Contents

RULES FOR BALLAST WATER MANAGEMENT INSTALLATIONS

Part 1 GENERAL

Chapter 1 GENERAL

1.1 General

1.1.1 Application

1 The Rules for Ballast Water Management Installations (hereinafter referred to as "the Rules") apply to the installations for the control and management of ship's ballast water and sediments of ships classed or to be classed with NIPPON KAIJI KYOKAI (hereinafter referred to as "the Society") under **Chapter 2 of the Regulations for the Classification and Registry of Ships** and intended to be registered as the ballast water management installations under **Chapter 3 of the** same regulations.

2 Notwithstanding the provisions in **-1**, the Rules do not apply to the following ships:

(1) Ships not designed or constructed to carry ballast water;

(2) Ships which only operate in waters under the jurisdiction of the Flag State if permitted by the Flag Administration;

(3) Ships which only operate in waters under the jurisdiction of a State other than the Flag State if permitted by the Administration of said State;

(4) Ships which only operate in waters under the jurisdiction of a State other than the Flag State and on the high seas if permitted by the Administration of said State;

(5) Ship owned or operated by a State and used only on government non-commercial service; and

(6) Ships which are not subject to discharge or permanently carry ballast water.

3 Where there are special reasons for non-compliance with any requirements of the Rules, it may comply with other requirements modified by the Society on the basis of the Rules.

4 The relevant requirements in the **Rules for the Survey and Construction of Steel Ships** apply to the materials, equipment, installation and workmanship of the systems, unless otherwise specified in the Rules.

1.1.2 Equivalents

Ballast water management installations which do not comply with requirements of the Rules may be accepted provided that they are deemed by the Society to be equivalent to those specified in the Rules.

Chapter 2 TERMINOLOGY AND ABBREVIATIONS

2.1 General

2.1.1 Terminology (*Article* 1 of *BWM Convention* and *Regulation* A-1 of *Annex*)

For the purpose of the Rules, the following definitions apply unless otherwise stated in each Part:

(1) "Ballast water" means water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship.

(2) "Ballast water management" means mechanical, physical, chemical, and biological processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments.

(3) "Harmful aquatic organisms and pathogens" means aquatic organisms or pathogens which, if introduced into the sea, including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

(4) "Sediments" means matter settled out of ballast water within a ship.

(5) "Ship" means a vessel of any type whatsoever operating in the aquatic environment and includes submersibles, floating craft, floating platforms, *FSUs* and *FPSOs*.

(6) "Anniversary date" means the day and the month of each year corresponding to the date of expiry of the Certificate of Classification.

(7) "Company" means the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the owner of the ship and who on assuming such responsibility has agreed to take over all the duties and responsibilities imposed by the *International Safety Management Code* (*ISM Code*).

(8) "Constructed" in respect of a ship means a stage of construction where:

(a) the keel is laid; or

(b) construction identifiable with the specific ship begins; or

(c) assembly of the ship has commenced comprising at least 50 *tonnes* or 1 *percent* of the estimated mass of all structural material, whichever is less; or

(d) the ship undergoes a major conversion.

(9) "Major conversion" means a conversion of a ship:

(a) which changes its ballast water carrying capacity by 15 percent or greater; or

(b) which changes the ship type; or

(c) which, in the opinion of the Society, is projected to prolong its life by ten years or more; or

(d) which results in modifications to its ballast water system other than component replacement-in-kind. Conversion of a ship to meet the provisions of **2.3, Part 3 of the Rules** is not to be deemed to constitute a major conversion.

(10) "From the nearest land" means from the baseline from which the territorial sea of the territory in question is established in accordance with international law.

(11) "Active substance" means a substance or organism, including a virus or a fungus that has a general or specific action on or against harmful aquatic organisms and pathogens.

(12) "Ballast tank" means any tanks, spaces or compartments on a ship used for carrying, loading or discharging ballast water, including any multi-use tank, space or compartment designed to allow carriage of ballast water.

(13) "Ballast water management system" (*BWMS*) means any system which processes ballast water such that it meets or exceeds the ballast water performance standards given in **3.2, Part 3 of the Rules**. The *BWMS* includes ballast water equipment, all associated piping arrangements as specified by the manufacturer, control and monitoring equipment and sampling facilities. In addition, *BWMS* does not include ship ballast water fittings (piping, valves, pumps, etc.) that are required when a *BWMS* is not fitted (i.e. where *IMO Res*. *MEPC*.279(70) "*2016 Guidelines for Approval of Ballast Water Management Systems (G8)*" or the *BWMS Code* is applicable).

(14) "Ballast water treatment equipment" means equipment which mechanically, physically, chemically, or biologically processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments.

(15) "Control equipment" means the installed equipment required to operate and control the ballast water treatment equipment.

(16) "Monitoring equipment" means the equipment installed for the assessment of the effective operation of the ballast water treatment equipment.

(17) "Sampling facilities" means the means provided for sampling treated or untreated ballast water.

(18) "Preparation" means any commercial formulation containing one or more active substances including any additives.

(19) "Ballast Water Management Plan" means the plan referred to in **Chapter 4, Part 3 of the Rules** describing the ballast water management process and procedures implemented on board individual ships.

(20) "Control and monitoring equipment" means the equipment installed for the effective operation and control of the *BWMS* and the assessment of its effective operation.

(21) "System Design Limitations of a *BWMS* (hereinafter referred to as "*SDL*")" means the limitatons specified in **11.1.2(16), Part 2 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.

(22) "*BWMS Code*" means the "Code for Approval of Ballast Water Management Systems", adopted by Resolution *MEPC*.300(72), as may be amended by the IMO, provided that such amendments are adopted and brought into force in accordance with Article 19 of the *BWM* Convention relating to amendment procedures applicable to the annex.

2.1.2 Abbreviations

For the purpose of the Rules, the following abbreviations apply:

(1) *BWM* Convention: The International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

(2) *Annex*: The annex of *BWM* Convention

(3) *IMO*: International Maritime Organization

Part 2 SURVEYS

Chapter 1 GENERAL

1.1 General

1.1.1 Application*

The requirements in this Part apply to ships of 400 *gross tonnage* and above, excluding floating platforms, *FSUs* and *FPSOs*.

1.1.2 Kinds of Surveys

Surveys are to be of the following kinds:

(1) Surveys for registration (hereinafter referred to as Registration Surveys)

(a) Registration Surveys during Construction

Registration Surveys carried out upon applications for those surveys submitted prior to any application of ballast water management installations with respect to those ships to in which ballast water management installations are to be provided during their Classification Surveys during Construction.

(b) Registration Surveys not Built under Survey

Registration Surveys other than those specified in **(a)** above

(2) Surveys for maintaining registration (hereinafter referred to as Registration Maintenance Surveys)

(a) Annual Surveys

(b) Intermediate Surveys

(c) Special Surveys

(d) Occasional Surveys

For the purpose of this part, Periodical Surveys consist of the surveys specified in **(2)** to **(4)** above.

(e) Unscheduled Surveys

1.1.3 Intervals of Surveys*

1 Registration Surveys

(1) Registration Survey during Construction

Ballast water management installations of ships intended to be constructed and registered with the Society under the survey by the Surveyors in accordance with the designs approved by the Society are to undergo the Registration Survey during construction. The presence of the Surveyor is required at the following stages of the work:

(a) when materials are applied to the parts and the parts are installed in the ballast water management installations,

(b) when machining of the main parts is finished and at a proper time during machining, if necessary,

(c) when important equipment is installed on board, and

(d) when performance tests are carried out.

(2) Registration Surveys not Built under Survey

The ballast water management installations of ships intended to be registered in a way other than that specified in **(1)** is to undergo the Registration Surveys not Built under Survey when an application for the survey is made.

2 Annual Surveys

Annual Surveys are to be carried out at intervals specified in **1.1.3-1(1), Part B of the Rules for the Survey and Construction of Steel Ships**.

3 Intermediate Surveys

Intermediate Surveys are to be carried out at intervals specified in **1.1.3-1(2), Part B of the Rules for the Survey and Construction of Steel Ships**.

4 Special Surveys

Special Surveys are to be carried out at intervals specified in **1.1.3-1(3)(a), Part B of the Rules for the Survey and Construction of Steel Ships**.

5 Occasional Surveys

Occasional Surveys are to be carried out at the following occasions at times other than Registration Surveys or Periodical Surveys.

(1) when important parts of equipment subjected to a Registration Survey are repaired or modified; when a change in the purpose, service area, or another major change, etc. made to the ship requires a corresponding change in the important parts of the equipment; or when the equipment is damaged to such a degree that effects its performance.

(2) when the survey for verifying compliance with requirements of the Rules is to be retroactively applied to a ship already constructed,

(3) when an Occasional Survey other than mentioned above is deemed necessary.

6 Unscheduled Surveys

The classed ships may be subject to Unscheduled Surveys when the confirmation of the status of the installations by survey is deemed necessary in cases where the Society considers the installations 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

The requirements for Periodical Surveys carried out in advance are to be in accordance with the provisions specified in **1.1.4, Part B of the Rules for the Survey and Construction of Steel Ships**.

1.1.5 Postponement of Special Surveys

The requirements for postponement of Special Surveys are to be in accordance with the provisions specified in **1.1.5-1(1)** or **1.1.5-1(2), Part B of the Rules for the Survey and Construction of Steel Ships**.

1.1.6 Modification of the Requirements*

1 With respect to Periodical Surveys in cases where considered appropriate by the Society, the Surveyor may modify the requirements based on the size, service engaged, construction, age, service performance, results of previous surveys and actual condition of the ship.

2 At Intermediate Surveys, where examinations have been carried out during the period between the 2nd and the 3rd Annual Surveys according to the requirements for Intermediate Surveys, said examinations to be carried out as Intermediate Surveys may be omitted at the discretion of the Surveyor.

3 At Intermediate Surveys, as to the items which are considered necessary by the Surveyor or requested by the ship owner, examinations may be carried out according to the requirements for Special Surveys.

4 At Special Surveys, where examinations have been carried out during the period between the 4th Annual Survey and the Special Survey specified in **1.1.3-4** according to the requirements for Special Surveys, said examinations to be carried out as Special Surveys may be omitted at the discretion of the Surveyor. However, in case where Annual Surveys or Intermediate Surveys are carried out in advance in accordance with **1.1.4**, the Special Survey is to be carried out in accordance with the provisions specified otherwise by the Society.

1.1.7 Laid-up Ships

1 Laid-up ships are not subject to Periodical Surveys. However, Occasional Surveys may be carried out at the request of owners.

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

(1) When the due date for any Periodical Survey designated before lay-up has not yet passed, the next scheduled Periodical Survey is to be carried out.

(2) When the due date for any Periodical Survey designated before lay-up has already passed, said Periodical Survey is to be carried out.

(3) When the due dates for two or more kinds of Periodical Surveys designated before lay-up have already passed due, the superlative one is to be carried out.

1.2 Preparation for Surveys and Others

1.2.1 Notification

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

1.2.2 Preparation for Surveys

1 All such preparations as required for registration, periodical and other surveys specified in this Part as well as those which may be required by the Surveyor in accordance with the provisions in this Part are the responsibility of the Owners or their representatives. The preparations are to include provisions of easy and safe access, necessary facilities and necessary records for the execution of the survey. 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 to 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 upon either calibration records or comparisons of readings with multiple instruments.

2 An applicant for survey(s) is to arrange a supervisor, who is well conversant with the survey items intended for the preparation of surveys, to provide the necessary assistance to the Surveyor according to his requests during the survey.

1.2.3 Suspension of Surveys

Surveys may be suspended where necessary preparations have not been made, an appropriate attendant is not present, or the Surveyor considers that the safety for execution of the survey is not ensured.

1.2.4 Disposition when Repairs are Considered Necessary as a Result of Surveys

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

1.2.5 Replacement of Fittings, Equipment 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

1.3 Verification Survey of Certificates

When Annual Surveys and Intermediate Surveys are carried out, the International Ballast Water Management Certificate is to be submitted to the Surveyor to obtain confirmation of the validity of the certificate as well as endorsement when necessary.

1.4 Other

1.4.1 Remote Surveys*

To implement the survey, in lieu of the traditional ordinary surveys where a surveyor is in attendance, the Society may approve survey methods which it considers to be appropriate.

Chapter 2 REGISTRATION SURVEYS

2.1 Registration Surveys during Construction

2.1.1 General*

At Registration Surveys during Construction, the ballast water management installations and their workmanship are to be satisfied with the relevant requirements in each Part of the Rules.

2.1.2 Submission of Plans and Documents*

1 For any ship intending to undergo a Registration Survey, the plans and documents specified in **(1)** and **(2)** are to be submitted to the Society for approval. The document specified in **(3)** is to be submitted to the Society for approval before delivery of the ship.

(1) For ships conducting the ballast water exchange specified in **Chapter 2, Part 3 of the Rules**, the following plans and document specified in **(a)** to **(e)**:

(a) Arrangement of ballast tanks;

(b) Plans and documents relevant to air pipes and sounding pipes for ballast tanks;

(c) Capacities of ballast pumps;

(d) Arrangement of ballast piping; and

(e) Plans and documents relevant to sampling facilities.

(2) For ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules**, the following plans and document specified in **(a)** to **(f)**:

(a) Arrangements of ballast water management systems;

(b) Arrangements of ballast tanks;

(c) Capacities of ballast pumps;

(d) Arrangement of ballast piping;

(e) Plans and documents specified in **1.1.6(1)(e), (1)(f), (2)(b), (2)(d) and (2)(e), Part H of the Rules for the Survey and Construction of Steel Ships**; and

(f) Other plans and documents deemed necessary by the Society

(3) Ballast water management plan

2 The plans and documents are to be submitted to the Society for reference, in addition to the approval plans and documents specified in **-1** above. The document specified in **(2)** is to be submitted before onboard testing.

(1) A copy of the certificate for type approval of ballast water management system

(2) On board test procedures

(3) Plans showing ballast water management systems

(4) Asbestos-free declarations and supporting documents.

3 The plans and documents specified in **-1** and **-2** above are to be submitted 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.

2.1.3 Plans and Documents to be Maintained On Board

Upon completion of a Registration Survey, the plans and documents specidied in **(1)** to **(4)** below are maintained on board.

(1) Ballast water management plan;

(2) Ballast water record book;

(3) For ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules** by approved *BWMS* based on *IMO Res*. *MEPC*.174(58) "*Guidelines for Approval of Ballast Water Management Systems (G8)*", the following **(a)** to **(h)**

documents:

(a) A copy of the certificate for type approval specified in **2.1.2-2(1)**;

(b) A statement confirming that the electrical and electronic components of the ballast water management system have been tested in accordance with the specifications for environmental testing specified in *IMO Res*. *MEPC*.174(58) "*Guidelines for Approval of Ballast Water Management Systems (G8)*", as amended;

(c) Equipment manuals for the major components of the ballast water management system;

(d) An operations and technical manual for the ballast water management system, containing a technical description of the ballast water management system, operational and maintenance procedures, and backup procedures in case of equipment malfunction;

(e) Installation specifications for the ballast water management system;

(f) Installation commissioning procedures for the ballast water management system;

(g) Initial calibration procedures of the ballast water management system; and

(h) Dosage and storage instructions for active substances or preparation of the ballast water management system.

(4) For ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules** by approved *BWMS* based on *IMO Res*. *MEPC*.279(70) "*2016 Guidelines for Approval of Ballast Water Management Systems (G8)*" or the *BWMS Code*, the following **(a)** to **(e)** documents:

(a) A copy of the certificate for type approval specified in **2.1.2-2(1)**;

(b) An operations and technical manual for the ballast water management system, containing a technical description of the ballast water management system, operational and maintenance procedures, and backup procedures in case of equipment malfunction;

(c) Installation specifications for the ballast water management system, e.g. installation drawing, piping and instrumentation diagrams, etc.;

(d) Installation commissioning procedures for the ballast water management system; and

(e) Dosage and storage instructions for active substances or preparation of the ballast water management system.

2.1.4 Inspections of Equipment*

1 For ships conducting the ballast water exchange specified in **Chapter 2, Part 3 of the Rules**, the ballast piping, ballast pump and air pipes and sounding pipes for ballast tanks are to be located in their proper positions based upon approved drawings, and other inspections deemed necessary by the Society are to be carried out.

2 For ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules**, the following inspections are to be carried out:

(1) Confirmation that installations for ballast water treatment (ballast water management system, ballast pump and ballast piping, etc.) are located in their proper positions based upon approved drawings;

(2) Confirmation that the *BWMS* is in good working order (in principle, includes operation tests associated with ballasting and de-ballasting at rated capacity);

(3) Confirmation that any consumables such as active substances and preparations necessary for conducting ballast water treatment are provided on board under appropriate controls;

(4) Confirmation that the *BWMS* is the same as that listed on the certificate for type approval specified in **2.1.2-2(1)**;

(5) For *BWMS* which make use of active substances or preparations, confirmation that the type of said *BWMS* complies with **3.3-1(2), Part 3 of the Rules**;

(6) Confirmation that the recording devices for control and monitoring equipment are operable and that sufficient supply of any consumables necessary for the recording devices is provided on board;

(7) For *BWMS* generating by-products such as sediments, dedicated installations to store such by-products are provided on board; and

(8) The workmanship of the installation is satisfactory and, in particular, that any bulkhead penetrations or penetrations of the ballast system piping are to the relevant approved standards;

(9) The installation commissioning procedures have been completed;

(10) For ships that complete their registration surveys on or after 1 June 2022, commissioning testing of the ballast water management system (*BWMS*) has been completed by service suppliers accepted by the Administration or approved by the

Society in accordance with the **Rules for Approval of Manufacturers and Service Suppliers**; and

(11) Other inspections deemed necessary by the Society.

3 For the tests specified in **-2(2)** above, the applicant is to prepare test plans for review by the Society prior to testing. Test records and measurement records are to be submitted to the Society, as required.

2.1.5 Inspections of Ballast Water Management Plans

Ballast water management plans are to be confirmed to comply with the requirements specified in **Chapter 4, Part 3 of the Rules**.

2.2 Registration Surveys Not Built under Survey

2.2.1 General

At Registration Surveys not Built under Survey, ballast water management installations are to be satisfied with the requirements specified in the Rules.

2.2.2 Submission of Plans and Documents

For any ships intending to undergo Registration Surveys not Built under Survey, the plans and documents specified in **2.1.2** are to be submitted as necessary.

2.2.3 Plans and Documents to be Maintained On Board

Upon completion of a Registration Survey, the plans documents specified in **2.1.3** are maintained on board.

2.2.4 Inspections of Equipment

1 At Registration Surveys not Built under Survey, relevant inspections are to be carried out mutatis mutandis according to the requirements specified in **2.1.4**. However, for ships in possession of an International Ballast Water Management Certificate or an equivalent thereto, inspections corresponding to those specified in **3.3** are to be carried out.

2 For ships carrying out Registration Surveys described in **2.1.4** according to **-1** above for which the completion date is on or after 1 June 2022, the confirmation inspection required by **2.1.4-2(10)** is to be included therein.

2.2.5 Inspections of Ballast Water Management Plans

It is to be confirmed that the ballast water management plan is in accordance with **Chapter 4, Part 3 of the Rules**.

Chapter 3 REGISTRATION MAINTENANCE SURVEYS

3.1 Annual Surveys

3.1.1 General

At Annual Surveys, inspections are to be carried out on the relevant items of the requirements specified in **3.1.2** and **3.1.3**. In addition, the general condition of the relevant equipment is to be inspected.

3.1.2 Inspections of Equipment

1 For ships conducting the ballast water exchange specified in **Chapter 2, Part 3 of the Rules**, it is to be confirmed that the ballast piping, ballast pump and air pipes and sounding pipes for ballast tanks are in good condition. In addition, other inspections deemed necessary by the Society are to be carried out.

2 For ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules**, the following inspections are to be carried out:

(1) Visual inspections and function tests of *BWMS*, as far as practicable;

(2) Confirmation that any consumables such as active substances and preparations necessary for conducting ballast water treatment are provided in sufficient supply on board under appropriate controls; and

(3) Other inspections deemed necessary by the Society.

3 For ships undergoing any installation, change, or replacement of their *BWMS*, the surveys described in **2.1.4** are to be carried out. For ships whose completion dates for such surveys are on or after 1 June 2022, the confirmation inspection required by **2.1.4-2(10)** is to be included therein.

3.1.3 Plans and Documents to be Maintained On Board

1 It is to be confirmed that the plans and documents specified in **2.1.3** are maintained on board.

2 It is to be confirmed that the ballast water record book is filled out appropriately in accordance with **1.2, Part 3 of the Rules**.

3 The records of control equipment and monitoring equipment are to be confirmed.

4 The Surveyor is to confirm the calibration certificates, which certify the date of the most recent calibration inspection by manufacturer or persons authorized by manufacturer, for measuring systems which are parts of the *BWMS*.

