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society; firms approved by the Administration; firms approved by duly authorized organizations acting on behalf of the Administration; or firms approved by other organizations which are acceptable to the Administration.

**3** Where the inspection company wishes to use inspection equipment or inspection robots for the inspection of offshore structures, it is to submit application form (**APP-IR**) together with the documents specified in the following **(1)** to **(9)** to the Society before inspections are carried out. Inspection companies approved by the Society as a provider of in-water inspection services or thickness gauging services are to submit a copy of the relevant approval certificate.

- (1) Specifications of equipment
- (2) Structural assembly drawings of equipment
- (3) Operating instruction manuals (including the correlation between equipment and inspection areas), maintenance manuals and calibration manuals of equipment
- (4) Outline of the company
- (5) Organisation and management system of the group implementing the inspection
- (6) Guidance for inspection services (including work system, work procedures, measures for safety and security, operating and inspection procedures for equipment)
- (7) Qualifications of divers, thickness gauging engineers, non-destructive testing engineers, and skilled operators such as welding operators
- (8) Education programs for skilled operators
- (9) Formats of inspection records

### **B13.3 Selection of Structural Members to be Inspected**

#### **B13.3.2 Categorization of Structural Members to be Inspected at Design Stage**

##### **1 Classification by stress level**

(1) Comparing the results of structural analyses at the design stage, allowable stress ( $\sigma_{allowable}$ ), and stress assumed to be generated in structural members ( $\sigma_{est}$ ); inspection areas are classified into the following three categories.

- (a) Category A  $0.6\sigma_{allowable} \geq \sigma_{est}$
- (b) Category B  $0.9\sigma_{allowable} \geq \sigma_{est} > 0.6\sigma_{allowable}$
- (c) Category C  $\sigma_{est} > 0.9\sigma_{allowable}$

(2) In **(1)** above, the analytical model and method used in the structural analyses are to be suitable for the structural members being analyzed, and are to be deemed appropriate by the Society.

##### **2 Classification by fatigue strength**

(1) Inspection areas are to be classified into the following three categories according to the effects of cumulative fatigue on the lives of structures assumed at the design stage.

- (a) Category A  $0.6 \geq \text{Cumulative fatigue}$
- (b) Category B  $0.9 \geq \text{Cumulative fatigue} > 0.6$
- (c) Category C  $\text{Cumulative fatigue} > 0.9$

(2) The analytical method for fatigue strength and S-N diagrams are to be as deemed appropriate by the Society.

##### **3 Classification by corrosive environment**

Inspection areas are to be classified into the following three categories according to the condition of corrosion control systems of structural members and the degree of exposure to a corrosive environment.

###### **(1) Category A**

Areas rarely corroded

E.g., bottom plating, void spaces, fuel oil tanks, oil tanks, and shell plating (excluding the vicinity of the water lines) that have a corrosion control system deemed appropriate by the Society

###### **(2) Category B**

Areas exposed to a corrosive environment

E.g., exposed tank top plating of oil tanks (deck head areas), side shell plating in the vicinity of water lines (splash zone), ballast

tanks

(3) Category C

Areas exposed to an excessive corrosive environment

E.g., tanks containing corrosive substances, and ballast tanks not subjected to corrosion control arrangement

**4 Classification by redundancy for assumed damages to structural members**

(1) Structural analyses are to be carried out assuming damage to one location from among (a) to (c) below of the primary structural members by applying the severest external environmental force anticipated in the period of one year. Here, the principal structural members are decks, side shell plating, inner bottom plating, transverse bulkheads, longitudinal bulkheads and girders.

(a) When a space enveloped by primary members such as girders, floors, and web frames, is the minimum structural unit, such members or plate members

(b) Deformation of plate members to approximately four times the plate thickness

(c) Uniform wear of plate members and primary members corresponding to the corrosion margin required by the Rules

(2) Inspection areas are to be classified into the following three categories by comparing the estimated stress ( $\sigma_{est}$ ) by structural analysis shown in (1) above and yield strength ( $\sigma_y$ ) of the material used.