3.2 Intermediate Surveys

3.2.1 General

At Intermediate Surveys, inspections are to be carried out on the relevant items of **3.2.2** and **3.2.3**. In addition, the general condition of the relevant equipment is to be inspected.

3.2.2 Inspections of Equipment

In addition to inspections specified in **3.1.2**, it is to be confirmed that there are no defects, such as corrosion, wastage and damage, in the *BWMS*, ballast pump and ballast piping, and the *BWMS* is in good working order for ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules**.

3.2.3 Documents to be Maintained On Board

Inspections specified in **3.1.3** are to be carried out.

3.3 Special Surveys

3.3.1 General

At Special Surveys, inspections are to be carried out on the relevant items of **3.3.2** and **3.3.3**. In addition, the general condition of the relevant equipment is to be inspected.

3.3.2 Inspections of Equipment

Inspections specified in **3.2.2** are to be carried out.

3.3.3 Documents to be Maintained On Board

Inspections specified in 3.1.3 are to be carried out.

Chapter 4 OCCASIONAL SURVEYS

4.1 Occasional Surveys

4.1.1 General*

1 At Occasional Surveys, inspections are to be carried out on the relevant items of the requirements specified in **3.1.2** and **3.1.3**. In addition, Registration Surveys for such installations are to be carried out mutatis mutandis according to the degree of repairs or modifications made to the ballast water management installation and its relevant equipment.

2 For ships undergoing any installation, change, and replacement of their *BWMS*, the Occasional Surveys described in **2.1.4** are to be carried out.

3 For ships carrying out the Occasional Surveys described in **2.1.4** according to **-2** above for which the completion date is on or after 1 June 2022, the confirmation inspection required by **2.1.4-2(10)** is to be included therein.

4 In cases where major components (as defined in the *BWMS* code) are changed or replaced, the *BWMS* is to be regarded as being newly installed and is to be confirmed in accordance with **2.1.4-2(10).** In such cases, the International Ballast Water Management Certificate (IBWMC) is to be re-written.

Chapter 5 UNSCHEDULED SURVEYS

5.1 General

At Unscheduled Surveys, investigations, examinations or tests are to be made to the satisfaction of the Surveyor with respect to the matters concerned.

Part 3 EQUIPMENT FOR THE BALLAST WATER MANAGEMENT

Chapter 1 GENERAL

1.1 General

1.1.1 Application

The requirements in this Part apply to installations for the control and management of ship's ballast water and sediments as well as to ships conducting ballast water exchange.

1.2 Ballast Water Record Book (*Regulation* B-2 of *Annex*)

1 The ballast water record book is to contain at least the information specified in *Appendix* II of *Annex* and keep record of the following operations. The ballast water record book may be an electronic recording system, or it may be integrated into another record book or system. The Ballast Water Record Book entries are to be completed taking into account any guidelines developed by the *IMO*. The volume of ballast water on board is to be estimated in cubic metres.

(1) When ballast water is taken on board from the aquatic environment (ballasting operation)
  (a) Start time and location (port of uptake or latitude/longitude)
  (b) Completion time and location (port of uptake or latitude/longitude and minimum depth of water during uptake)
  (c) The identity of the tanks affected
  (d) Estimated volume of uptake and final total quantity retained in cubic metres
  (e) Whether conducted in accordance with the approved Ballast Water Management Plan
  (f) Ballast water treatment method

(2) When ballast water is discharged into the aquatic environment (deballasting operation)
  (a) Start time and location (port of discharge or latitude/longitude)
  (b) Completion time and location (port of discharge or latitude/longitude and minimum depth of water during discharge)
  (c) The identity of the tanks affected
  (d) Estimated volume of discharge and final total quantity retained in cubic metres
  (e) Whether conducted in accordance with the approved Ballast Water Management Plan
  (f) Ballast water treatment method

(3) Whenever ballast water is exchanged, treated through internal circulation or treated in tank
  (a) Ballast water exchange
    i) Start time and location (latitude/longitude)
    ii) Completion time and location (latitude/longitude)
    iii) Minimum distance from the nearest land and minimum depth of water during the exchange or, if applicable, identify the designated exchange area in accordance with **2.2, Chapter 2, Part 3 of the Rules**
    iv) Whether conducted in accordance with the approved Ballast Water Management Plan and state the ballast water exchange method (Sequential or Flow-through or Dilution) used
    v) The identity of the tanks affected
    vi) The quantity exchanged and final total quantity on board in cubic metres
    vii) Treatment method for the incoming ballast water
  (b) Ballast water internal circulation for treatment or in-tank treatment
    i) Start time
    ii) Completion time

iii) The identity of the tanks affected (identifying source and destination tanks if applicable)
iv) Total quantity treated (through circulation or in tank) in cubic metres
v) Ballast water treatment method

(4) Uptake or discharge of ballast water from/to a port-based or reception facility
(a) Start time and location of uptake/discharge (state facility name)
(b) Completion time
(c) Operation carried out (Weather uptake or discharge)
(d) The identity of the tanks affected
(e) Total quantity on board in cubic metres and final quantity retained on board
(f) Whether conducted in accordance with the approved Ballast Water Management Plan
(g) Onboard ballast water treatment method

(5) Accidental discharge/ingress or other exceptional uptake or discharge of ballast water
(a) Start time and location of ingress/uptake/discharge (port name or latitude/longitude)
(b) Completion time
(c) Operation carried out (whether ingress, uptake or discharge)
(d) The identity of the tanks affected
(e) Total quantity on board in cubic metres
(f) State the circumstances of ingress, uptake, discharge or loss, the reason thereof, any treatment method used and general remarks

(6) Failures and inoperabilities of the ballast water management system (Failures and inoperabilities include malfunctions, shutdowns or critical alarms indicating a failure of the ballast water management system which may indicate non-compliance with the D-2 standard (except routine information and warnings))
(a) Time and location (port name or latitude/longitude) of failure of the ballast water management system
(b) Operation carried out (state whether uptake or discharge)
(c) Description of the issue (e.g. kind of alarm or other description of circumstances)
(d) Time and location (port name or latitude/longitude) when the ballast water management system has been made operational

(7) Ballast tank cleaning/flushing, removal and disposal of sediments
(a) Time and ship's location on commencement of ballast tank cleaning/flushing, removal or disposal of sediments (port name or latitude/longitude)
(b) Time and ship's location on completion of ballast tank cleaning/flushing, removal or disposal of sediments (port name or latitude/longitude)
(c) Tank(s) identification (name of the ballast tanks as per the Ballast Water Management Plan)
(d) Discharge or disposal to a reception facility (state quantity in cubic meters and name of the facility)
(e) Disposal or discharge to the aquatic environment as per Ballast Water Management Plan (state quantity in cubic metres, minimum distance from the nearest land in nm and minimum depth of water in metres)

(8) Additional operational procedure and general remarks

2 Ballast water record book entries are to be maintained on board the ship for a minimum period of two years after the last entry has been made and thereafter in the company's control for a minimum period of three years.

3 Ballast water record books are to be kept readily available for inspection at all reasonable times and, in the case of an unmanned ship under tow, may be kept onboard the towing ship.

4 Each operation concerning ballast water is to be fully recorded without delay in the ballast water record book. Each entry is to be signed by the officer in charge of the operation concerned and each completed page is to be signed by the master.

5 Ballast water record book entries are to be written in the working language of the ship. If the language used is not English, French or Spanish, the entries are to contain a translation into one of those languages.

1.3 Ballast Water Management Scheme (*Regulation* B-3 of *Annex*)

1 Ships constructed before 8 September 2017 (the date of entry into force of the *BWM* Convention) (hereinafter referred to as

"Existing Ships") are to conduct the ballast water exchange or ballast water management specified in **Chapter 2** or **Chapter 3, Part 3 of the Rules** until the dates below, after which time it is to conduct the ballast water management specified in **Chapter 3, Part 3 of the Rules**.

(1) Ships required to be provided with the International Oil Pollution Prevention Certificate:

(a) For ships which have completed the renewal survey associated with the International Oil Pollution Prevention Certificate on or after 8 September 2014 but prior to 8 September 2017, the completion date of the first renewal survey associated with the International Oil Pollution Prevention Certificate on or after 8 September 2017.

(b) For ships other than those specified in (a) above, the completion date of the second renewal survey associated with the International Oil Pollution Prevention Certificate on or after 8 September 2017, or the completion date of the first renewal survey associated with the International Oil Pollution Prevention Certificate on or after 8 September 2019, whichever comes first.

(2) Ships not required to be provided with the International Oil Pollution Prevention Certificate: 8 September 2024

2 Ships constructed on or after 8 September 2017 (the date of entry into force of the *BWM* Convention) are to conduct the ballast water management specified in **Chapter 3, Part 3 of the Rules**.

1.4 Sediment Management (*Regulation* B-5 of *Annex*)

1 All ships are to remove and dispose of sediments from spaces designated to carry ballast water in accordance with the provisions of the ship's ballast water management plan.

2 Ships constructed on or after 1 January 2009 should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments, and provide safe access to allow for sediment removal and sampling, taking into account *IMO Res. MEPC.*209(63) "*2012 Guidelines on Design and Construction to Facilitate Sediment Control on Ships(G12)*", as amended. Ships constructed before 1 January 2009 should, to the extent practicable, comply with this requirement.

1.5 Sampling Facilities*

1 Ships conducting the ballast water exchange specified in **Chapter 2, Part 3 of the Rules** are to be provided with facilities to collect samples in ballast tanks. In such cases, in-tank samples may be taken via sounding or air pipes and manholes by using pumps, sampling bottles or other water containers.

2 Ships conducting the ballast water management specified in **Chapter 3, Part 3 of the Rules** are to be provided with facilities for collecting ballast water from discharge lines, as near to the point of discharge as practicable, during ballast water discharge whenever possible. However, in cases where tanks, such as upper side wing tanks, are emptied through direct overboard discharge valves instead of through ballast pumps, the openings, etc. of such tanks may be used as a sampling facilities provided that ballast water can be easily collected through such facilities.

Chapter 2 BALLAST WATER EXCHANGE

2.1 General

2.1.1 Application

The requirements in this chapter apply to ships conducting ballast water exchange.

2.2 Ballast Water Exchange (*Regulation* B-4 of *Annex*)*

1 Whenever possible, ballast water exchange is to be conducted at least 200 *nautical miles* from the nearest land and in water at least 200 *metres* in depth, taking into account *IMO Res*. *MEPC*.288(71) "*Guidelines for Ballast Water Exchange (G6)*", as amended.

2 In cases where a ship is unable to conduct ballast water exchange in accordance with **-1**, ballast water exchange is to be conducted taking into account *IMO Res*. *MEPC*.288(71) "*Guidelines for Ballast Water Exchange (G6)*", as amended. In all such cases, the exchange is to be conducted at least 50 *nautical miles* from the nearest land and in water at least 200 *metres* in depth.

2.3 Ballast Water Exchange Standard (*Regulation* D-1 of *Annex*)

1 Ships performing ballast water exchange are to do so with an efficiency of at least 95 *percent* volumetric exchange of ballast water.

2 For ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank is to be considered to meet the standard described in **-1**. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 *percent* volumetric exchange is met.

Chapter 3 BALLAST WATER MANAGEMENT

3.1 General

3.1.1 Application

The requirements in this chapter apply to ships conducting ballast water management.

3.2 Ballast Water Performance Standard (*Regulation* D-2 of *Annex*)

For ballast water discharge, the following requirements are to be met:

(1) less than 10 viable organisms per cubic metre greater than or equal to 50 *μm* in minimum dimension;

(2) less than 10 viable organisms per millilitre less than 50 *μm* in minimum dimension and greater than or equal to 10 *μm* in minimum dimension;

(3) toxicogenic vibrio cholerae (O-1 and O-139) with less than 1 colony forming unit (*cfu*) per 100 *ml* or less than 1 *cfu* per 1 *g* (wet weight) zooplankton samples;

(4) escherichia coli less than 250 *cfu* per 100 *ml*; and

(5) intestinal enterococci less than 100 *cfu* per 100 *ml*.

3.3 Ballast Water Management Systems (*Regulation* D-3 of *Annex*)*

BWMS used to comply with 3.2 above is to satisfy the following requirements:

1 General requirements

(1) Except as specified in **(2)** below, a *BWMS* is to be approved by the Administration or the Society in accordance with following **(a)** or **(b)**:

(a) A *BWMS* installed on or after 28 October 2020 is to be approved in accordance with the *BWMS Code*; however, a *BWMS* approved taking into account the "*2016 Guidelines for Approval of Ballast Water Management Systems (G8)*" adopted by *IMO Res*. *MEPC*.279(70) is deemed to be in accordance with the *BWMS Code*.

(b) A *BWMS* installed before 28 October 2020 is to be approved taking into account the guidelines developed by the IMO or the *BWMS Code*.

(2) Any *BWMS* using active substances or preparations is to be approved by the *IMO* in accordance with *IMO Res*. *MEPC*.169(57) "*Procedure for Approval of Ballast Water Management Systems that Make Use of Active Substances (G9)*", as amended.

(3) The *BWMS* is to be safe in terms of the ship, its equipment and the crew.

2 Construction and performance requirements

(1) The *BWMS* which is approved based on *IMO Res*. *MEPC*.174(58) "*Guidelines for Approval of Ballast Water Management Systems (G8)*" is to comply with the following **(a)** to **(o)** requirements.

(a) The *BWMS* is not to contain or use any substance of a dangerous nature, unless adequate arrangements for storage, application, mitigation, and safe handling, acceptable to the Society, are provided to mitigate any hazards introduced thereby.

(b) In case of any failure compromising the proper operation of the *BWMS*, audible and visual alarm signals are to be given in all stations from which ballast water operations are controlled.

(c) All working parts of the *BWMS* that are liable to wear or to be damaged are to be easily accessible for maintenance.

(d) Every access of *BWMS* beyond the essential requirements of **(c)** above is to require the breaking of a seal.

(e) The *BWMS* is to be so constructed that a visual alarm is always activated whenever *BWMS* is in operation for purposes of cleaning, calibration or repair, and these events are to be recorded by the control equipment.

(f) In the event of an emergency, suitable by-passes or overrides to protect the safety of the ship and personnel are to be installed.

(g) The installations specified **(f)** above are to activate an audible and visual alarm, and the event is to be recorded by the control equipment.

(h) Ballast water treatment equipment is to be robust and suitable for working in the shipboard environment, is to be of a design and construction adequate for the service for which it is intended and is to be so installed and protected as to reduce to a minimum any danger to persons onboard, due regard being paid to hot surfaces and other hazards. The design is to have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

(i) Ballast water treatment equipment is to be provided with simple and effective means for its operation and control. It is to be provided with a control system that is to be such that the services needed for the proper operation of the ballast water treatment equipment are ensured through the necessary automatic arrangements.

(j) Ballast water treatment equipment and its relevant electrical equipment are to be of explosion-protected type, if intended to be fitted in locations where flammable atmospheres may be present. Any moving parts fitted in such locations are to be arranged so as to avoid the formation of static electricity.

(k) The *BWMS* is to incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities or other aspects of *BWMS* of the vessel, which while not directly effecting treatment, are nonetheless required for proper administration of the necessary treatment.

(l) Control equipment is to incorporate a continuous self-monitoring function during the period in which the *BWMS* is in operation.

(m) Monitoring equipment is to record the proper functioning or failure of the *BWMS*.

(n) Control equipment is to be able to store data for at least 24 months, and is to be able to display or print a record for inspections. In the event the control equipment is replaced, means is to be provided to ensure the data recorded prior to replacement remains available on board for 24 months.

(o) Control equipment is to be provided with the ability to correct and re-zero the control equipment meters and the repeatability of the values obtained from measurements.

(2) In addition to **(a)**, **(b)** and **(d)** of **(1)** above, the *BWMS* which is approved based on *IMO Res.MEPC.*279(70) "*2016 Guidelines for Approval of Ballast Water Management Systems (G8)*" or the *BWMS Code* is to comply with the following **(a)** to **(i)** requirements.

(a) All working parts of the *BWMS* that are liable to wear or to be damaged are to be easily accessible for maintenance.

(b) The *BWMS* is to be so constructed that a visual indication is always activated whenever the *BWMS* is in operation for purposes of cleaning, calibration, or repair, and these events are to be recorded by the control and monitoring equipment.

(c) The *BWMS* is to be provided with the necessary connections to ensure that any bypass of the *BWMS* will activate an alarm, and that the bypass event is to be recorded by the control and monitoring equipment.

(d) The *BWMS* is to incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities or other aspects of the *BWMS* of the ship, which while not directly affecting treatment, are nonetheless required for proper administration of the necessary treatment.

(e) The control and monitoring equipment is to record the operation condition automatically, and the proper functioning or failure of the *BWMS*. Where practical, system design limitation parameters are to be monitored and recorded by the *BWMS* to ensure proper operation.

(f) The *BWMS* is to be able to produce (e.g. display, print or export) a report of the applicable self-monitoring parameters for official inspections or maintenance, as required.

(g) The control and monitoring equipment are to be able to store data for at least 24 months. In the event the control and monitoring equipment is replaced, means are to be provided to ensure the data recorded prior to replacement remains available on board for 24 months.

(h) Suitable bypasses or overrides to protect the safety of the ship and personnel are to be installed and used in the event of an emergency and these are to be connected to the *BWMS* so that any bypass of the *BWMS* should activate an alarm. The bypass event is to be recorded by the control and monitoring equipment and within the ballast water record book.

(i) The requirement of **(h)** above is not to apply to internal transfer of ballast water within the ship (e.g. anti-heeling operations). However, internal transfer which affect ballast water performance standard specified **3.2, Part 3 of the Rules**

may be applied the requirement of **(h)** above.

3 Other requirements deemed necessary by the Society

3.4 Prototype Ballast Water Treatment Technologies (*Regulation* D-4 of *Annex*)

1 For any ship that, prior to the date that the standard specified in **3.2** would otherwise become effective for it, participates in a programme approved by the Administration to test and evaluate promising ballast water treatment technologies, the standard specified in **3.2** is not to apply to that ship until five years from the date on which the ship would otherwise be required to comply with such standard.

2 For any ship that, after the date on which the standard specified in **3.2** has become effective for it, participates in a programme approved by the Administration, taking into account Guidelines developed by the *IMO*, to test and evaluate promising ballast water technologies with the potential to result in treatment technologies achieving a standard higher than that specified in **3.2**, the standard specified in **3.2** is to cease to apply to that ship for five years from the date of installation of such technology.

Chapter 4 BALLAST WATER MANAGEMENT PLAN

4.1 General

4.1.1 Application

1 The requirements in this chapter apply to ballast water management plan required to be on board.

2 A ballast water management plan is to be provided on board.

4.2 Ballast Water Management Plan (*Regulation* B-1 of *Annex*)

1 Ballast water management plans are to be approved by the Administration or the Society. If the contents of any such plan are modified, the plan is to be approved once again.

2 Ballast water management plans are to at least contain the following:

(1) Safety procedures for the ship and the crew associated with ballast water management;

(2) Actions to be taken to implement the ballast water management requirements and supplemental ballast water management practices as set forth in the *BWM* Convention;

(3) Procedures for the following disposals of sediments:

(a) at sea; and

(b) to shore;

(4) Procedures for coordinating shipboard ballast water management that involves discharge to the sea with the authorities of the State into whose waters such discharge will take place;

(5) The designated officer on board in charge of ensuring that the plan is properly implemented; and

(6) The reporting requirements for ships provided for under the *BWM* Convention.

3 Ballast water management plans are to be written in the working language of the ship. If the language used is not English, French or Spanish, a translation into one of these languages is to be included.

Part 4 REQUIREMNETS FOR BALLAST WATER MANAGEMENT SYSTEM INSALLATION

Chapter 1 GENERAL

1.1 General

1.1.1 Application

This part applies to ships subject to **3.3**, **Chapter 3**.

1.1.2 Other

Compliance with additional requirements may be required when deemed necessary by the Society.

Chapter 2 ARRAGEMENT, PIPING, ELECTRICAL INSTALLATIONS, ETC.

2.1 General

2.1.1 Terminology

The following definitions apply throughout this chapter.

(1) "Ballast water management system" (*BWMS*) means the definition given in **2.1.1(13), Part 1**. The categorisation of *BWMS* technology is as given in **Table 2.1.1-1**. The meaning of "category" as specified in this chapter is the *BWMS* technology category given in **Table 2.1.1-1**. In addition, the applicability of requirements to *BWMS* technology is as given in **Table 2.1.1-2**, and supplemental *BWMS* technology information is given in **Fig. 2.1.1-1**.

(2) "Cargo area of tankers" means the following:

(a) For tankers, the areas defined in **1.2.1** and **3.2.6, Part R of the Rules for the Survey and Construction of Steel Ships.**

(b) For chemical tankers, the area defined in **1.3.1(4), Part S of the Rules for the Survey and Construction of Steel Ships**.

(c) For gas carriers, the area defined in **1.1.5(6), Part N of the Rules for the Survey and Construction of Steel Ships**.