(a) Category A  $0.8\sigma_y \geq \sigma_{est}$

(b) Category B  $1.2\sigma_y \geq \sigma_{est} > 0.8\sigma_y$

(c) Category C  $\sigma_{est} > 1.2\sigma_y$

(3) The elasto-plastic analysis on a three-dimensional panel model is to be deemed the standard for the structural analysis method and analytical model. However, structural analysis methods and analytical models considered to be equivalent by the Society may be used for the analysis. In this case, data demonstrating equivalence is to be submitted to the Society for approval.

**B13.3.3 Review of Categories of Structural Members at Construction Stage**

At the construction stage, the structural members categorized in B13.3.2 are to be reviewed using the following procedures.

(1) Where the in-house standards of the shipyard or owner's specifications are severer than the inspection standards of the Society: If the results of an inspection of an offshore structure are considered to have sufficiently met the in-house standards or owner's specifications, and the structural members in question are easily subjected to in-service inspections, the structural members to be inspected specified in B13.3.2-1, -2 and B13.3.2-4(1)(a), (b) may be re-classified to a lower level.

(2) Where coating measures are considered to be sufficient by the Society:

If the coating specifications prepared by the owner are severer than those of ships in general, and the coating measures taken by the shipyard are considered to be sufficient by the Society, the structural members to be inspected in accordance with the requirements of B13.3.2-3 and -4(1)(c) may be re-classified to a lower level.

**B13.3.4 Review of Categories of Structural Members based on Results of Periodical Surveys**

**1** The structural members of offshore structures to be inspected at Periodical Surveys are to be re-classified into the following three categories based on the results of previous Periodical Surveys.

(1) Category A

Structural members classified into Category A under the requirements of B13.3.2 and B13.3.3 that have no structural failures, and the coating condition is judged to be "Good" or "Fair" as defined in 1.3.1(8), Part B of the Rules

(2) Category B

(a) Structural members classified into Category A under the requirements of B13.3.2 and B13.3.3 that have no structural failures, but the coating condition is judged to be "Poor" as defined in 1.3.1(8), Part B of the Rules

(b) Structural members classified into Category B under the requirements of B13.3.2 and B13.3.3 that have no structural failures, and the coating condition is judged to be "Good" or "Fair" as defined in 1.3.1(8), Part B of the Rules

(3) Category C

(a) Structural members classified into Category C under the requirements of B13.3.2 and B13.3.3 that have no structural failures, and the coating condition is judged to be "Good" as defined in 1.3.1(8), Part B of the Rules

(b) Structural members classified into Category B under the requirements of B13.3.2 and B13.3.3 that have no structural failures, and the coating condition is judged to be "Poor" as defined in 1.3.1(8), Part B of the Rules

(c) Structural members classified into Categories A or B under the requirements of B13.3.2 and B13.3.3 that are visibly worn down or the coating is extensively peeled, but wastage is less than that specified in B13.4.1-3(2)

- (d) Structural members which have been repaired and members that are similar to them in construction or location.

## **B13.4 Periodical Surveys for Hull Structure**

### **B13.4.1 General**

**1** Periodical Surveys for hull structures are to be carried out in accordance with the following -2 through -5.

#### **2 Cracking**

- (1) When cracks are found in structural members, similar structural members are to be subjected to close-up inspections, and the damaged structural members are to be repaired appropriately.
- (2) Where cracks are found in the structural members of a unit complying with **12.1.1-3, Part B of the Rules**, the damaged structural members are to be repaired appropriately. Also, inspections are to be carried out on the same (and surrounding) structural members of other identical units at the same level as the original unit