(d) For offshore support vessels, the area defined in paragraph 1.3.1 of *IMO* Resolution *A*.673(16) (as amended by Resolution *MSC*.236(82)) or paragraph 1.2.7 of the *IMO* Resolution *A*.1122(30), as applicable.

(3) "Dangerous gas" means any gas which may develop an atmosphere that is hazardous to the ship or its crew due to concerns related to flammability, explosivity, toxicity, asphyxia, corrosivity or reactivity (e.g. hydrogen (H_2), hydrocarbon gas, oxygen (O_2), carbon dioxide (CO_2), carbon monoxide (CO), ozone (O_3), chlorine (Cl_2) and chlorine dioxide (ClO_2), etc.) and for which due consideration of the hazard is required,

(4) "Dangerous liquid" means any liquid that is identified as hazardous in the Material Safety Data Sheet (*MSDS*) or other documentation relating to the liquid.

(5) "Hazardous area" means an area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatuses. When such a gas atmosphere is present, the following hazards may also be present: toxicity, asphyxia, corrosivity and reactivity. Hazardous area classification is to be in accordance with **4.2.3, Part H of the Rules for the Survey and Construction of Steel Ships**.

(6) "Non-hazardous area" means an area which is not a hazardous area as defined in **(5)** above.

Table 2.1.1-1 *BWMS* Technology Categorisation

BWMS technology category →		1	2	3a	3b	3c	4	5	6	7a	7b	8
Characteristics ↓		In-line UV or UV + Advanced Oxidation Technology (AOT) or UV + TiO2 or UV + Plasma	In-line flocculation	In-line membrane separation and de-oxygenation (injection of N2 from N2 generator)	In-line de-oxygenation (injection of inert gas from inert gas generator)	In-tank de-oxygenation with inert gas generator	In-line full-flow electrolysis	In-line side-stream electrolysis (2)	In-line (stored) chemical injection	In-line side-stream ozone injection without gas/liquid separation tank and without discharge treatment tank	In-line side-stream ozone injection with gas/liquid separation tank and discharge water treatment tank	In-tank pasteurisation and de-oxygenation with N2 generator
Des-infection when ballasting	Making use of active substance		X			In-tank technology: no treatment when ballasting or de-ballasting	X	X	X	X	X	In-tank technology: no treatment when ballasting or de-ballasting
	Full flow of ballast water is passing through the *BWMS*	X	X	X	X		X				X	
	Only a small part of ballast water is passing through the *BWMS* to generate the active substance							X				
After-treatment when de-ballasting	Full flow of ballast water is passing through the *BWMS*	X									X	
	Injection of neutraliser						X	X	X	X	X	
	Not required by the Type Approval Certificate issued by the Administration		X	X								
Examples of dangerous gas as defined in **2.1.1(3)**			(1)	O_2 N_2	CO_2 CO		H_2 Cl_2	H_2 Cl_2	(1)	O_2 O_3 N_2		O_2 N_2

Notes

1 To be investigated on a case-by-case basis based on the result of the *IMO (GESAMP) MEPC* report for basic and final approval.

2 In-line side-stream electrolysis may also be applied in-tank in the circulation mode (no treatment when ballasting or de-ballasting).

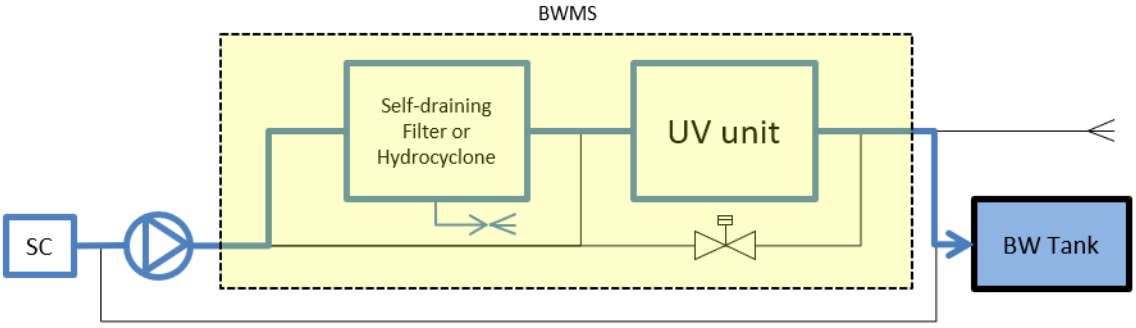
Table 2.1.1-2 Applicability of the Requirements for Each *BWMS* Technology

BWMS technology category →	1	2	3a	3b	3c	4	5	6	7a	7b	8
Requirements ↓	In-line UV or UV + Advanced Oxidation Technology (AOT) or UV + TiO2 or UV + Plasma	In-line flocculation	In-line membrane separation and de-oxygenation (injection of N_2 from N_2 generator)	In-line de-oxygenation (injection of inert gas from inert gas generator)	In-tank de-oxygenation with inert gas generator	In-line full-flow electrolysis	In-line side-stream electrolysis	In-line (stored) chemical injection	In-line side-stream ozone injection without gas/liquid separation tank and without discharge treatment tank	In-line side-stream ozone injection with gas/liquid separation tank and discharge water treatment tank	In-tank pasteurisation and de-oxygenation with N_2 generator
2.2.1	x	x	x	x	x	x	x	x	x	x	x
2.2.2			x	x	x						x
2.2.3-1 and **-2.**				x	x				x	x	
2.2.3-1 and **-3 to -6**						x	x	x			
2.2.3-7 and **-8**	x	x	x	x		x	x	x	x	x	
2.2.3-9 to **-14**	x	x	x	x	x	x	x	x	x	x	x
2.2.3-15 to **2.2.3-17**	x	x	x	x		x	x	x	x	x	
2.2.4-1(1)		x	x			x	x	x	x	x	x
2.2.4-1(2)			x	x	x				x	x	x
2.2.4-1(3)									x	x	
2.2.4-1(4)						x	x	x	x	x	
2.2.4-1(5)						x	x	x			
2.2.4-1(6)			x	x	x				x	x	x
2.2.4-2(1) to **(7)**		x	x	x	x	x	x	x	x	x	x
2.2.4-2(8)			x			x	x	x	x	x	x
2.2.4-2(9) and **(11)**			x			x	x	x	x	x	x
2.2.4-2(10)			x						x	x	x
2.2.4-3		x				x	x	x	x	x	
2.2.4-4						x	x	x	x	x	
2.2.5				x						x	

Fig. 2.1.1-1 Supplemental *BWMS* Technology Information

Fig. 2.1.1-1(1) *BWMS* Technology Group 1:
In-line UV, UV + AOT, UV+TiO_2 or UV+Plasma

Ballasting operation:



De-ballasting operation:

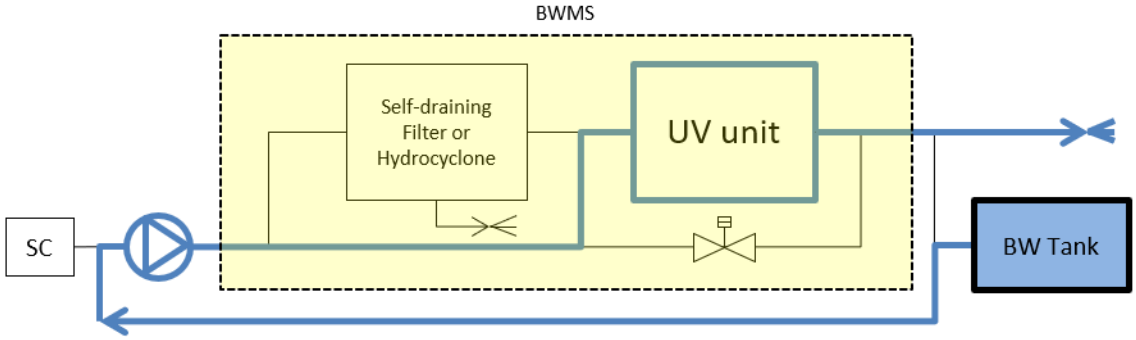
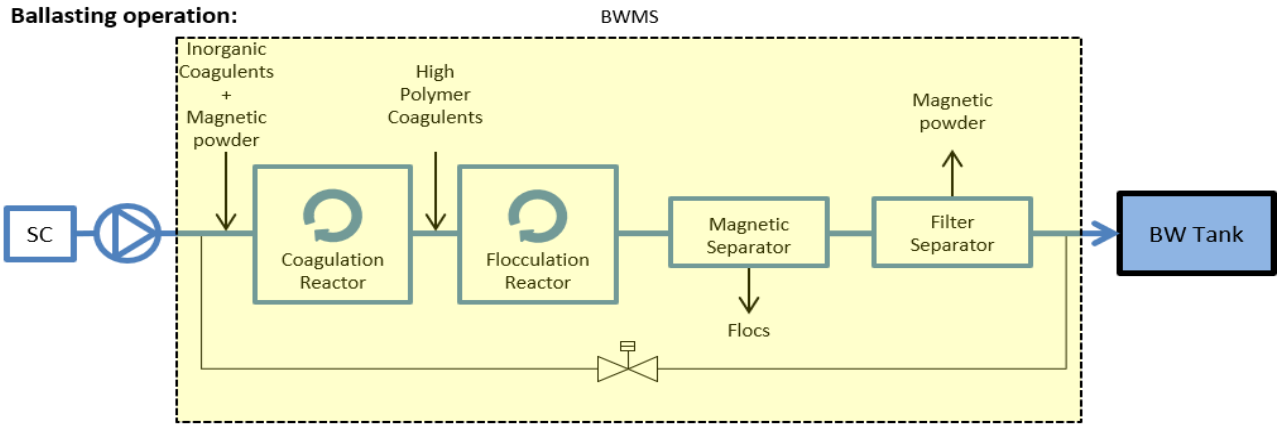


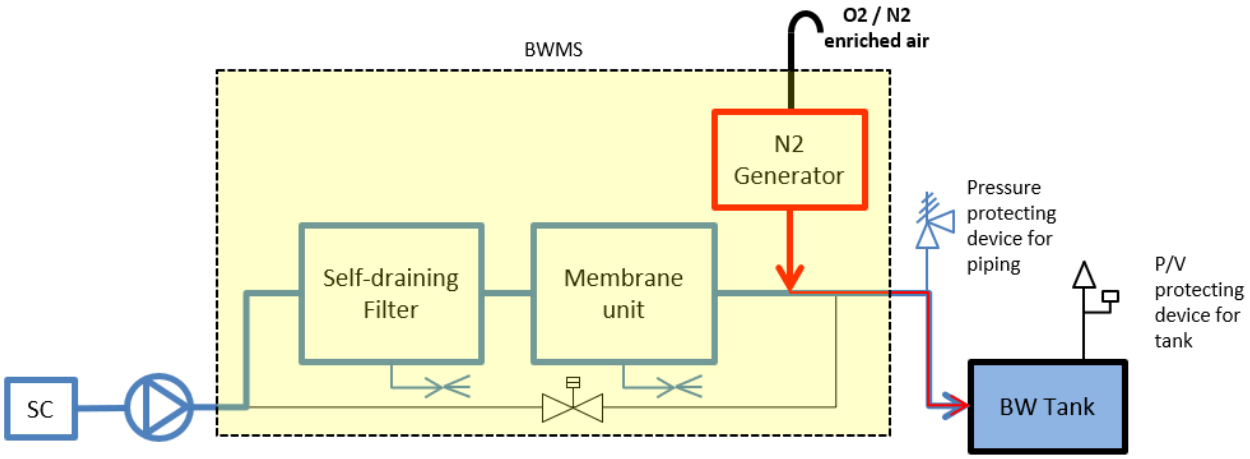
Fig. 2.1.1-1(2) *BWMS* Technology Group. 2:
In-line Flocculation



De-ballasting operation: no requirement for after-treatment

Fig. 2.1.1-1(3) *BWMS* Technology Group 3a:
In-line Membrane Separation and De-oxygenation (Injection of N_2 from N_2 Generator)

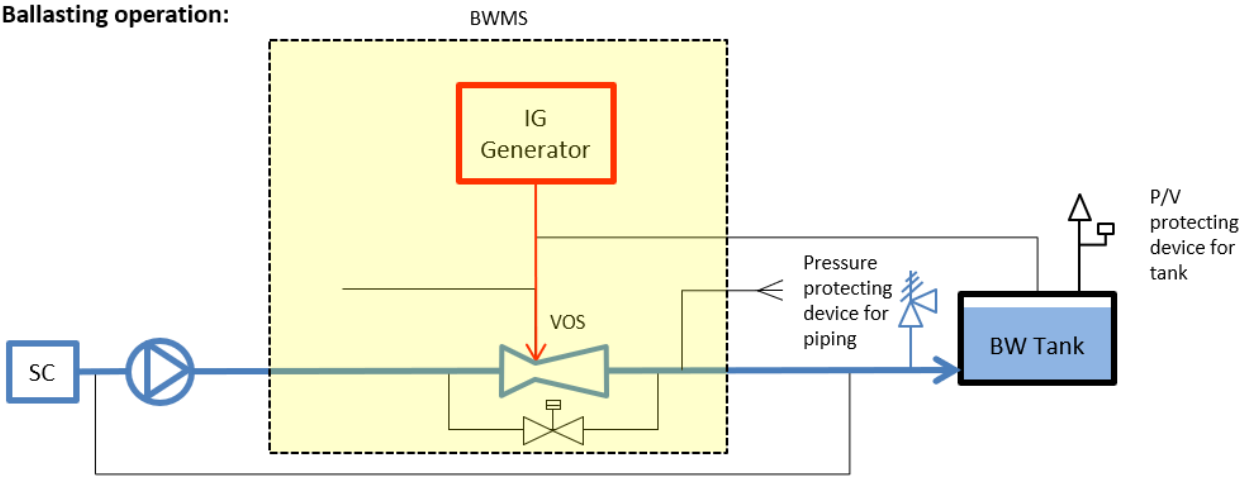
Ballasting operation:



De-ballasting operation: no requirement for after-treatment

Fig. 2.1.1-1(4) *BWMS* Technology Group 3b:
In-line De-oxygenation (Injection of Inert Gas from either an Oil-fired Inert Gas Generator or Inert Gas from Treatment of the Flue Gas from Main or Auxiliary Boilers)

Ballasting operation:



De-ballasting operation:

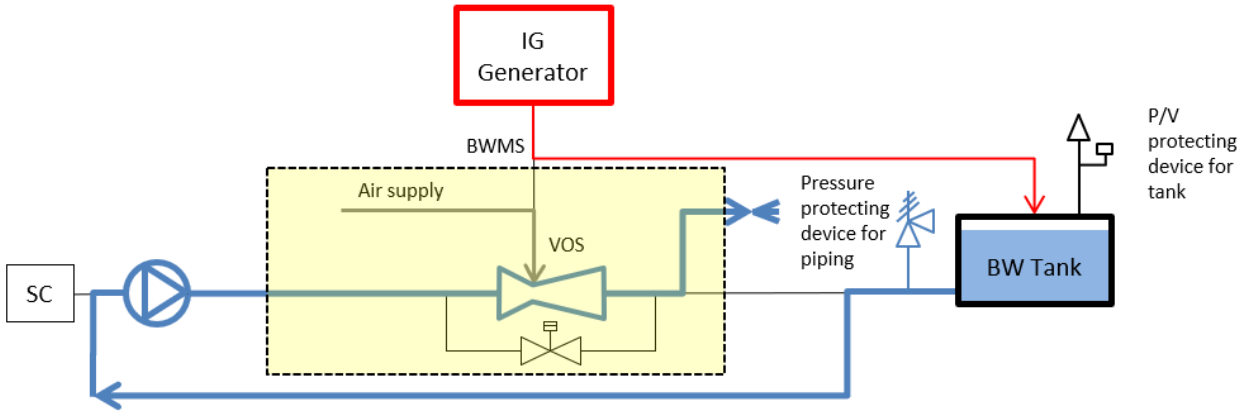


Fig. 2.1.1-1(5) *BWMS* Technology Group 3c:
In-tank De-oxygenation with IGG

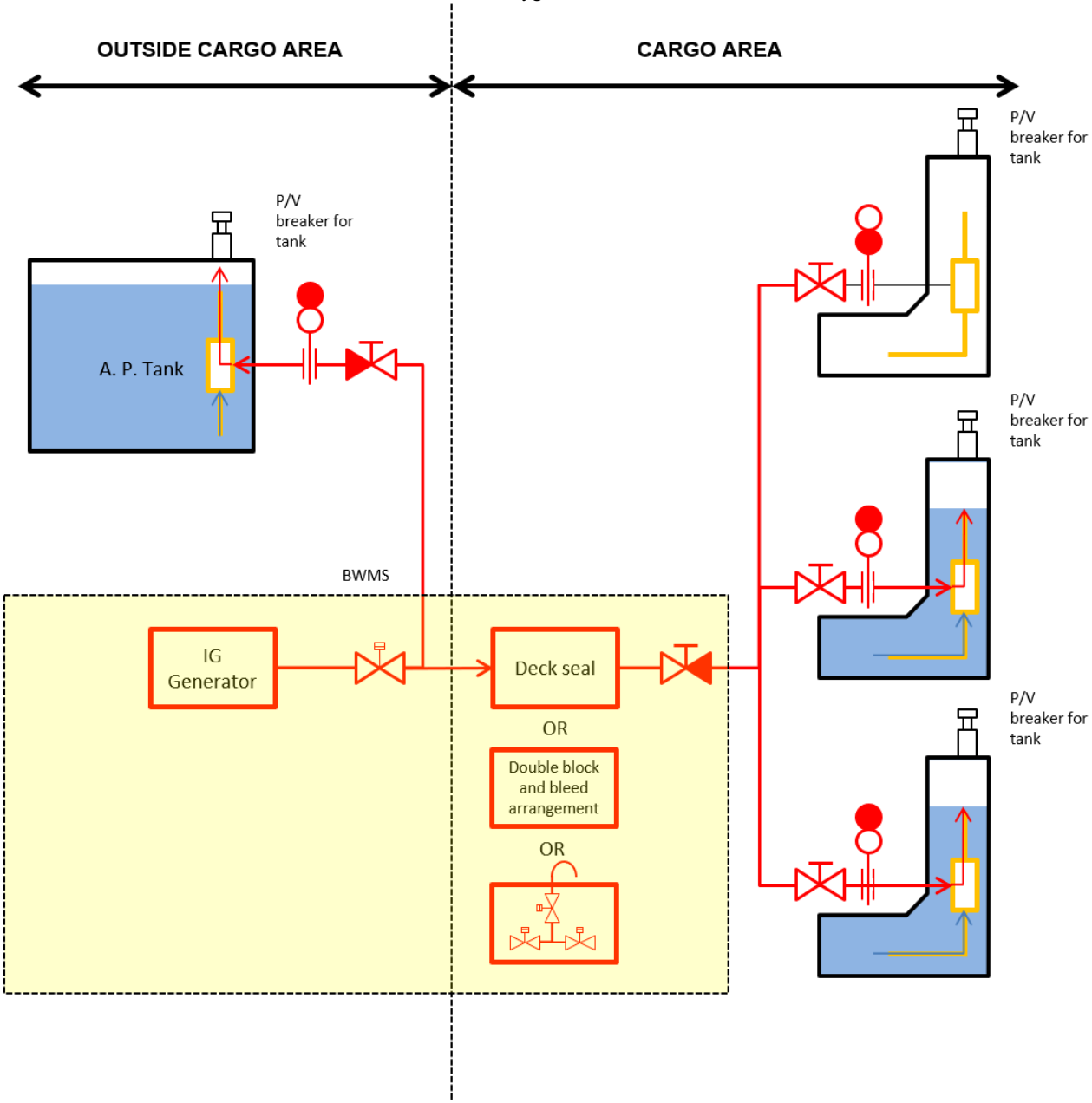
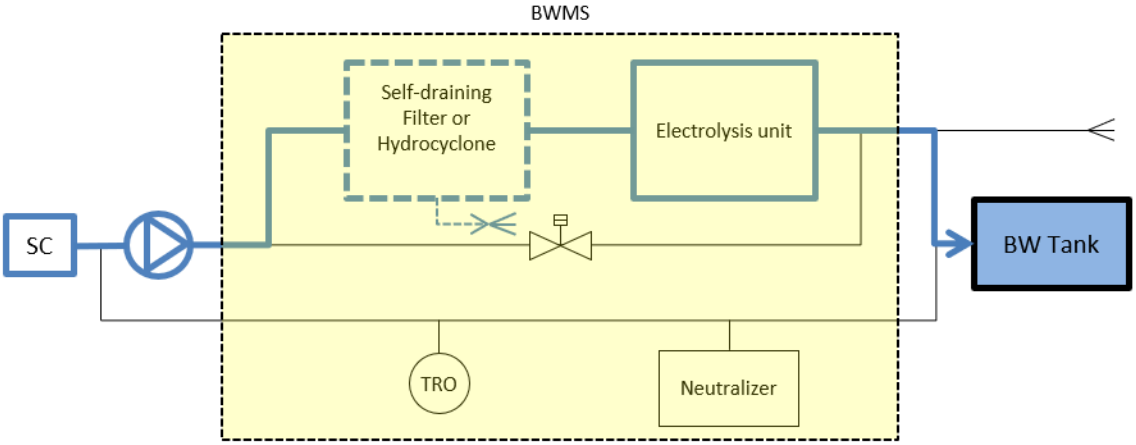


Fig. 2.1.1-1(6) *BWMS* Technology Group 4:
In-tank De-oxygenation with IGG

Ballasting operation:



De-ballasting operation:

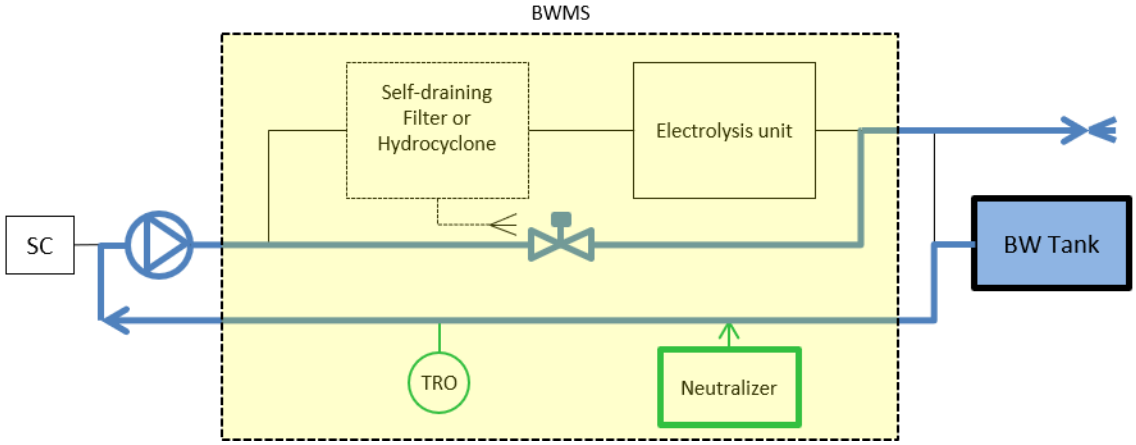
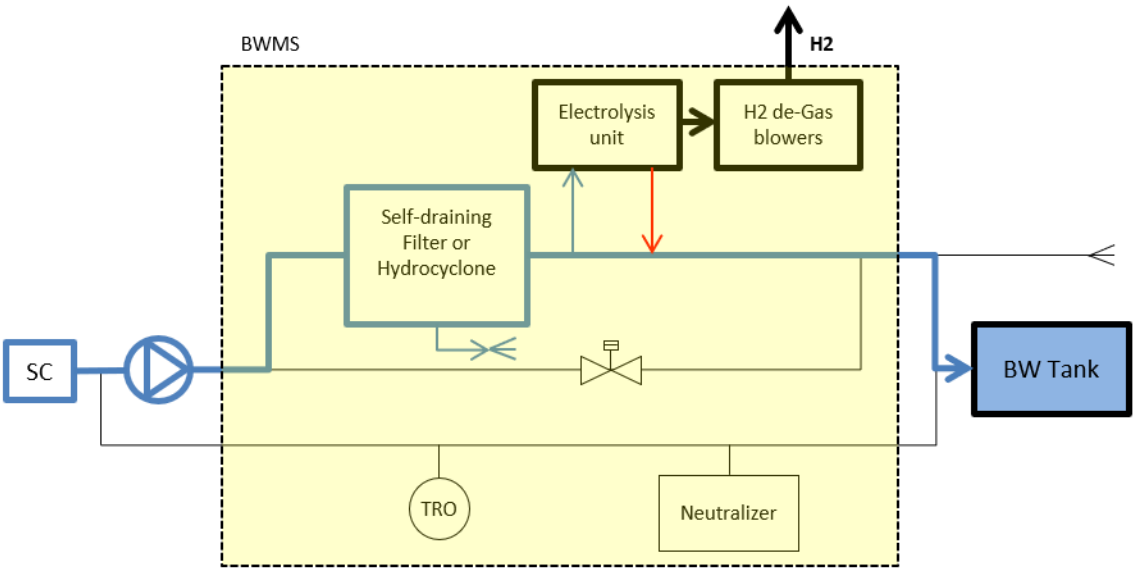


Fig. 2.1.1-1(7) *BWMS* Technology Group 5:
In-line Side-stream Electrolysis (Electro-chlorinisation)

Note: In-line side-stream electrolysis may also be applied in-tank in the circulation mode (no treatment when ballasting or de-ballasting)

Ballasting operation:



De-ballasting operation:

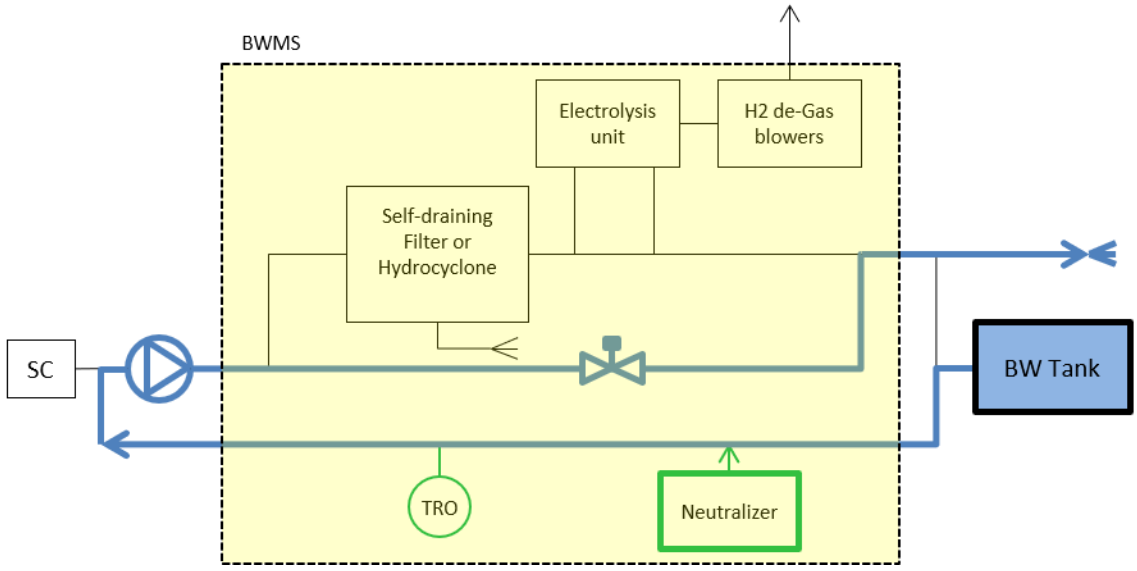
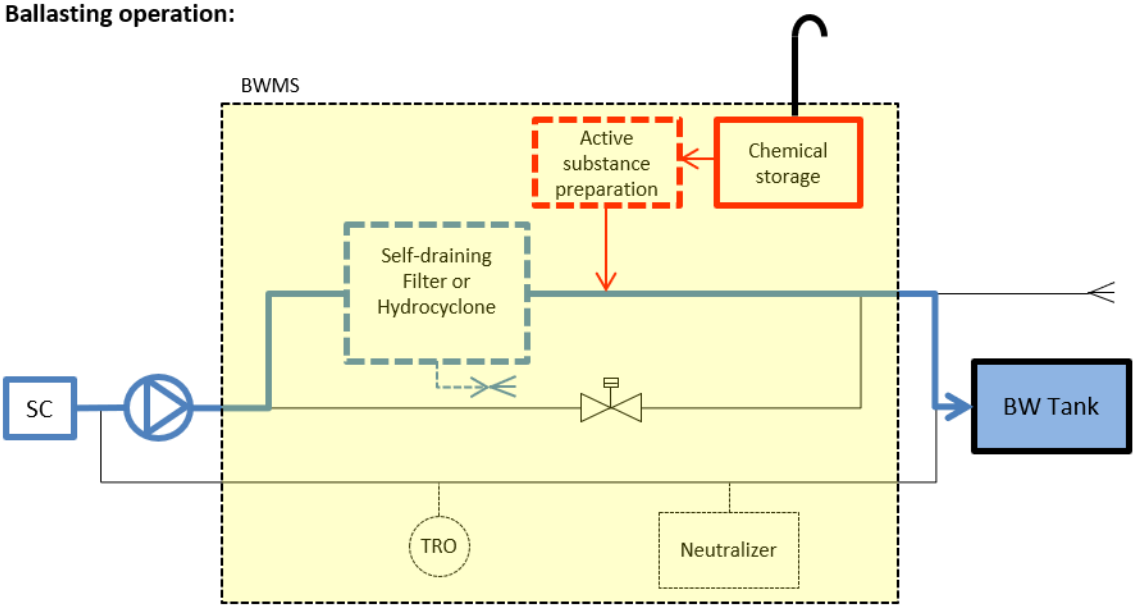


Fig. 2.1.1-1(8) *BWMS* Technology Group 6:
In-line Chemical Injection

Ballasting operation:



De-ballasting operation (when netralization is required by the Type Approval certificate):

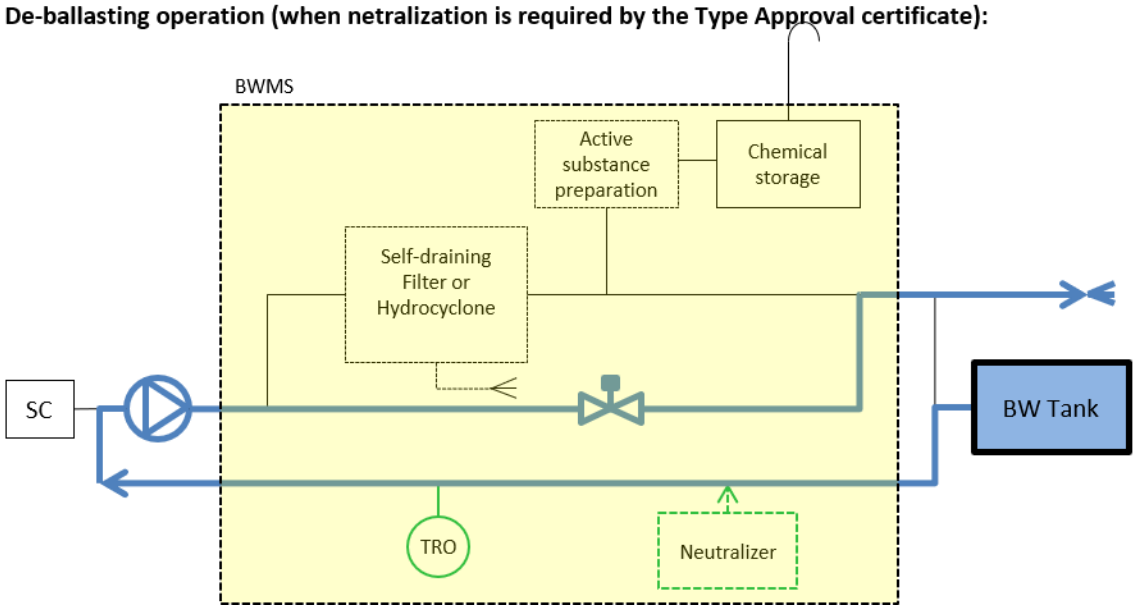


Fig. 2.1.1-1(9) *BWMS* Technology Group 7a:
In-line Side-stream Ozone Injection
without Gas/Liquid Separation Tank and Discharge Water Treatment Tank

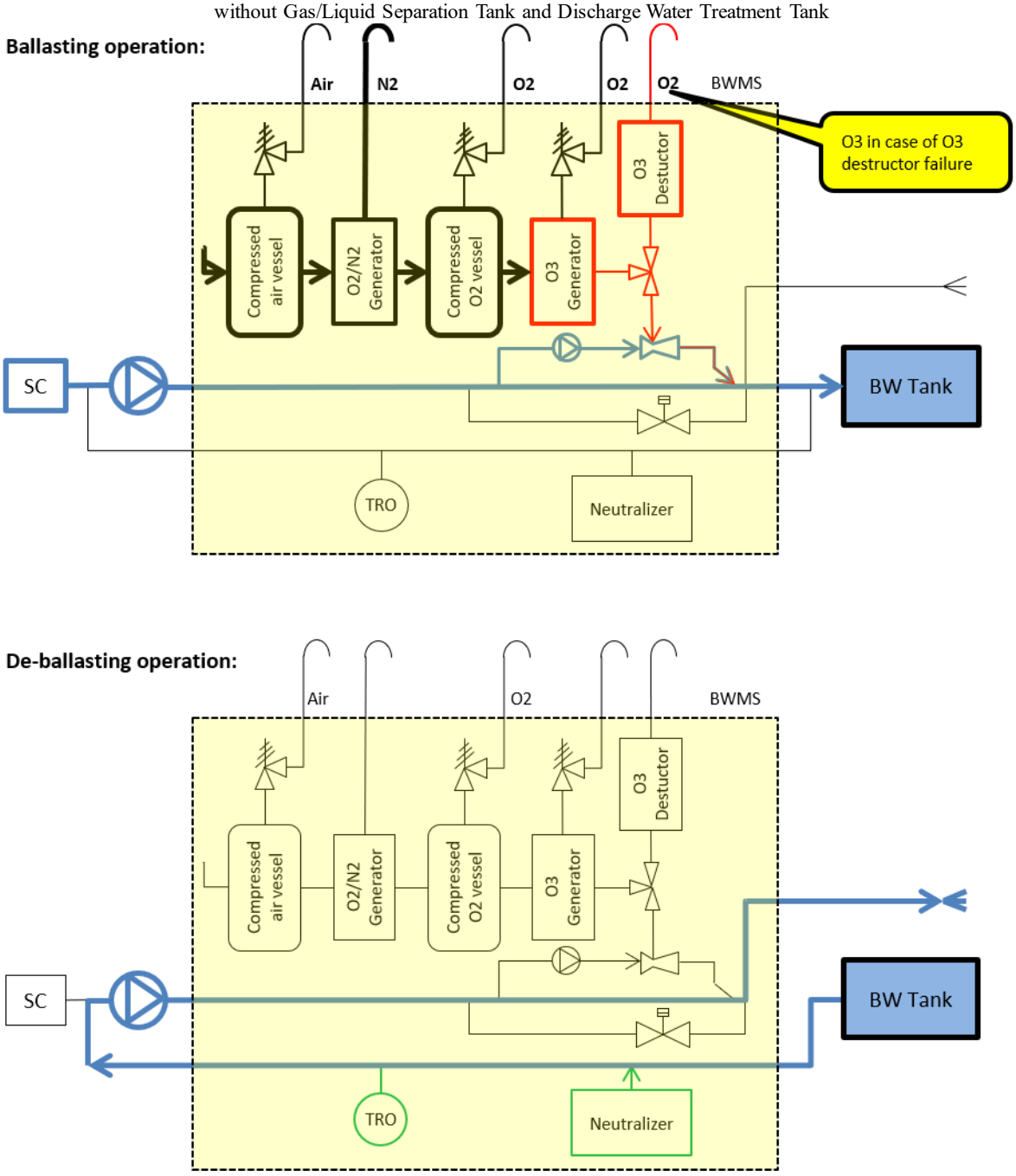


Fig. 2.1.1-1(10) *BWMS* Technology Group 7b:
In-line Side-stream Ozone Injection
with Gas/Liquid Separation Tank and Discharge Water Treatment Tank

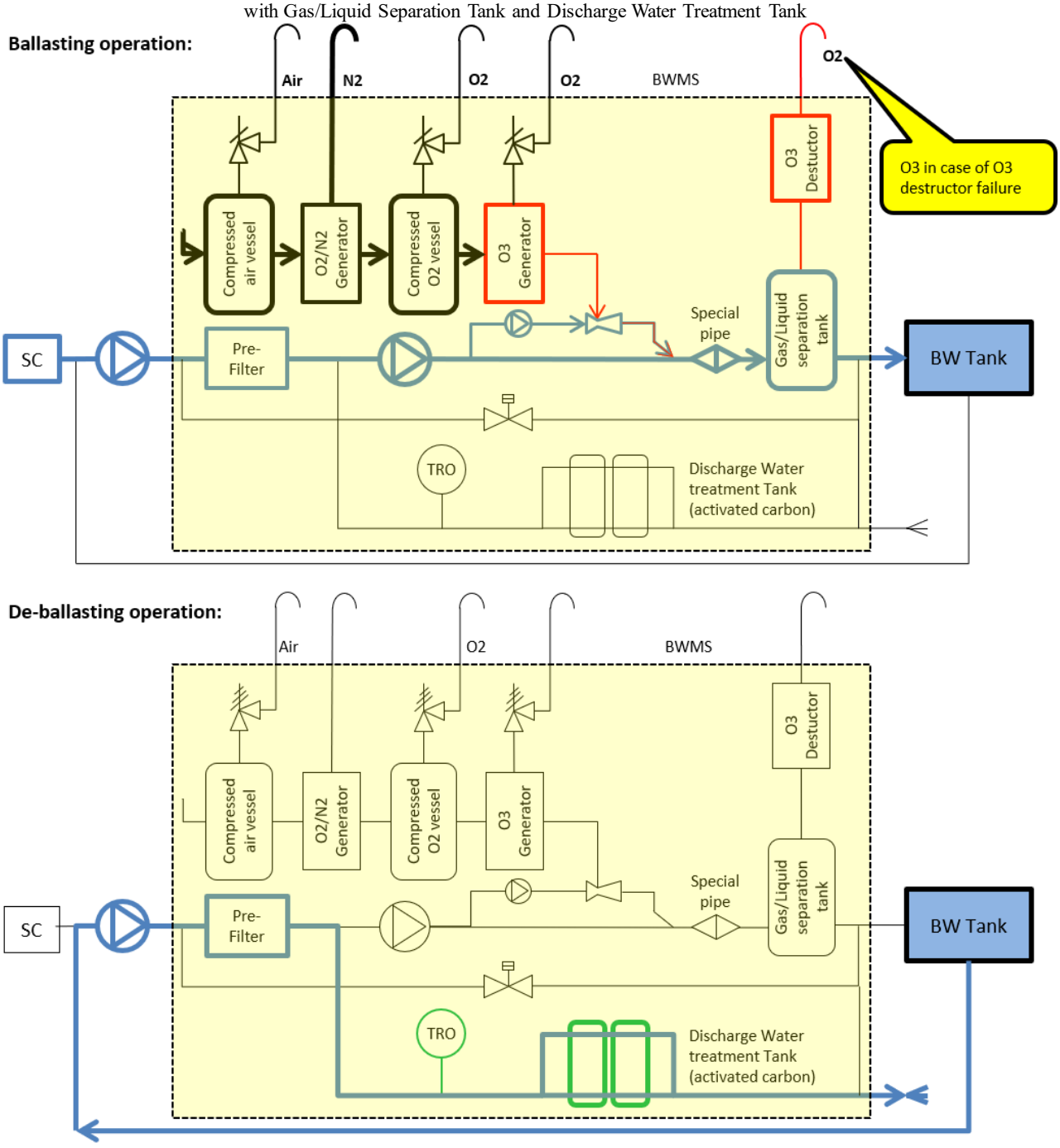
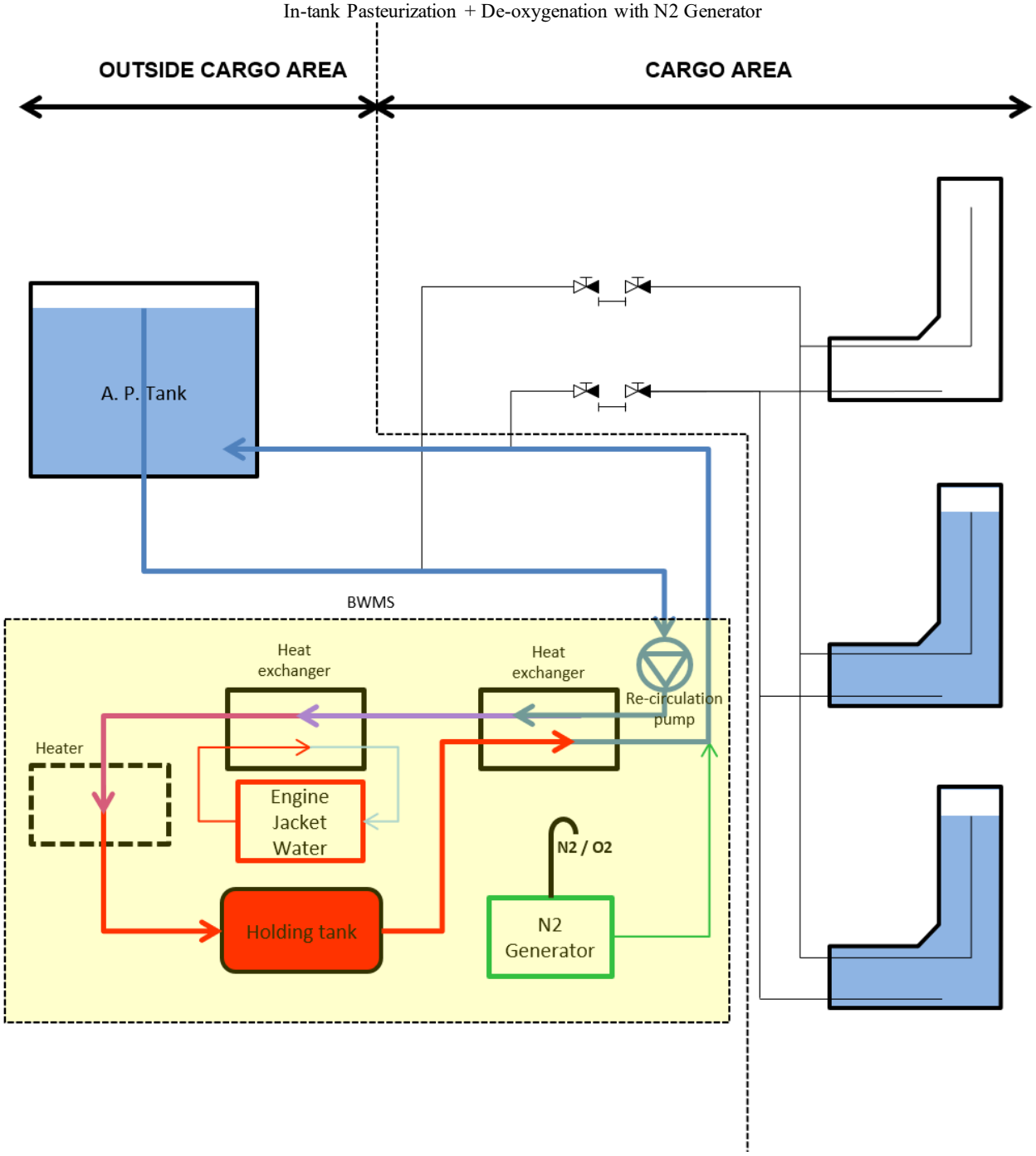


Fig. 2.1.1-1(11) *BWMS* Technology Group 8:
In-tank Pasteurization + De-oxygenation with N2 Generator



2.2 Installation

2.2.1 General Requirements

1 Valves, piping fittings and flanges are to comply with the relevant requirements of **the Rules for the Survey and Construction of Steel Ships**.