#### **3 Thickness of structural members**

- (1) Where the dimensions of structural members have reduced in excess of 75% of the corrosion margin specified in the Rules, measures to prevent the progress of wear (e.g., coating, electric corrosion protection) are to be taken. Where corrosion of structural members have reached the corrosion margin required by the Rules, the structural members are to be repaired appropriately, corrosion-control measures are to be taken, and a permanent repair plan is to be prepared and submitted to the Society for approval.
- (2) Where dimensions of structural members of units complying with **12.1.1-3, Part B of the Rules** involve wear as mentioned below, measures to prevent the progress of corrosion (e.g., coating, electric corrosion-control) are to be taken. When wear exceeds 1.3 times the amounts listed below, the structural members are to be repaired appropriately with corrosion-control arrangements provided, and a permanent repair plan is to be prepared and submitted to the Society for approval.
  - (a) Structural members classified into Category A:  
75% or more of the corrosion margin required by the Rules
  - (b) Structural members classified into Category B:  
50% or more of the corrosion margin required by the Rules
  - (c) Structural members classified into Category C:  
30% or more of the corrosion margin required by the Rules

#### **4 Coating conditions**

Coating conditions are to be classified according to the criteria of “Good” “Fair,” and “Poor” as defined in **1.3.1(8), Part B of the Rules**, and areas classified as “Poor” are to be subjected to appropriate corrosion-control arrangements.

#### **5 Corrosion control arrangements**

When a cathodic protection system is used for corrosion-control, the following requirements are to be complied with:

- (1) Measurements of potential difference are to be carried out in detail (e.g. increasing the number of measuring points) when using an artificial salt water silver iodide as a reference pole and the absolute values of measurements are less than 900 *mmV*.
- (2) All units complying with the provisions of **12.1.1-3, Part B of the Rules** are to have measurements of potential difference carried out in detail when using an artificial salt water silver iodide as a reference pole and the absolute values of measurements are less than 900 *mmV*.
- (3) Where the absolute values of measuring potential difference in (1) and (2) above are less than 800 *mmV*, close-up visual inspections of the coating condition is to be conducted, and the reduction of cathodic anodes is to be determined before repairing the corrosion-control systems.
- (4) Where other reference poles are used, data showing the characteristics of the reference poles are to be submitted to the Society in advance. Values equivalent to those obtained from measurements using an artificial saltwater silver iodide are to be used as the acceptance criteria.

**6** In order to monitor the condition of structural members specified in **13.4.1-3, Part B of the Rules**, visual inspections of deformation and wear of the structural members are to be carried out at intermediate stages (at least twice a year) between each Annual Survey specified in **1.1.3, Part B of the Rules**. Records of the monitoring activities are to be retained by such means as photographs or video footage with the date included, and be accessible to the Surveyor.



7 Notwithstanding the requirements in -6, where it is difficult to carry out visual inspections of the structural members to be monitored, appropriate measures to deduce their conditions by means such as measuring the stress of adjacent structural members or external forces are to be conducted. Factors such as the target structural members, monitoring method, deduction method are to be included in the Inspection Procedures.

#### **B13.4.4 Inspection of Hull Structure in a Dry Dock or Slipway**

1 Where the hull structure of a representative unit of large oil storage barges complying with 12.1.1-3, Part B of the Rules is examined in a dry dock or slipway, the examinations are to be carried out as prescribed below. The inspection areas are to be cleaned and made safe for inspection (e.g. thoroughly freed of gas).

(1) Oil Storage tanks

- (a) All oil storage tanks are to be examined internally for corrosion and cracks or excessive deformation of internal structural members, and to confirm the condition of the anti-corrosive coating.
- (b) The bell mouths of the oil suction pipes of the tanks examined in (a) above are to be removed, and the inner bottom plating and bulkheads in their vicinity are to be examined.

(2) Cofferdam

All cofferdams are to be examined internally for corrosion and cracks or excessive deformation of internal structural members, and to confirm the condition of the anti-corrosive coating and cathodic protection measures.

(3) Pump room and motor room

Pump rooms and motor rooms are to be internally examined with special attention being paid to the way pumps and motors are installed, stuffing boxes, piping, penetrations of bulkheads, and ventilating systems.