2 *BWMS* are to be provided with by-pass or override arrangements to effectively isolate them from essential ship systems to which they are connected.

3 For new installation or retrofit installation on existing ships, generating plant capacity sufficiency is to be verified by electrical load analysis under the normal operating conditions of ballasting and de-ballasting given in the Ballast Water Management Plan.

4 For retrofit installation on exiting ships, a revised electrical load analysis with preferential trips of non-essential services may be accepted.

5 *BWMS* are to be operated in accordance with the requirements specified in their Type Approval Certificates. *BWMS* are to be operated within their Treatment Rated Capacity (*TRC*) as per their Type Approval Certificate. This may require the limiting of ship ballast pump flowrates in some cases.

6 Arrangements of *BWMS* bypasses or overrides are to be consistent with type-approved operations, maintenance and safety manuals.

7 In cases where maximum ballast pump capacity exceeds the maximum *BWMS* Treatment Rated Capacity (*TRC*) specified on Type Approval Certificates, the limitations specified in Ballast Water Management Plans for ballast pump operation maximum allowable flow rates are not to exceed the maximum *BWMS TRC*.

8 *BWMS* are subject to design reviews by the Society to verify the compliance of their *BWMS* manufacturer packages with relevant requirements in the Rules. *BWMS* manufacturers *BWMS* may apply such design reviews as part of the type approval process.

9 In general, *BWMS* monitoring functions of *BWMS* belong to system category I when applying **Part X of the Rules for the Survey and Construction of Steel Ships**. However, in cases where by-pass valves are integrated into valve remote control systems, such by-pass valves belong to the system category II for ballast transfer remote control systems.

10 *BWMS* components (including pressure vessels, group I or II piping, filters, switchboards, etc.) are required to be inspected and certified by the Society at manufacturers.

11 Electrical installations are not to be installed in hazardous areas unless they are of certified safe types for use in such areas. Cable penetrations of decks and bulkheads are to be sealed when pressure differences between such areas are to be maintained.

12 *BWMS* automatic shut-downs required for safety reasons are to be initiated by safety systems independent of *BWMS* control systems.

13 The wording “discharging safe location” in this chapter means the following **(1)** to **(8)**.

(1) Inert gas or nitrogen-product-enriched air from “protection devices for ballast tanks, nitrogen gas generators, inert gas generators and nitrogen buffer tanks (i.e. *BWMS* categories 3a, 3b, 3c and 8)” or “oxygen generators (i.e. *BWMS* categories 7a and 7b)” is to be discharged at safe locations on open decks that satisfy the following **(a)** and **(b)**.

(a) Locations not within 3 *m* of areas traversed by personnel.

(b) Locations not within 6 *m* of machinery (engines and boilers) air intakes and ventilation inlets or outlets.

(2) Oxygen-enriched air from “nitrogen generator (i.e. *BWMS* categories 3a and 8)” or “ protection devices or vents for oxygen generators, compressed oxygen vessels, the ozone generators and ozone destructor devices (i.e. *BWMS* categories 7a and 7b)” is to be discharged at safe locations on open decks that satisfy the following **(a)** to **(d)**.

(a) Locations outside of hazardous areas.

(b) Locations not within 3 *m* of ignition sources as well as deck machinery (e.g. anchor windlasses, chain locker openings, etc.) and other equipment which may constitute an ignition hazard.

(c) Locations not within 3 *m* of areas traversed by personnel.

(d) Locations not within 6 *m* of machinery (engines and boilers), and ventilation inlets or outlets.

(3) The discharging safe locations described in **(1)** and **(2)** above are to satisfy the following **(a)** and **(b)**.

(a) The specific type of discharge is indicated.

(b) Signboards or similar warnings are provided.

(4) Hydrogen by-product enriched gas from “hydrogen de-gassing arrangements (i.e. *BWMS* categories 4, 5 and 6)” is to be

discharged to safe locations on open decks that satisfy the following **(a)** to **(c)**.

(a) Locations not within 5 *m* of ignition sources as well as deck machinery (e.g. anchor windlasses, chain locker openings, etc.) and other equipment which may constitute an ignition hazard.

(b) Locations not within 3 *m* of areas traversed by personnel.

(c) Locations not within 5 *m* of air intakes from non-hazardous enclosed spaces.

(5) Areas within 3 *m* of the outlets for the hydrogen by-product enriched gas referred to in **(4)** above are to be categorised as hazardous areas zone 1. In addition, an additional 1.5 *m* surrounding said 3 *m* hazardous area zone 1 is to be categorised as hazardous areas zone 2.

(6) Electrical apparatuses located in the hazardous areas zone 1 and zone 2 referred to in **(5)** above are to be suitable for at least *IICT*1.

(7) Air from O_3 destructor device (ODS) (i.e. *BWMS* categories 7a and 7b) vent outlets may be considered as oxygen-enriched air when it satisfies the following **(a)** to **(c)**. This means the discharging safe locations for such air are to be as given in **(2)** above.

(a) ODS redundancy is provided

(b) Manufacturers have justified that the quantities of consumables (activated carbon) used by the ODS are sufficient for the *BWMS* life cycle.

(c) Zone detection systems are arranged in the vicinities of the discharge outlet for ODS vent outlets and such systems alarm the crew in the case of ODS failure.

(8) If one of conditions described in **(7)(a)** to **(c)** above is not fulfilled, the discharging safe locations for ODS on open decks are to satisfy the following **(a)** to **(d)**.

(a) They are to be outside of hazardous areas.

(b) They are to be not within 3 *m* of ignition sources.

(c) They are not to be within 6 *m* of areas traversed by personnel.

(d) They are not to be within 6 *m* of machinery (engines and boilers) air intakes, and ventilation inlets or outlets

2.2.2 Requirements for *BWMS* Categories 3a, 3b, 3c and 8

1 Where a vacuum or overpressure may occur in ballast piping due to height differences, injections of inert gas or injections of nitrogen (N_2), suitable protection devices (e.g. P/V valves, P/V breakers, P/V breather valves, pressure safety relief valves or high/low pressure alarms) are to be provided. The pressure and vacuum settings of such devices are to not exceed ballast piping (i.e. *BWMS* categories 3a and 3b) or ballast tank (i.e. *BWMS* categories 3a, 3b and 3c) design pressures.

2 For *BWMS* categories 3a, 3b and 3c, the inert gas or nitrogen-product-enriched air from inert gas systems and from protection devices provided for ballast tanks (e.g. P/V valves, P/V breakers or P/V breather valves) is to be discharged to the safe locations on open decks specified in **2.2.1-13(1)** and **(2)**.

3 When ballast tanks are in hazardous areas, open deck areas or semi-enclosed spaces on open decks within 1.5 *m* of protection device outlets are to be categorised as hazardous area zone 1, and an additional 1.5 *m* surrounding said 1.5 *m* hazardous area zone 1 is to be categorised as hazardous area zone 2. Furthermore, ignition sources (e.g. anchor windlasses, chain locker openings, etc.) are to be located outside such hazardous areas.

4 Hazardous areas, acceptable electrical equipment and ventilation system designs are to satisfy relevant requirements in **Part H of the Rules for the Survey and Construction of Steel Ships**.

5 Inert gas based *BWMS* are to satisfy the following requirements described in **Chapter 35, Part R of the Rules for the Survey and Construction of Steel Ships**.

(1) **35.2.1(2)**, **35.2.1(3)**, **35.2.2-1(3)**, **35.2.2-1(4)**, **35.2.2-2(1)**, **35.2.2-2(2)**, **35.2.2-2(3)**, **35.2.2-2(6)**, **35.2.2-4(1)**, **35.2.2-4(2)**, **35.2.2-4(3)**, **35.2.2-4(4)**, **35.2.2-4(5)** (except **35.2.2-4(5)(a)iii)** and **35.2.2-4(5)(c)**), **35.2.3(1)(a)ii)**, **35.2.3(1)(b)**, **35.2.3(1)(d)ii)**, **35.2.3(1)(e)**, **35.2.3(1)(f)**, **35.2.3(2)** (except **35.2.3(2)(b)i)**), **35.2.4(1)(a)**, **35.2.4(1)(b)**, **35.2.4(1)(g)**, **35.2.4(1)(h)**, **35.2.4(1)(i)**, **35.2.4(1)(j)** and **35.2.4(2)**.

(2) In addition to **(1)** above, inert gas systems installed for in-tank de-oxygenation *BWMS* (i.e. category 8) are to satisfy **35.2.2-3(1)** and **35.2.2-3(2)** (except **35.2.2-3(2)(f)**, **35.2.2-3(2)(g)** and **35.2.2-3(2)(j)**).

6 In general, when applying **Chapter 35, Part R of the Rules for the Survey and Construction of Steel Ships** to inert gas based *BWMS*, relevant requirements may be correspondingly applied as follows.

(1) The terms “cargo tank” and “cargo piping” are to be replaced by “ballast water tank” or “ballast water piping”.

(2) The term "cargo control room" is to be replaced by "*BWMS* control station".

(3) Requirements for slop tanks on combination carriers are to be disregarded.

(4) When applying **35.2.2-4(5)(a)i), Part R of the Rules for the Survey and Construction of Steel Ships**, the acceptable oxygen content is to be specified by the manufacturer regardless of the requirement.

2.2.3 Requirements for Tankers

1 Hazardous area classification is to be in accordance with **Part H of the Rules for the Survey and Construction of Steel Ships**.

2 *BWMS* categories 3b, 3c, 7a and 7b are to be located outside cargo areas in accordance with **35.2.3(1)(a)ii), Part R of the Rules for the Survey and Construction of Steel Ships**.

3 *BWMS* categories 4, 5 and 6 may be located inside hazardous areas with due consideration given to **2.2.1-11**. However, *BWMS* are not to be located inside cargo pump rooms unless it is demonstrated the implementation of measures recommended by *BWMS* manufacturers with respect to the additional hazards that may be expected from dangerous liquids and dangerous gases stored or generated in such rooms does not lead to the following **(1)** to **(5)**.

(1) An upgrading of the hazardous area categorisation of the cargo pump room.

(2) A reaction with the cargo vapours expected to be present in the cargo pump room.

(3) A reaction with the fire-extinguishing medium provided inside the cargo pump room.

(4) An impacting of the performance of existing fire-fighting systems provided inside the cargo pump room

(5) An introducing of additional hazards (e.g. toxicity hazards) inside the cargo pump room not present prior to the implementation of such measures.

4 *BWMS* category 4 may be acceptable in cargo compressor rooms of liquefied gas carriers and inside cargo pump rooms of oil tankers or chemical tankers when such rooms are located above cargo tank decks.

5 For submerged cargo pumps, rooms containing hydraulic power units or electric motors are not considered to be "cargo pump rooms".

6 Ballast pump rooms and other pump rooms not containing cargo pumps are not considered to be "cargo pump rooms".

7 In general, two independent *BWMS* are required (e.g. one for ballast tanks located within cargo areas and one for ballast tanks located outside cargo areas). Specific arrangements where only one in-line *BWMS* may be accepted are given in **Table 2.2.3-1** and **Fig. 2.2.3-3**.

8 When fore peak tanks are ballasted with piping systems serving other ballast tanks within cargo areas in accordance with **D14.3.2, Part D of the Guidance for the Survey and Construction of Steel Ships**, the fore peak tank ballast water is to be processed by the same *BWMS* processing the ballast water of the other ballast tanks within the cargo area.

9 Isolation between ballast piping serving ballast tanks inside and outside of cargo areas is to be in accordance with the following **(1)** and **(2)**.

(1) Interconnections between ballast piping serving ballast tanks located within cargo areas and ballast piping serving ballast tanks located outside cargo areas may be accepted when appropriate isolation arrangements are provided in accordance with **Table 2.2.3-1** and **Fig. 2.2.3-3**.

(2) The appropriate isolation arrangements described in **(1)** above are necessary for such interconnections regardless of piping diameters.

10 The appropriate isolation arrangements described in **-9** above are to be one of following **(1)** to **(3)**. For *BWMS* categories 2, 3a, 4 and 9, only the following **(1)** is acceptable.

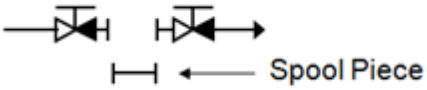
(1) Two non-return valves with positive means of closing in series with spool pieces (**Fig. 2.2.3-1(1)**). As an alternative to such positive means of closing, additional valves having such means of closing may be provided between non-return valves and spool pieces.

(2) Two non-return valves with positive means of closing in series with liquid seals at least 1.5 *m* in depth (**Fig. 2.2.3-1(2)**). As an alternative to such positive means of closing, additional valves having such means of closing may be provided between non-return valves and liquid seals. For ships operating in cold weather conditions, freeze protection is to be provided for water seals (portable heating systems may be accepted for this purpose).

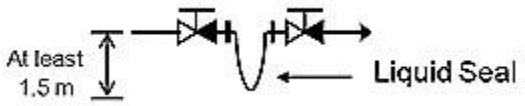
(3) Automatic double block and bleed valves and non-return valves with positive means of closing (**Fig. 2.2.3-1(3)**). As an alternative to such positive means of closing, additional valves having such means of closing may be provided after non-return valves.

Fig. 2.2.3-1 Means of appropriate isolation

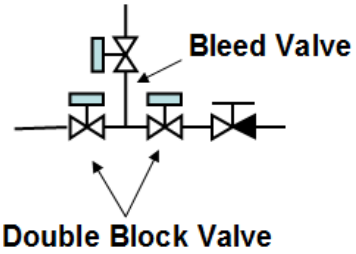
(1)



(2)



(3)



11 The appropriate isolation arrangements described in **-9** and **-10** above are to be provided on open decks in cargo areas.

12 When fore peak tanks are ballasted with piping systems serving other ballast tanks within cargo areas in accordance with **D14.3.2, Part D of the Guidance for the Survey and Construction of Steel Ships**, the appropriate isolation arrangements described in **-9** and **-10** above are not required between fore peak tanks and common ballast water piping serving the other ballast tanks within the cargo area.

13 As indicated in **Table 2.2.3-1** and **Fig. 2.2.3-3**, the appropriate isolation arrangements described in **-9** and **-10** above are necessary for interconnections in *BWMS* piping such as N_2 gas piping, inert gas piping, neutraliser piping, freshwater piping for filter cleaning, compressed air piping for remaining water purge and sea water piping for adjusting the salinity, etc.

14 Notwithstanding **-13** above, alternative means of isolation may be considered by the Society for the active substance piping and neutraliser piping with diameters not exceeding 50.8 *mm*.

15 Sampling lines connected to the ballast water piping systems serving tanks in cargo areas are to satisfied the following **-16** for the purpose of the following **(1)** and **(2)**.

(1) For any *BWMS* : ballast water sampling required by the G2 Guideline of the BWM Convention (2004)

(2) For *BWMS* technology categories 4, 5, 6, 7a and 7b: total residual oxidant (TRO) analysis in a closed loop system.

16 The "sampling lines" described in **-15** above are to satisfy the following **(1)** and **(2)**.

(1) Such lines are not to be led into non-hazardous enclosed spaces outside cargo areas.

(2) The appropriate isolation arrangements described in **-10** to **-14** above for interconnections need not be applied to such lines.

17 Notwithstanding **-16(1)** above, sampling lines may be led into non-hazardous enclosed spaces outside cargo areas provided they satisfy the following **(1)** to **(6)**. An example arrangement of sampling lines led into non-hazardous enclosed spaces outside cargo areas is provided in **Fig. 2.2.3-2**.

(1) Sampling facilities for *BWMS* monitoring and control are to be located within gas tight enclosures (hereinafter referred to as "cabinet") and to satisfy the following **(a)** to **(d)**.

(a) Stop valves are to be provided for each sampling line in the cabinet.

(b) Gas detection equipment is to be installed in the cabinet and the valves specified in **(a)** above are to automatically close upon activation of this gas detection equipment.

(c) Audible and visual alarm signals are to be activated both locally and at the *BWMS* control station when the concentration of explosive gases reaches a pre-set value, which is not to be higher than 30 % of the lower flammable limit (LFL). Upon alarm activation, electrical power to the cabinet is to be automatically disconnected. Notwithstanding this requirement, automatic disconnection of power supply is not required when the electrical equipment is of a certified safety type.

(d) Cabinets are to be vented to safe locations in non-hazardous areas on open decks and vents are to be fitted with flame arresters.

(2) Standard internal diameters of sampling pipes are to be the minimum necessary in order to achieve the functional requirements of the sampling system.

(3) Cabinets are to be installed as close as possible to bulkheads facing cargo areas, and sampling lines located outside cargo areas are to be as short as possible.

(4) Stop valves are to be located in non-hazardous enclosed spaces outside cargo areas for both suction and return lines close to penetrations through bulkheads facing cargo areas. Warning plates stating "Keep valve closed when not performing measurements" are to be posted near the valves. Furthermore, in order to prevent backflow, water seals or equivalent arrangements are to be installed on the hazardous area sides of return pipes.

(5) Stop valves are to be installed in cargo areas for each sampling line (i.e. both the suction and return lines).

(6) Samples which are extracted from ballast water piping systems serving tanks within cargo areas are not to be discharged to tank located outside cargo areas and are not to be discharged to piping lines supplying spaces located outside cargo areas.

Fig. 2.2.3-2 Example Arrangement of Sampling Lines Led into Non-Hazardous Enclosed Spaces outside Cargo Areas

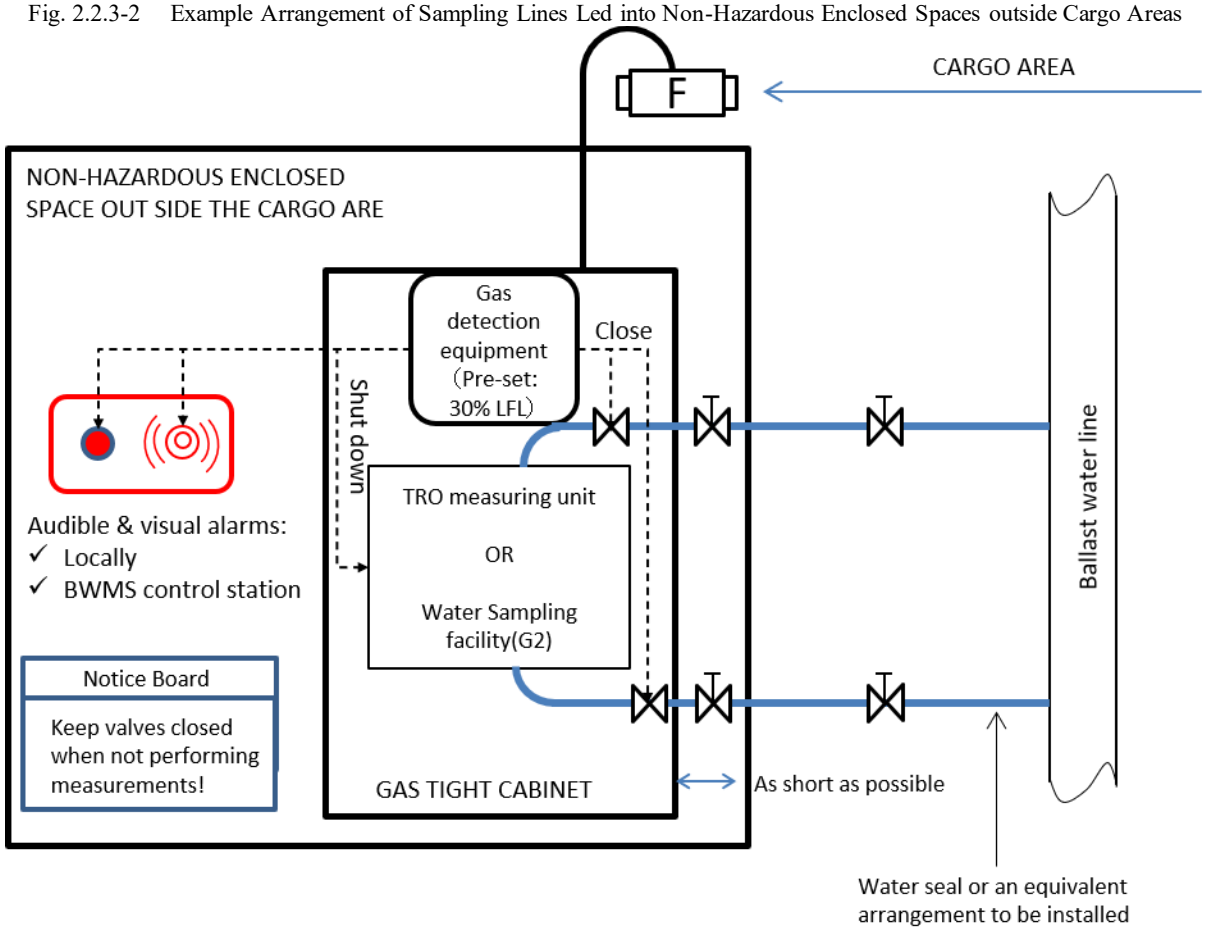


Table 2.2.3-1 In-line *BWMS* technology categorization

(Does not cover categories 3c and 8)

BWMS technology category → / Characteristics ↓		1	2	3a	3b	4	5	6	7a	7b
		In-line UV, UV with advanced oxidation technology (AOT), UV with TiO2 or UV with plasma	In-line flocculation	In-line membrane separation and de-oxygenation (injection of N2 from N2 generator)	In-line de-oxygenation (injection of inert gas from inert gas generator)	In-line full-flow electrolysis	In-line side-stream electrolysis (3)	In-line (stored) chemical injection	In-line side-stream ozone injection without gas/liquid separation tank and discharge water treatment tank	In-line side-stream ozone injection with gas/liquid separation tank and discharge water treatment tank
Disinfection when ballasting	Making use of active substance		X			X	X	X	X	X
	Full flow of ballast water is passing through the *BWMS*	X	X	X	X	X				X
	Only a small part of ballast water is passing through the *BWMS* to generate the active substance						X			
After-treatment when de-ballasting	Full flow of ballast water is passing through the *BWMS*	X								X
	Injection of neutraliser					X	X	X	X	X
	Not required by the Type Approval Certificate issued by the Administration		X	X						
Examples of dangerous gas as defined in **2.1.1(3)**			(1)	O_2 N_2	CO_2, CO	H_2, Cl_2	H_2, Cl_2	(1)	O_2, O_3, N_2	
Arrangement of one *BWMS*	*BWMS* is located outside cargo area	NA	**Fig.2.2.3-3(2)** (2)	**Fig.2.2.3-3(2)** (2)	**Fig.2.2.3-3(3)**	**Fig.2.2.3-3(4)** (2)	**Fig.2.2.3-3(5)**	**Fig.2.2.3-3(6)**	**Fig.2.2.3-3(7)**	**Fig.2.2.3-3(8)** (2)

Notes

1 To be investigated on a case-by-case basis based on the result of the *IMO (GESAMP) MEPC* report for basic and final approval in accordance with the G9 Guideline.

2 Isolation arrangements between ballast piping serving ballast tanks located within cargo areas and ballast piping serving ballast tanks located outside cargo areas are only subject to **2.2.3-10(1)**.

Fig. 2.2.3-3 Arrangements with only one in-line *BWMS*

Fig. 2.2.3-3(1) Explanation of symbols used in figure

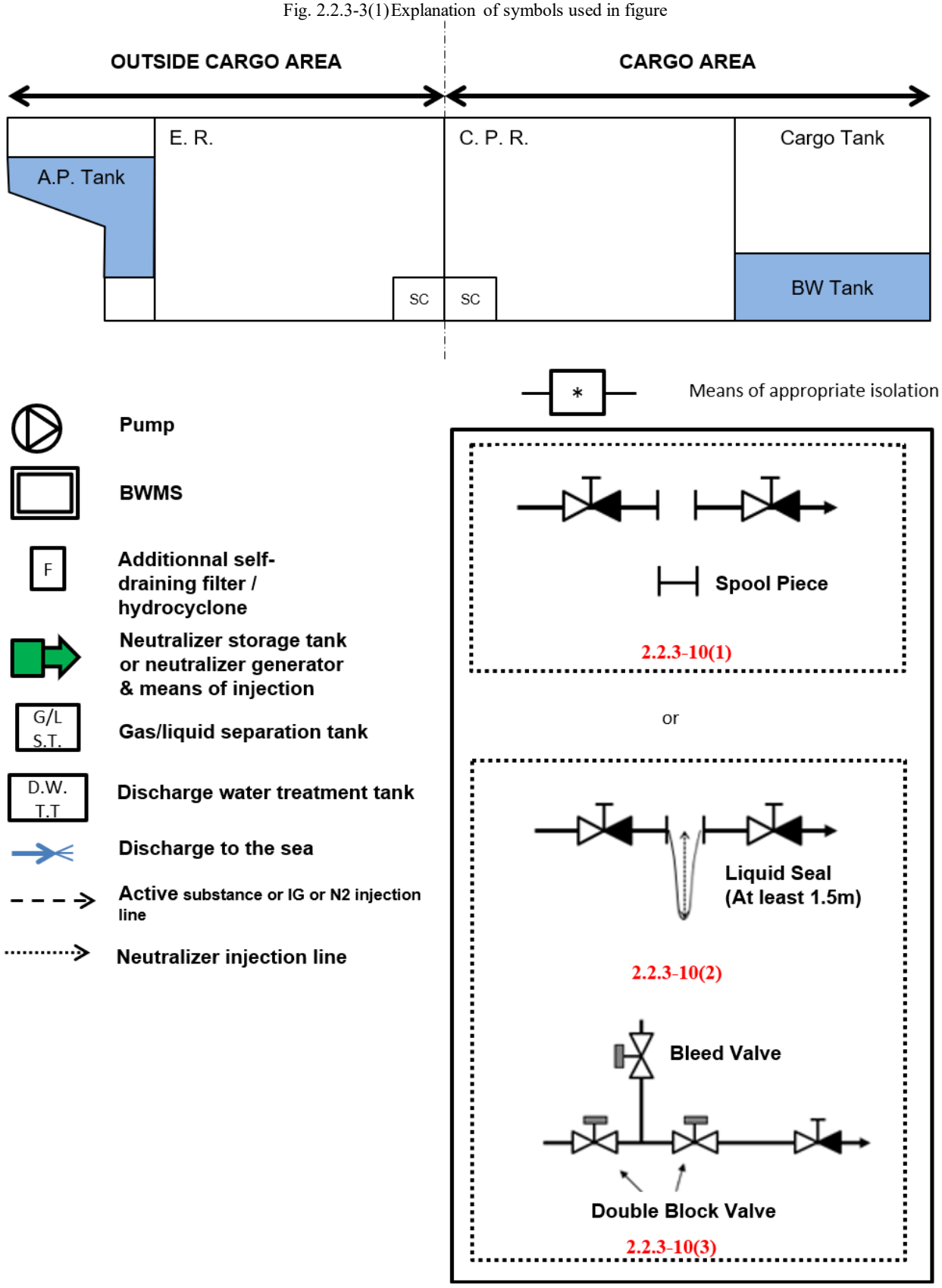


Fig. 2.2.3-3(2) *BWMS* installation (categories 2 and 3a)

Category 2: In-line flocculation

Category 3a: In-line membrane separation and de-oxygenation (injection of N_2 from N_2 generator)

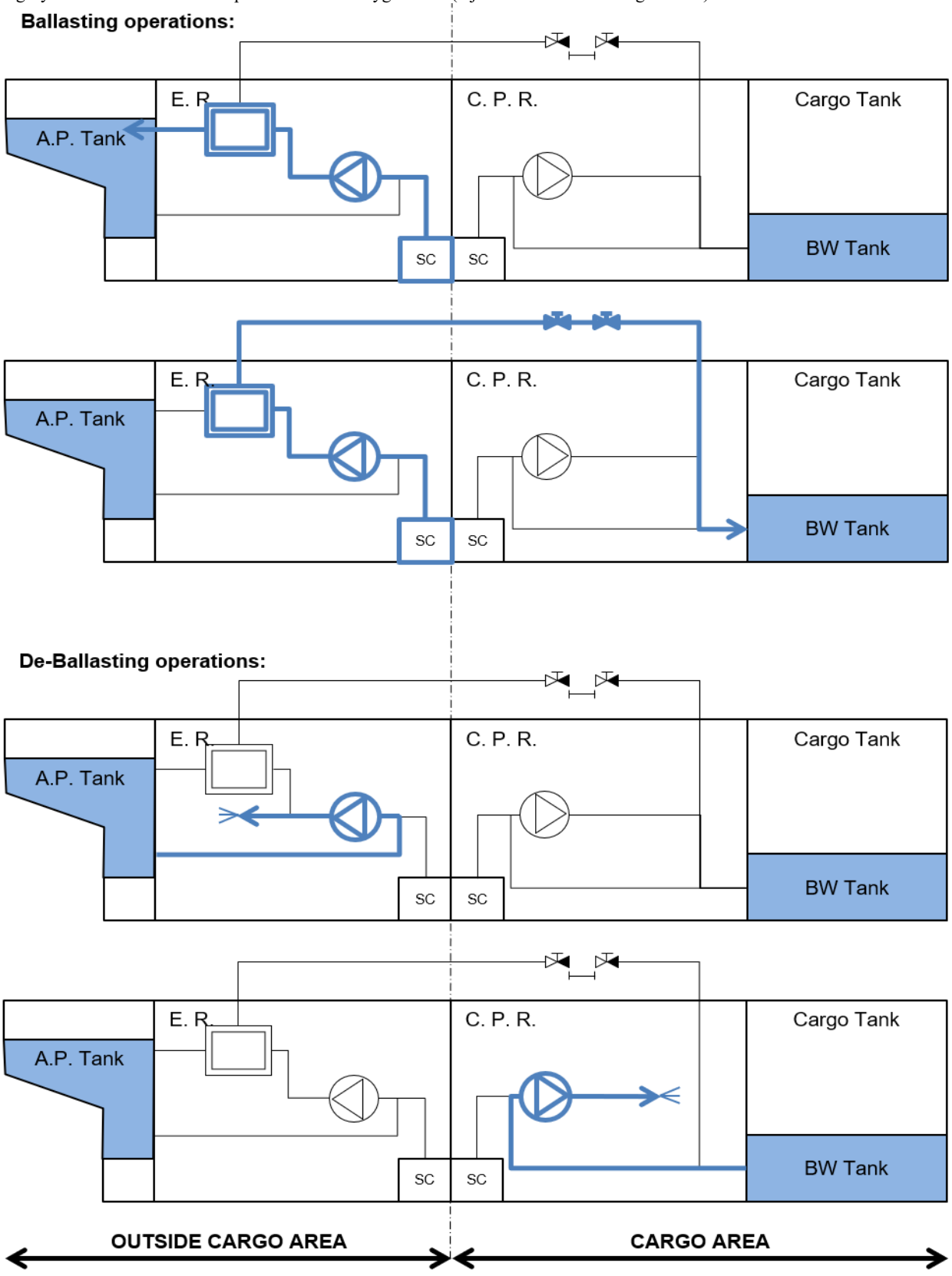


Fig. 2.2.3-3(3) *BWMS* installation (category 3b)

Category 3b: In-line de-oxygenation (injection of inert gas from inert gas generator)

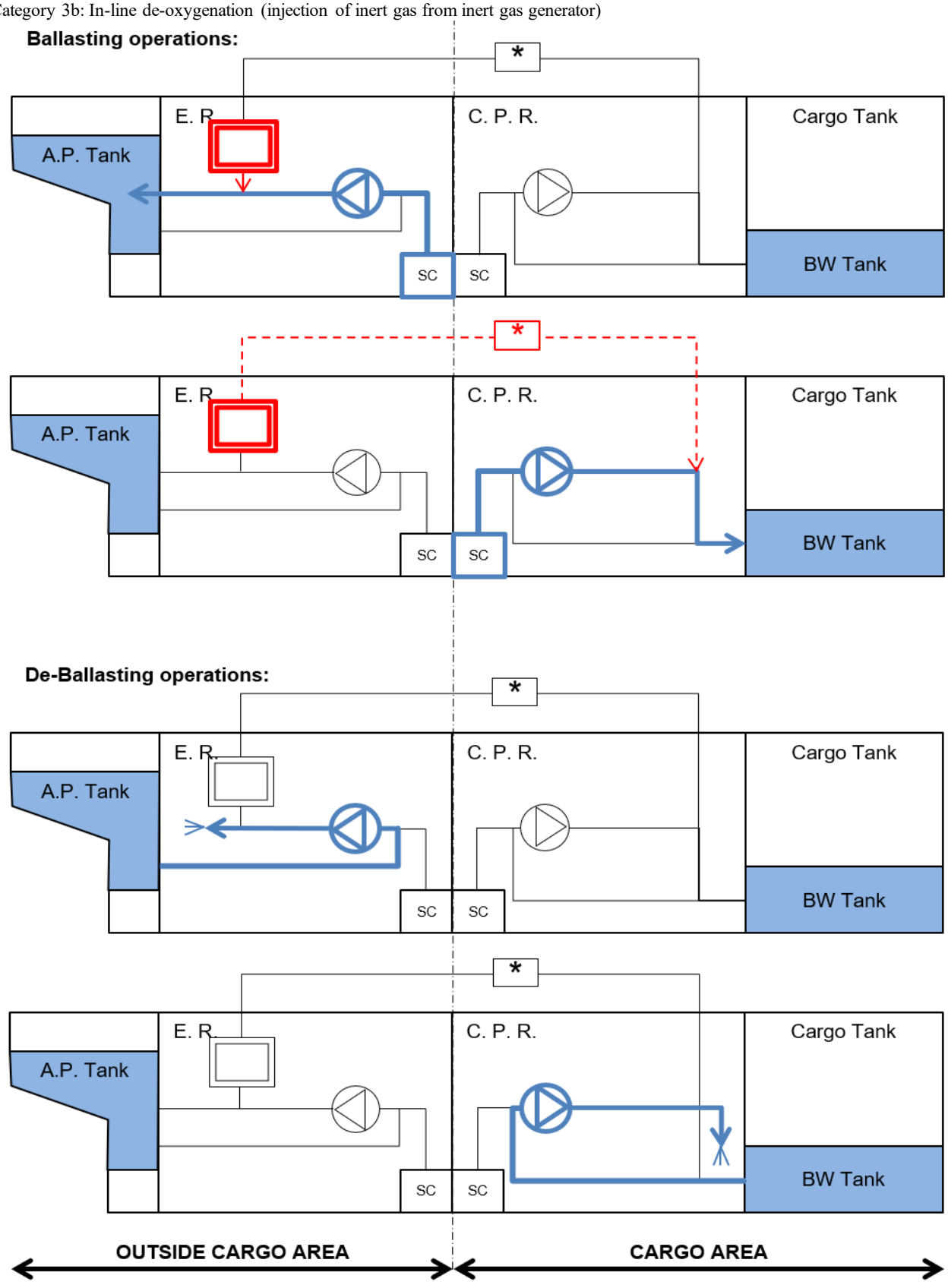


Fig. 2.2.3-3(4) *BWMS* installation (category 4)

Category 4: In-line full-flow electrolysis

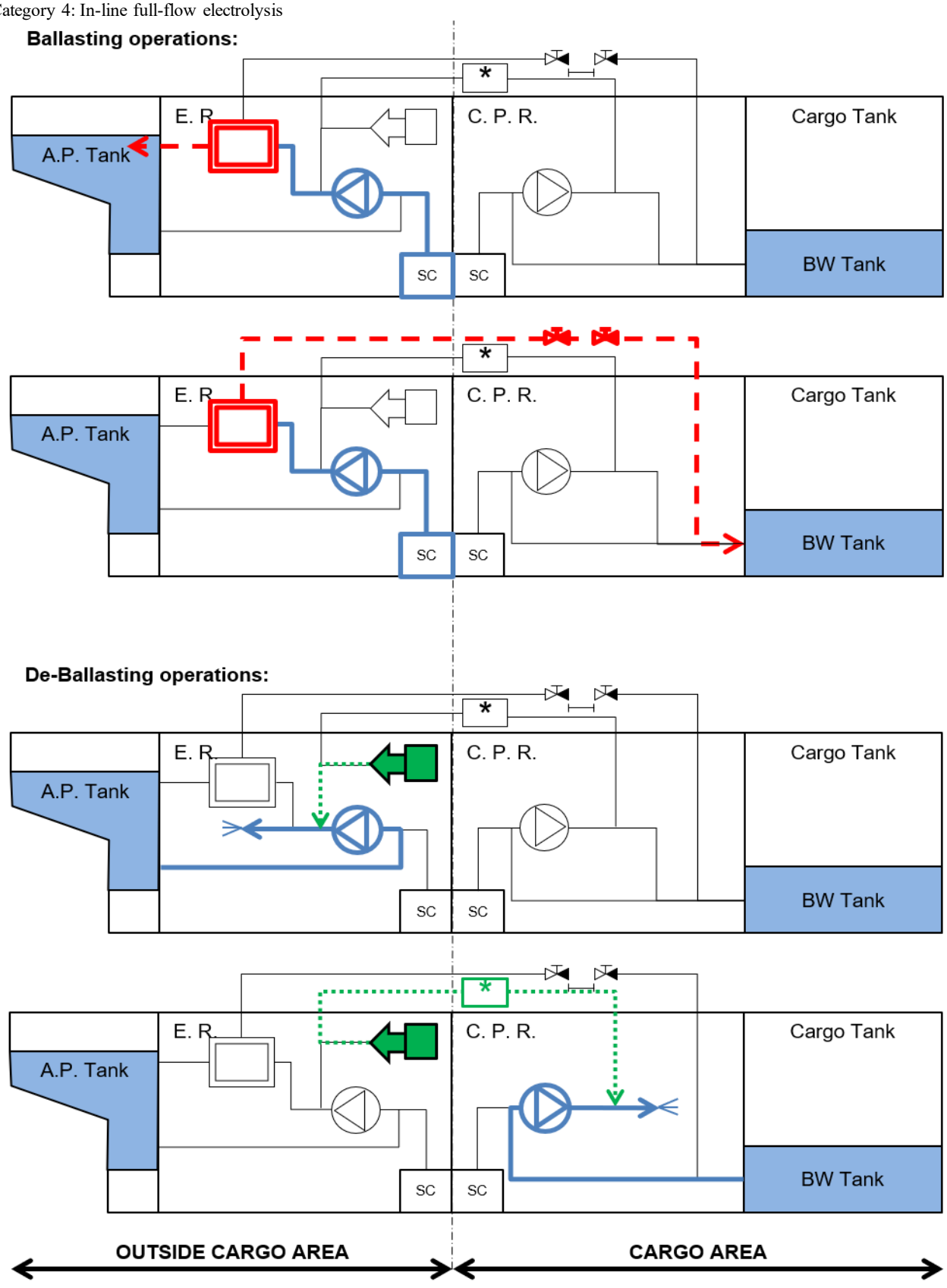


Fig. 2.2.3-3(5) *BWMS* installation (category 5)