(4) Outer side of hull structures

Shell plating, bottom plating and the exposed deck are to be examined externally for corrosion and cracks or excessive deformation of structural members and to confirm the condition of the anti-corrosive coating and cathodic protection measures. Special attention is to be paid to the structural members in way of welds, discontinuities of structure, corners of openings and contact parts of the fender.

(5) Thickness measurement

Unless specified otherwise, thickness measurement of structural members is to be carried out in accordance with Table B13.4.4-1.

(6) Pressure tests

Pressure tests are to be carried out on the oil storage tanks and cofferdams (internally inspected in (1) and (2) above) at the designed pressure. However, the pressure tests may be dispensed with, provided that the Surveyor considers the condition of these tanks satisfactory as a result of the examinations specified in (1) through (5) above.

2 Where the examinations specified in -1 are carried out on the representative unit, the following examinations are to be carried out on the rest of the units.

(1) Outside of side shell plating above the water line and deck

Visual inspection

(2) Outside of side shell plating below the water line and bottom plating

In-water visual inspection (by an appropriate method of the Society) and confirmation of the condition of cathodic protection measures and coating

(3) Pump room and motor room

Examinations specified in -1(3) above

(4) Thickness measurement of structural members

Unless specified otherwise, thickness measurements of structural members specified in (a), (b), (c) and (e) and uppermost part of structural members specified in (g) and (i) of Table B13.4.4-1

3 The Society is to be notified in advance when inspection of the unit is intended to be carried out in a drydock or slipway. A docking inspection plan including inspection items specified in -1 and -2 and inspection method is to be prepared and submitted to the Society for approval prior to commencement.

Table B13.4.4-1 Thickness Measurement Points on Large Storage Units

Structural members			Measuring points	Number of Points
Upper deck	(a)	Space in way of Storage tanks	Fore, midship and aft part in the space	10 points at each part
	(b)	Spaces in way of Cofferdams	Fore, midship and aft part in the space	10 points at each part
Side shell plating	(c)	Space above lightweight waterline	Fore, midship and aft part in the space	5 points at each side of each part
	(d)	Space below lightweight waterline	Fore, midship and aft part in the space	3 points at each side of each part
	(e)	Contact part with fender	The relevant parts	3 points at each part
Bottom shell plating	(f)		Fore, midship and aft parts	5 points at each part
Internals of cofferdam	(g)	Storage tank boundary (longitudinal and transverse bulkheads)	Fore, midship and aft parts	5 points at each boundary of each part
	(h)	Inner bottom plating	Fore, midship and aft parts	3 points in each tank for each part
	(i)	Longitudinal, transverse, horizontal and vertical girders	Fore, midship and aft parts	3 points each at both ends and centre of girders along the direction of depth of web at each position
	(j)	Horizontal division	Fore, midship and aft parts	3 points for each tank at each part
Structural members in storage tank	(k)	Deck girders	Tanks examined internally	3 points each at both ends and centre of girders along the direction of depth of web and one point at face plate
	(l)	Longitudinal swash bulkhead and its vertical girders	Tanks examined internally	3 points each at both ends and centre of girders along the direction of bulkhead and depth of web and one point at face plate

Note:

Measuring points listed in the Table are to be the same as the points which were measured at the time of the Classification Survey

### B13.5 Periodical Surveys for Equipment, Machinery Installations and Fire Extinguishing Systems

#### B13.5.1 General

1 For large oil storage barges complying with **12.1.1-3, Part B of the Rules**, the surveys of equipment and fire extinguishing systems are to be carried out in accordance with the following, and completed by the time of the Annual Surveys specified in **1.1.3, Part B of the Rules**.

- (1) Inspection of the condition of all piping systems on deck and rupture hatches of all units
- (2) Inspection of the condition of fire extinguishing systems specified in the following
  - (a) Fire detection and warning appliances
  - (b) Water spray appliances (including hose, nozzle, monitor and associated accessories)
  - (c) Fixed deck foam systems and fixed foam systems in storage tank.

- (d) Filling systems of cofferdams and filling systems on deck
- (e) Fixed inert gas system
- (f) Fixed pressure water spraying fire extinguishing system
- (g) Movable and portable fire extinguishing system
- (h) Accessories

**2** For large oil storage barges complying with **12.1.1-3, Part B of the Rules**, the surveys of equipment and fire extinguishing systems are to be carried out in accordance with the following, and completed by the time of the Intermediate Surveys specified in **1.1.3, Part B of the Rules**.

- (1) The representative unit
  - (a) Piping and rupture hatches  
Inspection of the condition of all piping on the exposed deck and rupture hatches
  - (b) Fire extinguishing systems  
Inspection of the condition of fire extinguishing systems specified in **-1(2)(a)** through **(h)**
- (2) Rest units
  - (a) Piping and rupture hatches  
Inspection of the condition of all piping on the exposed deck and rupture hatches
  - (b) Fire extinguishing systems  
Inspection of the condition of fire extinguishing systems specified in **-1(2)(a)** through **(h)**

**3** For large oil storage barges complying with **12.1.1-3, Part B of the Rules**, the surveys of equipment and fire extinguishing systems are to be carried out in accordance with the following, and completed by the time of the Special Surveys specified in **1.1.3, Part B of the Rules**.

- (1) The representative unit
  - (a) Piping  
Inspection of the conditions of all piping on the deck and in storage tanks, cofferdams, pump rooms, and motor rooms that have been internally examined; and overhaul inspection and pressure test of sample pressure/vacuum relief valves and devices  
Where deemed necessary by the Surveyor, the piping is to be subject to pressure tests and thickness measurements (using a pinhole or other appropriate method).
  - (b) Rupture hatches  
The tests and inspections specified in the following **i)** through **iv)** for rupture hatches are to be carried out.
    - i) For rupture hatches of storage tanks which are examined internally, an airtightness test for all rupture hatches at the set pressure of pressure/vacuum relief valves of the tanks or 0.014 MPa, whichever is greater
    - ii) Detailed external inspection of three rupture hatches specified in **i)**
    - iii) The hydrostatic test specified **12.2.4, Part B of the Rules** on three hatches specified in **i)**
    - iv) Inspection of the condition of the other rupture hatches  
However, where deemed necessary by the Surveyor based on the results of the above tests and inspections, the remaining rupture hatches may also be examined in accordance with the tests and inspections specified in **i)** through **iii)**.
  - (c) Fire extinguishing systems  
Examinations of fire extinguishing systems are to be carried out in accordance with the provisions specified in **-2(1)(b)**.
- (2) Rest units
  - (a) All piping and rupture hatches  
Inspection of the condition of all piping and rupture hatches on the exposed deck
  - (b) Fire extinguishing systems  
Inspection of the condition of fire extinguishing systems specified in **-1(2)(a)** through **(h)**

## **B14 SURVEY FOR FLOATING OFFSHORE FACILITIES FOR CRUDE OIL/PETROLEUM GAS PRODUCTION, STORAGE AND OFFLOADING**

### **B14.2 Classification Surveys**

#### **B14.2.3 Presence of Surveyors**

The wording “items specified otherwise by the Society” in **14.2.3-1, Part B of the Rules** means surveys of the tests specified the relevant requirements in **2.1.7, Part B of the Rules** and **14.2.4-2**, and the wording “the Society may approve other survey methods which it considers to be appropriate” means to be in accordance with item 1(3), **Table B2.7, Part B of the Rules**.

## B15 SURVEYS FOR WORK-SHIPS

### B15.2 Classification Surveys during Construction

#### B15.2.2 Submission of Plans and Documents

For the purpose of **15.2.2-1** and **-2, Part B of the Rules**, at least the following plans and documents regarding work-related installations and drawings indicating the construction of the part of the hull where the work-related installations are installed are to be submitted to the Society. In addition, in cases where deemed necessary by the Society, additional plans and documents may be requested depending on the operations, etc. of such ships.