Category 5: In-line side-stream electrolysis

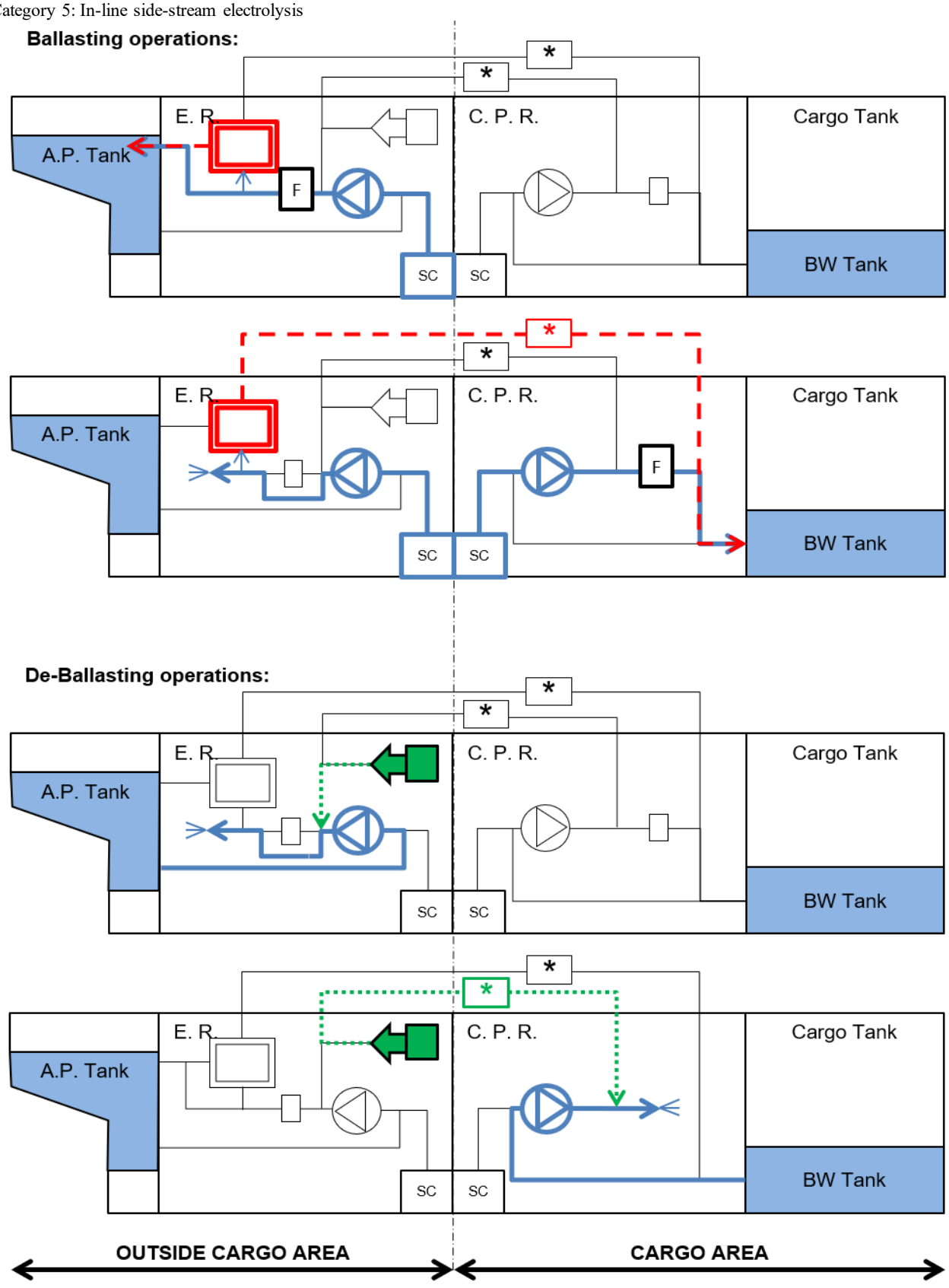


Fig. 2.2.3-3(6) *BWMS* installation (category 6)

Category 6: In-line (stored) chemical injection

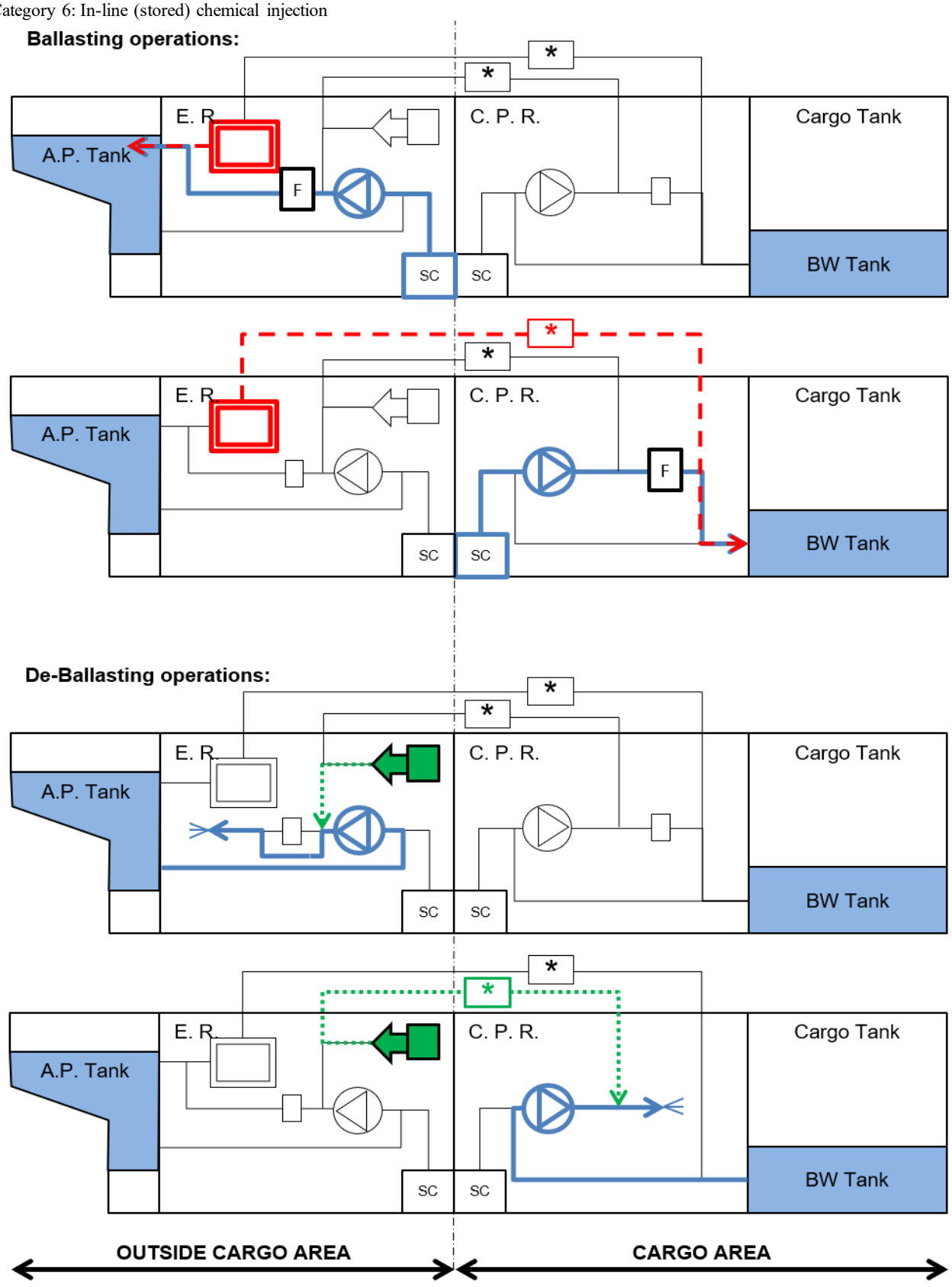


Fig. 2.2.3-3(7) *BWMS* installation (category 7a)

Category 7a: In-line side-stream ozone injection without gas/liquid separation tank and without discharge water treatment tank

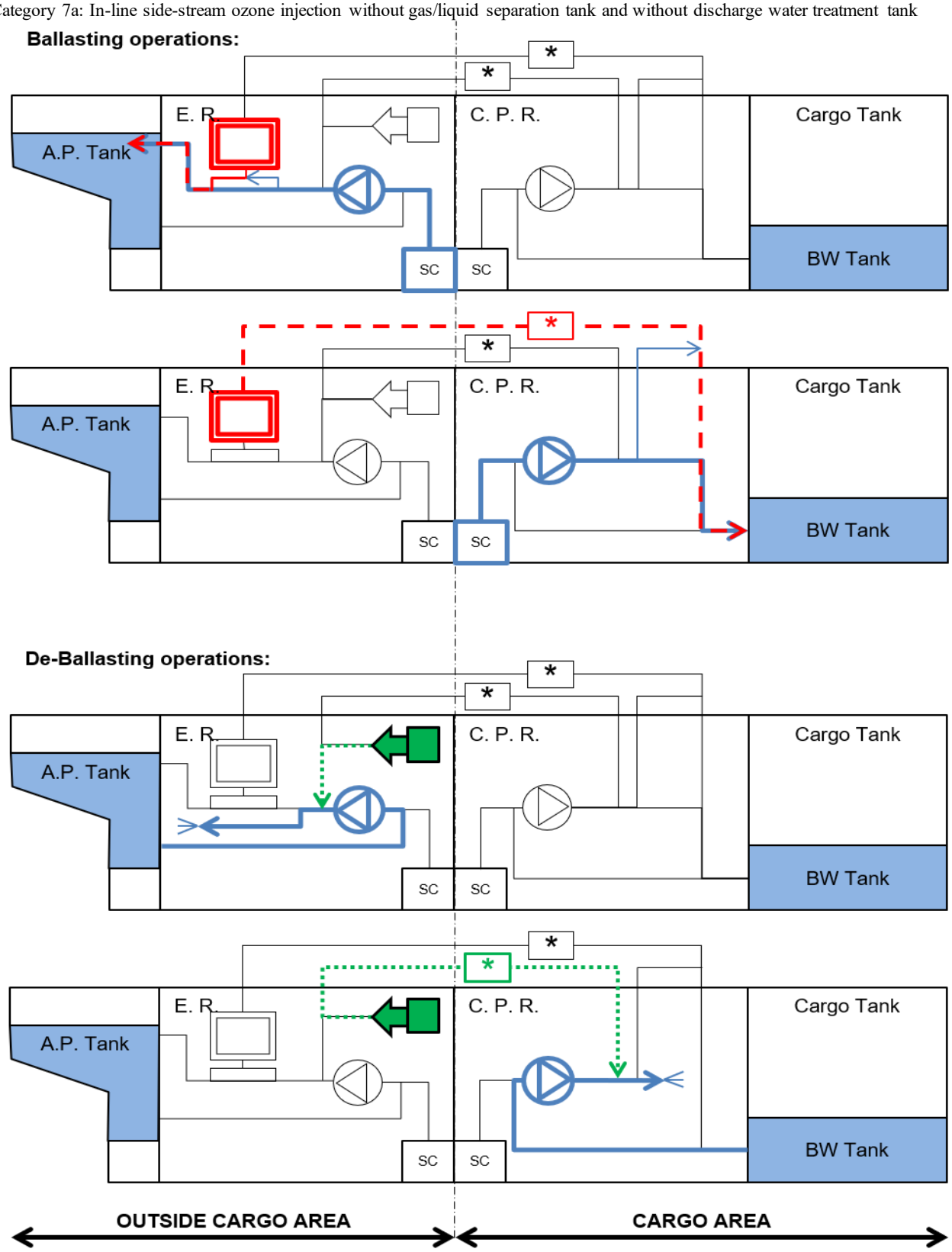
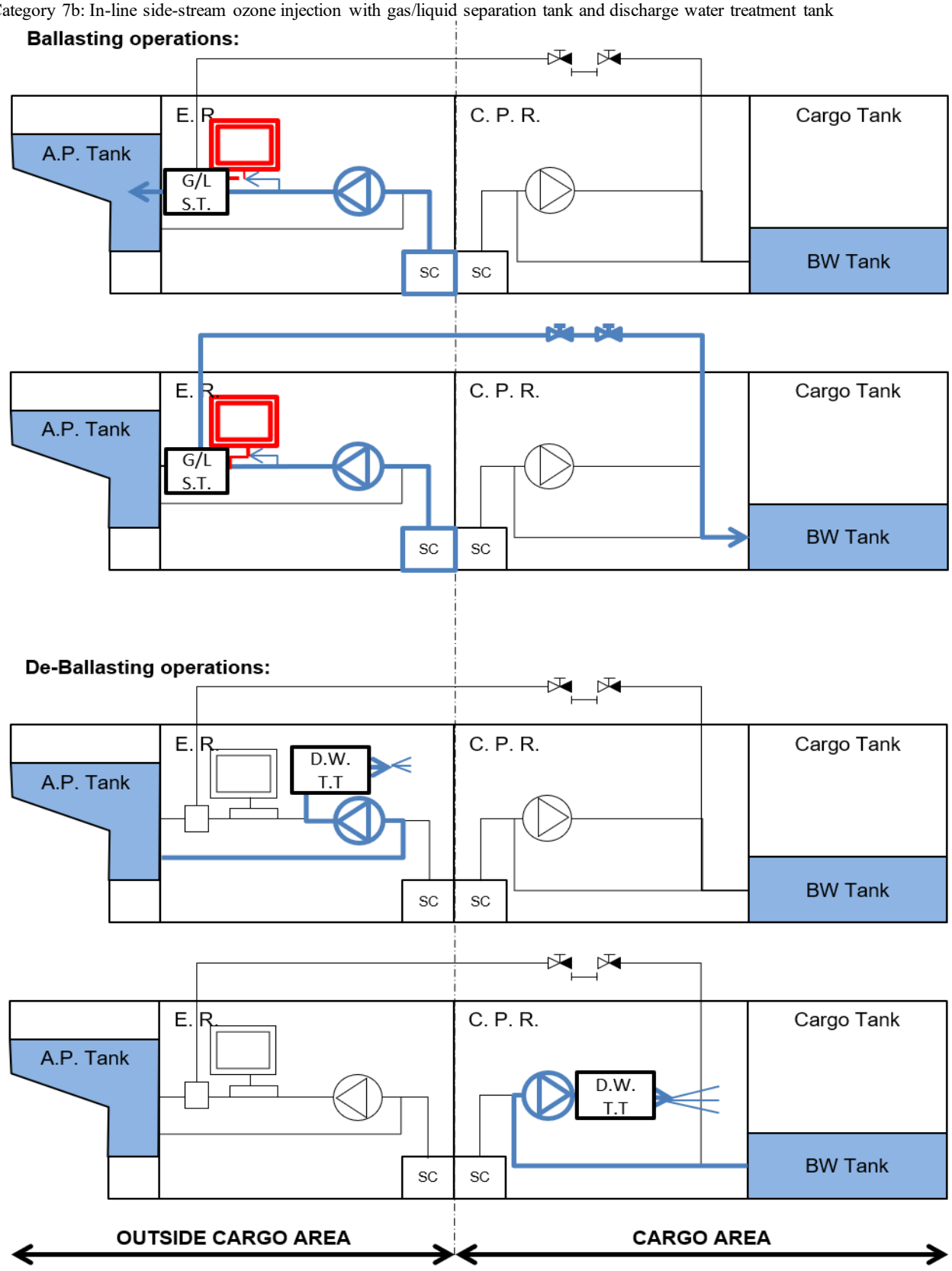


Fig. 2.2.3-3(8) *BWMS* installation (category 7b)

Category 7b: In-line side-stream ozone injection with gas/liquid separation tank and discharge water treatment tank



2.2.4 Special Requirements for *BWMS* categories 2, 3a, 3b, 3c, 4, 5, 6, 7a, 7b and 8

1 Where the *BWMS* operating principle involves generation of dangerous gas, the following **(1)** to **(6)** are to be satisfied.

(1) Gas detection equipment

(a) Gas detection equipment is to be fitted in spaces where dangerous gas may be present.

(b) Audible and visual alarms are to be activated both locally and at *BWMS* control stations in the event of leakage.

(c) Gas detectors are to be located as close as possible to *BWMS* components where dangerous gas may accumulate.

(d) For flammable gases and explosive atmospheres including but not limited to H_2, the construction, testing and performance of gas detection devices are to be in accordance with *IEC* 60079-29-1:2016, *IEC* 60079-29-2:2015, *IEC* 60079-29-3:2014 and/or *IEC* 60079-29-4:2009, as applicable.

(e) Where other hazards (e.g. toxicity, asphyxia, corrosivity and reactivity) are considered, recognized standards acceptable to the Society are to be selected with due consideration of the specific gases to be detected and due consideration of detection device performance with regards to the specific atmosphere where such devices are intended to be used.

(2) Oxygen sensors

(a) In spaces where inert gas generator systems are fitted (i.e. *BWMS* categories 3b and 3c) or nitrogen generators are fitted (i.e. *BWMS* categories 3a and 8), at least two oxygen sensors to be positioned at appropriate locations (as required by **35.2.2-4(5)(d), Part R of the Rules for the Survey and Construction of Steel Ships**) to alarms when oxygen levels fall below 19 %. Such audible and visual alarms are to be activated at the following **i)** to **iii)** locations.

i) Inside the space

ii) At the entrance to the space

iii) Inside the *BWMS* control station

(b) For *BWMS* categories 7a and 7b, at least two oxygen sensors are to be positioned at appropriate locations in one of the following **i)** to **iii)** spaces.

i) Spaces where ozone generators are fitted

ii) Spaces where ozone destructors are fitted

iii) Spaces where ozone piping is routed

(c) Audible and visual alarms are to be activated at the following **i)** to **iii)** locations when the oxygen levels of the sensors described in **(b)** above rise above 23 %.

i) Inside the space

ii) At the entrance to the space

iii) Inside the *BWMS* control station

(d) Automatic *BWMS* shut-down is to be arranged so as to activate when the oxygen levels described in **(b)** above rise above 25 %. Audible and visual alarms independent from the alarms described in **(c)** above are to be activated prior to this shut-down.

(3) Ozone sensors

(a) For *BWMS* categories 7a and 7b, at least one ozone sensor is to be provided in the vicinity of discharge outlets to open decks from the ozone destructors specified in **2.2.1-13(7)** and **(8)** to alarms when ozone concentration levels rise above 0.1 *ppm*. In such cases, audible and visual alarms are to be activated in *BWMS* control rooms.

(b) In addition to the ozone sensors described in **(1)** above, at least two ozone sensors are to be positioned at appropriate spaces in the following **i)** to **iii)** spaces.

i) Spaces where ozone generators are fitted

ii) Spaces where ozone destructors are fitted

iii) Spaces where ozone piping is routed

(c) Audible and visual alarms are to be activated at the following **i)** to **iii)** locations when the ozone concentration levels of the ozone sensors described in **(b)** above rises above 0.1 *ppm*.

i) Inside the space

ii) At the entrance to the space

iii) Inside the *BWMS* control station

(d) Automatic *BWMS* shut-down is to be arranged so as to activate when the ozone concentration measured from one of the

two sensors described in **(b)** above inside the space rises above 0.2 *ppm*.

(4) Leakage detection

(a) Sensors are to be provided for the detection of H_2 leakages (i.e. *BWMS* categories 4, 5 and 6) or O_2 leakages (i.e. *BWMS* categories 7a and 7b) or O_3 leakages (i.e. *BWMS* categories 7a and 7b) within double-walled spaces or pipe ducts when constructed in accordance with **2.2.4-2(2)**.

(b) The sensors described in **(a)** above are to activate alarms and automatic *BWMS* shut-down at the high-high level settings described in **(1)** to **(3)** above.

(c) As an alternative to sensors for gas detection described in **(a)** above, monitored under-pressurisation within double-walled spaces or pipe ducts may be provided with automatic alarms and *BWMS* shut-down in the case of the loss of under-pressurisation. Such monitoring may be achieved either by monitoring the pressure within double-walled spaces or pipe ducts, or by monitoring exhaust fans.

(5) Measures for hydrogen (i.e. *BWMS* categories 4, 5 and 6)

(a) Redundant ventilation fans and monitoring of ventilation systems are to be provided when hydrogen de-gassing arrangements are provided.

(b) Ventilation fans are to be certified as explosion proof and have spark arrestors to avoid ignition sources from developing within ventilation systems in which remaining H_2 gas may be present in dangerous concentrations.

(c) Audible and visual alarms and automatic *BWMS* shut-down are to be arranged so as to activate when respectively high and high-high levels of H_2 concentrations are detected.

(d) Open ends of the hydrogen by-product enriched gas relieving devices are to be led to the safe locations on open decks described in **2.2.1-13(4)**.

(6) Open ends of inert gas or nitrogen gas enriched air (i.e. *BWMS* categories 3a, 3b, 3c and 8) or oxygen-enriched air (i.e. *BWMS* categories 3a, 7a, 7b and 8) are to be led to the safe locations on open decks described in **2.2.1-13(1)** and **(2)**.