- (1) Vessels engaged in towing operations
  - (a) Submission of plans and documents for approval
    - i) Plans showing the arrangements of towing equipment
    - ii) Details of the supporting structures of towing equipment
  - (b) Submission of plans and documents for reference
    - i) Details of towing equipment
    - ii) Calculation sheets of the supporting structures for towing equipment
    - iii) Bollard pull testing procedures
    - iv) Manuals for towing
- (2) Pusher tugs
  - (a) Submission of plans and documents for approval
    - i) Construction of the joint between pusher tugs and barges
  - (b) Submission of plans and documents for reference
    - i) Manuals for pushing
- (3) Fire fighting vessels
  - (a) Submission of plans and documents for approval
    - i) Plans showing the arrangements of fire fighting equipment (the locations, types and numbers of fire fighting systems, hydrants, fire-fighter's outfits, etc.)
    - ii) Plans showing the arrangements of sea water inlets
    - iii) Details of the supporting structures for the monitors for fire fighting
  - (b) Submission of plans and documents for reference
    - i) Remote control arrangements of the monitors for fire fighting
    - ii) Details of water-spray systems (In cases where water-spray systems for fire fighting are installed)
    - iii) Details of mobile foam generators and their capacity (In cases where mobile foam generators are provided)
    - iv) Details of foam generator systems
    - v) Design materials for positioning the units at a specific position during fire fighting operations
    - vi) Calculation sheets of the supporting structures for the monitors for fire fighting
- (4) Offshore supply vessels
  - (a) Submission of plans and documents for reference
    - i) Cargo loading arrangements
    - ii) Cargo securing plans
- (5) Anchor handling Vessels
  - (a) Submission of plans and documents for approval
    - i) Plans showing the arrangements of anchor handling equipment (the locations, types, etc. of stern rollers, cranes, bollards, etc.)
    - ii) Details of the supporting structures for anchor handling equipment
  - (b) Submission of plans and documents for reference

- i) Details of anchor handling equipment
  - ii) Calculation sheets of the supporting structures for anchor handling equipment
  - iii) Cargo loading arrangements
  - iv) Cargo securing plans
- (6) Vessels engaged in laying objects on the seabed
  - (a) Submission of plans and documents for approval
    - i) Plans showing the arrangements of laying equipment
    - ii) Details of the supporting structures of laying equipment
  - (b) Submission of plans and documents for reference
    - i) Details of laying equipment
    - ii) Calculation sheets of the supporting structures for laying equipment
- (7) Oil Recovery Vessels
  - (a) Submission of plans and documents for approval
    - i) Cooling system or insulation for the exhaust pipes of combustible engines
    - ii) Exhaust piping system of combustible engines
    - iii) Construction and arrangements for the spark arresting systems of combustible engines
    - iv) Ventilation system diagrams
    - v) Installations of oil recovery systems
  - (b) Submission of plans and documents for reference
    - i) Construction plan of oil recovery systems
    - ii) Operation booklet
 

Note: The shipbuilder is to provide an operation booklet which includes the following items to the ship operator and is also to submit a copy to the Society.

      1. Operating conditions (including the kind of oils to be recovered)
      2. Position and time of gas detection
      3. Procedures to deal with gas after it is detected
      4. Other items deemed necessary for the safety of the ship and personnel
- (8) Wind turbine installation ships
  - (a) Plans and documents for approval
    - i) Arrangement of cargo gears such as cranes, boom rests, etc.
    - ii) Details for the supporting structures of cargo gear such as cranes, boom rests, etc.
    - iii) Arrangement of pile driving equipment
    - iv) Details for the supporting structures of pile driving equipment
  - (b) Plans and documents for reference
    - i) Calculation sheets for the supporting structures of cargo gears such as cranes, boom rests, etc.
    - ii) Calculation sheets for the supporting structures of pile driving equipment
- (9) Support ships of submersibles
  - (a) Plans and documents for approval
    - i) Arrangement of the supporting installations on support units
    - ii) Towing arrangement
    - iii) Lifting installation arrangement
    - iv) Arrangement of communication devices
    - v) Plans for the position detection system of submersibles
  - (b) Plans and documents for reference
    - i) Strength calculation sheets of towing system
    - ii) Strength calculation sheets of the lifting system

### **B15.2.3 Presence of Surveyor**

- 1 For the performance tests of the work-related installations of work-ships related to **15.2.3-1(1), Part B of the Rules**, the

following tests are to be carried out. In cases where it is impractical to carry out such tests on board ship, they may be replaced with examinations carried out at the place of manufacture in the presence of a Surveyor.

- (1) Vessels engaged in towing operations
  - (a) Confirmation that towing equipment is installed according to approved plans showing the arrangements of such equipment
  - (b) Confirmation that towing equipment works well
- (2) Fire Fighting Vessels
  - (a) Confirmation that fire fighting equipment is installed according to approved plans showing the arrangements of such equipment
  - (b) Fire fighting equipment
    - i) Water monitor systems  
Confirmation that the range of each monitor is more than that specified in [Table O6.4.2, Part O of the Guidance](#) in cases where all fixed water monitors are in simultaneous use
    - ii) Hoses and nozzles for fire fighting  
Confirmation that water jet flows are more than 12m
    - iii) Mobile high expansion foam generators  
Confirmation that mobile high expansion foam generators work well
    - iv) Foam monitor systems  
Confirmation that the height of foam flow with all fixed foam monitors in simultaneous use at maximum foam generation is more than 15m
    - v) Water-spray systems  
Confirmation that water-spray systems work well
- (3) Anchor handling vessels
  - (a) Confirmation that anchor handling equipment is installed according to approved plans showing the arrangements of such equipment
  - (b) Confirmation that anchor handling equipment works well
- (4) Vessels engaged in laying objects on the seabed
  - (a) Confirmation that laying equipment is installed according to approved plans showing the arrangements of such equipment
  - (b) Confirmation that laying equipment works well

2 For support ships of submersibles, the following examinations or tests of supporting systems are to be carried out in the presence of the Surveyor:

- (1) When the towing system is tested
- (2) When the lifting system is tested
- (3) When the supporting system is installed on board
- (4) When the performance test of the supporting system is carried out

3 The wording “items specified otherwise by the Society” in [15.2.3-1, Part B of the Rules](#) means surveys of the shop tests specified in [2.1.7, Part B of the Rules](#) and [1.5 of Annex 4.4.2-3, Part O of the Rules](#), and the wording “the Society may approve other survey methods which it considers to be appropriate” means to be in accordance with item 1(3), [Table B2.7, Part B of the Rules](#).

#### **B15.2.6 Classification Survey of Ships Not Built under Survey**

1 The treatment of the Classification Surveys of Ships not Built under Survey is to be in accordance with [2.2, Part B of the Rules](#).

2 For the support ships of submersibles, a detailed examination and tests of the supporting system are to be carried out. In addition, overhaul examinations and load tests are to be performed on lifting systems and towing systems if deemed necessary by the Surveyor.

### **B15.3 Annual Surveys**

#### **B15.3.2 Annual Surveys for Hull, Equipment, Fire Extinguishing Systems, and Fittings**

For self-elevating ships, thorough examinations including a non-destructive test of essential structural members deemed necessary by the Society may be required at the first Annual Survey after the date of completion of the Classification Survey During

Construction.

### **B15.3.3 Annual Surveys for Machinery and Electrical Installations**

For support units of submersibles, the general condition of supporting systems is to be examined, and when the operation or performance tests of the submersible specified in **11.4.1-1(7), Part B of the Rules** are carried out in water, a performance test of the supporting systems is to be carried out.

## **B15.6 Docking Surveys**

### **B15.6.1 General**

Ships which will undergo an in-water survey are to comply with the provisions of **6.1.2-4, Part B of the Rules** relevant to their configuration/construction. Where the unit has a dynamic positioning system, a suitable means to allow inspection of the exterior of thrusters is to be provided.