2 Where piping conveys active substances, by-products or neutralisers that contain dangerous gases or dangerous liquids, the following **(1)** to **(11)** are to be satisfied. This applies to injection lines conveying dangerous gases or dangerous liquids but does not apply to ballast water lines where dangerous gases or dangerous liquids are diluted.

(1) Notwithstanding design pressure and temperature, such piping is to be either of Class I (without special safeguards) or Class II (with special safeguards) as required by **Chapter 12, Part D of the Rules for the Survey and Construction of Steel Ships**. In addition, material selection, material testing, welding, non-destructive welding tests, connection types, mechanical joints (in cases where allowed), hydrostatic tests and pressure tests after onboard assembly are to be as required by **Part D of the Rules for the Survey and Construction of Steel Ships**.

(2) For Class II piping conveying dangerous gases (e.g. hydrogen (H_2), oxygen (O_2) or ozone (O_3)), the special safeguards described in **(1)** above are to be either double-walled pipes or pipe ducts.

(3) For Class II piping conveying dangerous liquids, the special safeguards described in **(1)** above are to be measures deemed acceptable by the Society.

(4) Notwithstanding **(1)** above, plastic pipes may be accepted after due assessment of the dangerous gases or dangerous liquids conveyed inside. When plastic pipes are accepted, such pipes are subject to **Annex 12.1.6, Part D of the Rules for the Survey and Construction of Steel Ships**.

(5) Pipe length and number of connections are to be minimised.

(6) The insides of double-walled spaces or pipe ducts constructed as the special safeguards for the purpose of **(2)** above are to be equipped with mechanical exhaust ventilation leading to the safe locations on open decks described in **2.2.1-13(4)**, **(7)** or **(8)** above.

(7) Piping system routing is to be kept away from heating sources, ignition sources and other sources that may react hazardously with the dangerous gases or liquids conveyed inside. Pipes are to be suitably supported and protected from mechanical damage.

(8) Pipes carrying acids are to be arranged so as to avoid spillage onto the crew in the case of leakage.

(9) H_2 by-product enriched air vent pipes (i.e. *BWMS* categories 4, 5 and 6), O_2 enriched air vent pipes (i.e. *BWMS* categories 3a, 7a, 7b and 8) and O_3 piping (i.e. *BWMS* categories 7a and 7b) are not to be routed through accommodation spaces, services spaces and control stations.

(10) O_2 enriched air vent pipes (i.e. *BWMS* categories 3a, 7a, 7b and 8) are not to be routed through hazardous areas unless they are

arranged as follows.

(a) Within double-walled pipes or pipe ducts as described in **(2)** above

(b) Provided with gas detection as described in **2.2.4-1(4)**

(c) Provided with mechanical exhaust ventilation as described in **(6)** above

(11) The routing of H_2 by-product enriched air vent pipes (i.e. *BWMS* categories 4, 5 and 6) and O_2 enriched air vent pipes (*BWMS* categories 3a, 7a, 7b and 8) is to be as short and as straight as possible. When necessary, horizontal portions may be arranged with a minimum slope in accordance with manufacturer recommendations.

3 When *BWMS* categories 2, 4, 5, 6, 7a and 7b are installed on board, the following measures **(1)** to **(8)** are to be implemented**.**

(1) Procedures for chemical substances or dangerous gases are to be in accordance with the Material Safety Data Sheet (*MSDS*) and *BWM*.2/*Circ*.20.

(2) Materials, coatings used for the chemical storage tank interiors, piping and fittings are to be resistant to such chemical substances.

(3) Chemical substances (even when not defined as a "dangerous liquid" in **2.1.1(3)**) and gas storage tanks are to satisfy the following **(a)** to **(c)**.

(a) Independent tanks containing dangerous liquids (e.g. sulfuric acid (H_2SO_4)) or dangerous gases (e.g. oxygen (O_2)) that are permanently fixed on board are to satisfy **Chapter 10, Part D of the Rules for the Survey and Construction of Steel Ships**

(b) Independent tanks not containing dangerous liquids (e.g. sodium sulphite, sodium biosulphite or sodium thiosulfphate neutralisers)and not containing dangerous gases (e.g. nitrogen (N_2)) that are not permanently fixed on board are to satisfy standards recognized by the Society

(c) Portable tanks are to satisfy the IMDG Code or standards recognized by the Society

(4) When chemical substances are stored in integral tanks, ship shell plating is not to form any boundary of the tank.

(5) Dangerous liquid and dangerous gas storage tank air pipes are to be led to discharging safe locations as described in **2.2.1-13(1)** and **(2)**.

(6) Operation manuals containing chemical injection procedures, alarm systems, measures in case of emergency, etc. are to be maintained on board.

(7) Dangerous liquid storage tanks and their associated components (e.g. pumps and filters) are to be provided with spill trays or secondary containment systems of sufficient volume to contain potential leakages from tank openings, gauge glasses, pumps, filters and piping fittings.

(8) In addition to **(7)** above, for safety or pollution assessments of the concerned chemical substances, consideration is to be given the segregation of drains from such spill trays (or secondary containment systems), or piping systems from engine room bilge systems, or from cargo pump room bilge systems, as applicable. When necessary, arrangements are to be provided within spill trays (or within secondary containment systems) for the detection of dangerous liquids or dangerous gases.

4 In principle, risk assessments are to be conducted and submitted to the Society for *BWMS* categories 4, 5, 7a and 7b as well as for *BWMS* category 6 when a Material Safety Data Sheets (*MSDS*) indicates that the chemical substance stored on board is either flammable, toxic, corrosive or reactive. Such risk assessments are to satisfy the following **(1) and (2)**.

(1) Risk assessment techniques are to follow standards recognized by the Society.

(2) Risk assessments are to satisfy the following **(a) to (c)**.

(a) Intrinsically safe or mitigation measures for the hazards created by the *BWMS* which have been identified by manufacturers.

(b) Intrinsically safe or mitigation measures for the hazards created by the *BWMS* which have been identified during design review.

(c) The intrinsically safe and mitigation measures described in **(a) and (b)** above are to be implemented during *BWMS* installation.

2.2.5 Other Requirements

When cavitation is used for the entire *BWMS* treatment process (for example, the use of pressure vacuum reactors working in combination with vertical ballast water drop lines), part of the *BWMS* treatment process (for example, the use of "smart pipes" or "special pipes" in *BWMS* category 7b or the use of "venturi pipes" in *BWMS* technology 3b), or through the use other means, the design and wall thickness or grade of materials for the inside coating or surface treatment of the parts of piping where cavitation is taking place are to be specifically considered.

Chapter 3 FIRE SAFETY MEASURES

3.1 General

3.1.1 Terminology

The following definitions apply throughout this chapter.

(1) "Airlock" means a space enclosed by gastight steel bulkheads with two gastight doors spaced not more than 2.5 *m* apart. Such doors are to be self-closing without holding back arrangements. Air locks are to have mechanical ventilation and are not to be used for other purposes. Audible and visual alarm systems to give warnings on both sides of the air lock are to be provided to indicate when more than one door is moved from its closed position. Air lock spaces are to be monitored for dangerous gases as defined **2.1.1(3)**.

(2) "Ballast water management system" (*BWMS*) means the same as defined in **2.1.1(1)**.

(3) "Ballast water management room" (*BWMR*) means any space containing equipment belonging to the *BWMS*. Spaces containing remote controls for *BWMS* or spaces dedicated to the storage of liquid or solid chemicals for *BWMS* need not be considered a *BWMR*.

3.1.2 *BWMS* Storing, Introducing or Generating Chemicals

1 In general, *BWMS* storing, introducing or generating chemicals refer to the following **(1)** to **(3)**.

(1) In-line flocculation (i.e. *BWMS* category 2)

(2) Chemical injection (i.e. *BWMS* category 6)

(3) Neutraliser injection (i.e. *BWMS* categories 4, 5, 6 and 7)

2 *BWMS* that do not store, use or generate toxic or flammable chemicals may be specially considered as detailed in **Table 3.1.2-1**.

Table 3.1.2-1 Requirements that may be reduced for *BWMS* storing, introducing or generating chemicals depending on the chemicals

Requirement	Conditions to be met before reducing the requirement
3.2.3-5	The stored chemicals are neither toxic nor flammable
3.3.1	No dangerous gas will be generated by the *BWMS*
3.3.2	The *BWMS* does not use any flammable or toxic chemical substances
3.6.1-1	No toxic chemical is stored and no toxic gas will be generated by the *BWMS*
3.7.1-1, **-3** and **-6**	No toxic chemical is used or will be generated by the *BWMS*

Notes

1 *IMO (GESAMP) MEPC* reports issued during the basic and final approval procedures and the "safety hazards" listed in **Chapter 17, Part S of the Rules for the Survey and Construction of Steel Ships** are to be considered for this purpose.

2 The "chemicals" described in the table include *BWMS* additives.

3.2 Fire Categorisation

3.2.1 General

BWMR are to be categorised as the following **(1)** and **(2)** in accordance with **Chapter 9, Part R of the Rules for the Survey and Construction of Steel Ships** and Regulation II-2/9 of *SOLAS*.

(1) *BWMR* containing oil-fired inert gas generators (i.e. *BWMS* categories 3b and 3c) are to be treated as machinery spaces of category A.

(2) Other *BWMR* are to be considered as other machinery spaces and are to be categorised, depending on the ship type in accordance with Regulations II-2/9.2.2.3 (10) or (11), 9.2.2.4 (7) of *SOLAS* or **9.2.3-2(7)** and **9.2.4-2(7), Part R of the Rules for the Survey and Construction of Steel Ships**.

3.2.2 *BWMS* Located in tanker cargo areas

Notwithstanding **3.2.1** above, where *BWMS* are located in tanker cargo areas as allowed by the relevant requirements of **the Rules**, said *BWMR* are to be categorised as "cargo pump-rooms" as defined in **9.2.4-2(8), Part R of the Rules for the Survey and Construction of Steel Ships** for determining the extent of fire protection to be provided.

3.2.3 Storage of Chemicals

1 Storage spaces for liquid or solid chemicals for *BWMS* are to be categorised as the following **(1)** and **(2)** in accordance with **Chapter 9, Part R of the Rules for the Survey and Construction of Steel Ships** and Regulation II-2/9 of *SOLAS*.

(1) On passenger ships carrying more than 36 passengers

(a) "Other spaces in which flammable liquids are stowed" as defined in Regulation II-2/9.2.2.3.2.2(14) of *SOLAS* when flammable products are stored.

(b) "Store-rooms, workshops, pantries, etc." as defined in Regulation II-2/9.2.2.3.2.2(13) of *SOLAS* in all other cases.

(2) On other ships

(a) "Cargo pump-rooms" as defined in **9.2.4-2(8), Part R of the Rules for the Survey and Construction of Steel Ships** when located in the cargo areas described in **2.1.1(2)**.

(b) "Service spaces (low risk)" as defined in **9.2.3-2(5) and 9.2.4-2(5), Part R of the Rules for the Survey and Construction of Steel Ships** when the surface area is less than 4 m^2 and when no flammable products are stored.

(c) "Service spaces (high risk)" as defined in **9.2.3-2(9) and 9.2.4-2(9), Part R of the Rules for the Survey and Construction of Steel Ships** in all other cases.

2 Since it is understood that only chemical injection (i.e. *BWMS* category 6), in-line flocculation (i.e. *BWMS* category 2) and technologies using neutraliser injection (i.e. *BWMS* categories 4, 5, 6 and 7) will need chemical or additive storage, such *BWMS* are subject to **-1** above.

3 When chemical substances are stored in same spaces containing ballast water management machinery, such spaces are considered to be both the spaces described in **-1** above and as the machinery spaces described in **3.2.1**.

4 When chemical substances are stored inside integral tanks, ship shell plating is not to form any boundary of the tank.

5 Tanks containing chemicals are to be segregated from accommodation, service spaces, control stations, and machinery spaces not related to the *BWMS* as well as from drinking water and stores for human consumption by means of cofferdams, void spaces, cargo pump rooms, empty tanks, oil fuel storage tanks, *BWMR* or other similar spaces. On-deck stowage of permanently attached deck tanks or installation of independent tanks in otherwise empty hold spaces is to be considered as satisfying this provision.

3.3 *BWMR* Locations and Boundaries

3.3.1 General

1 *BWMR* containing equipment for *BWMS* for the following **(1)** to **(4) purposes are** to be equipped with tested gastight and self-closing doors without holding back arrangements.

(1) *BWMS* storing, introducing or generating chemical substances

(2) De-oxygenation by inert gas generators

(3) Electrolysis

(4) Ozone injection

2 The *BWMR* doors described in **-1** above are to be led to open decks but are not to be self-closing.

3.3.2 *BWMS* Using Chemical Substances

For *BWMS* using chemical substances storing, introducing or generating chemicals, *BWMR* and chemical substance storage spaces are not to be located in accommodation areas. Ventilation exhausts or other openings from such spaces are to be located not less than 3*m* from entrances, air inlets and openings to accommodation spaces. This requirement need not apply when *BWMS* are located in engine rooms.

3.3.3 *BWMS* Using Ozone

1 *BWMS* using ozone (hereinafter referred to as "ozone-based *BWMS*") (i.e. *BWMS* categories 7a and 7b) are to be located in dedicated compartments, separated from other spaces by gastight boundaries. Access to such *BWMR* from other enclosed spaces is to be through airlocks only, except when the only access to that space is from an open deck.

2 Access to the ozone-based *BWMR* may be provided through engine rooms when the following **(1)** and **(2)** are satisfied.

(1) Access from the engine room to the *BWMR* is through an airlock.

(2) An alarm repeater, which will repeat any alarm activated in the engine room, is provided in the *BWMR*.

3 Signs are to be affixed on the doors of ozone-based *BWMR* providing the crew with warnings that ozone may be present and with the necessary instructions to be followed before entering such spaces.

3.4 Fire Fighting

3.4.1 Fixed Fire Extinguishing Systems

1 Fixed fire extinguishing systems are to comply with relevant provisions of **Part R of the Rules for the Survey and Construction of Steel Ships**.

2 *BWMR* containing equipment related to ozone-based *BWMS* are to be provided with fixed fire extinguishing systems suitable for category A machinery spaces and capable of manual release.

3 When fixed fire-extinguishing systems are provided for *BWMR*, such systems are to be compatible with *BWMS* and the chemical products that are used, stored or generated in the *BWMR*. Specific attention is to be paid to potential chemical reactions between fire extinguishing media and chemical products used for water treatment. Water-based fire-extinguishing systems are to especially be avoided in the case of sulfuric acid storage.

4 When foam fire extinguishing systems are installed in the *BWMR*, their efficiency is not to be impaired by the chemicals used by the *BWMS*.

5 When fixed fire-extinguishing systems are installed in the *BWMR*, automatic *BWMS* shut-down upon release of fixed fire extinguishing systems is to be arranged. Any need for cooldown necessary for safe shut-down is to be considered in shut-down sequences.

6 When *BWMS* that includes air or O_2 storage are located in spaces provided with fixed gas fire-extinguishing systems, the air or O_2 storage is to be taken into account for gas capacity calculations, unless discharge pipes from safety valves for the air or O_2 storage are led directly outside the space.

3.4.2 Portable Fire Fighting Equipment

At least one portable fire extinguisher that complies with **Part R of the Rules for the Survey and Construction of Steel Ships** and suitable for electrical fires is to be provided for *BWMR* containing UV-type *BWMS*.

3.5 Fire Prevention

3.5.1 Equipment Protection

1 Overcurrent or overvoltage protection is to be installed to protect UV-type *BWMS*.

2 Electrolysis reactors are to be provided with at least with two independent means of monitoring operations. Monitoring systems are to initiate audible and visual alarms and automatic shut-downs of *BWMS* when anomalies are detected. Requirements for shut-down arrangements are described in **2.2.1-12**.

3 When pressure relief valves are provided in addition to the shut-down arrangements described in **-2** above, vents of such valves are to be led to safe locations on open decks, and such valves are to be positioned so as to optimally remove gas from electrolysis

reactors.

3.5.2 Fire Detection

1 Fixed fire detection and fire alarm systems complying with **Part R of the Rules for the Survey and Construction of Steel Ships** are to be provided for spaces containing inert gas generators or ozone generators.

2 Sections of fire detectors which cover control stations, service spaces or accommodation spaces are not to include *BWMR* containing equipment related to ozone-based *BWMS*.

3.6 Ventilation

3.6.1 Equipment Requirements

1 Ventilation systems for *BWMR* containing *BWMS* for the following **(1)** to **(4) purposes** are to be independent of ventilation systems serving other spaces.

(1) *BWMS* storing, using or generating chemical substances

(2) De-oxygenation, including pasteurisation and de-oxygenation (i.e. *BWMS* categories 3 and 8)

(3) Electrolysis

(4) Ozone injection

2 Ventilation exhausts for *BWMR* containing nitrogen generators are to be located in the lower parts of spaces in order to efficiently disperse dangerous gases heavier than air.

3 Ventilation exhausts for *BWMR* containing electrolysis systems are to be located so as to be able to efficiently disperse dangerous gases that may be generated during electrolysis. Due regard to be paid to the expected quantity and density of such gases when designing the ventilation exhaust.

4 Ventilation ducts serving *BWMR* for ozone-based *BWMS* are to satisfy the following **(1)** to **(3)**.

(1) Parts of ducts located outside *BWMR* are to be made of steel having thicknesses of at least 3 *mm* for ducts with free cross-sectional areas of less than 0.075 m^2, thicknesses of at least 4 *mm* for ducts with free cross-sectional areas between 0.075 m^2 and 0.45 m^2 and thicknesses of at least 5 *mm* for ducts with free cross-sectional areas exceeding 0.45 m^2.

(2) Ducts are to be suitably supported and stiffened.

(3) The outside openings of ducts are to be fitted with protective screens of not more than 13 *mm*×13 *mm* mesh.

5 Ventilation systems for *BWMR* containing ozone-based *BWMS* or ventilation systems for hydrogen de-gassing arrangements required by **2.2.4-1(5)** are to be interlocked with the *BWMS* in accordance with the following **(1)** and **(2)**.

(1) In the case of loss of ventilation (primary and secondary), visual and audible alarms are to be activated both inside and outside the *BWMR* and at locations where responsible members of the crew are on duty. If ventilation is not restored after a pre-set time, the *BWMS* is to automatically shut-down. Any need for cooldown necessary for safe shut-down is to be considered in shut-down sequences.

(2) *BWMS* are not to be started without ventilation systems running.

6 For the ventilation systems described in **-5** above, relevant requirements in **2.2.4** are to be satisfied.

3.6.2 Ventilation Rates

1 An adequate power ventilation system is to be provided in enclosed *BWMR*.

2 The ventilation capacity is to be at least 30 air changes per hour where explosive or toxic gases may be generated during operation of the *BWMS*. The *IMO* reports issued during the basic and final approval procedures in accordance with *IMO (GESAMP) MEPC* report and "safety hazard" as listed in **Chapter 17, Part S of the Rules for the Survey and Construction of Steel Ships** are to be used as references for identifying those cases.

3 The ventilation capacity may be reduced as following **(1)** to **(6)**.

(1) Flocculation-type *BWMS* : 6 air changes per hour

(2) De-oxygenation, incl. pasteurisation and de-oxygenation (categories 3 and 8): 6 air changes per hour

(3) Full flow electrolysis: 6 air changes per hour

(4) Side-stream electrolysis: 20 air changes per hour

(5) Ozone injection: 20 air changes per hour

(6) Chemical injection: 6 air changes per hour

4 Notwithstanding **-1** to **-3** above, more stringent ventilation capacity requirements in other parts of the NK Rules like **Part S of the Rules for the Survey and Construction of Steel Ships** may apply to spaces located in cargo areas.

3.7 Personal Equipment

3.7.1 Personal Equipment

1 Suitable protection equipment (as recommended by the product manufacturers) is to be available on board for the protection of crew engaged in the servicing, maintenance and repair of *BWMS* storing, using or generating chemicals. Such equipment is to consist of large aprons, special gloves with long sleeves, suitable footwear and coveralls made of chemical-resistant materials as well as tight fitting goggles, face shields or both. Protective clothing and equipment are to cover all skin so that no part of the body is unprotected. Moreover, such equipment is to be provided separately without taking into account the equipment required by other mandatory requirements.

2 Work clothes and protective equipment are be kept in easily accessible places and in special lockers. Such equipment is not to be kept within accommodation spaces; this, however, need not apply to new, unused equipment or equipment which has not been used since undergoing a thorough cleaning process. Notwithstanding **-1** above, storage rooms for such equipment may be located within accommodation spaces when adequately segregated from living areas such as cabins, passageways, dining rooms, bathrooms, etc.

3 When *BWMS* storing, using or generating chemicals are installed on board, suitably marked decontamination showers and eyewashes are to be available in convenient locations in close proximately to the *BWMS* and the chemical store-rooms.

4 Emergency escape breathing apparatuses (EEBD) are to be provided in *BWMR*. Such apparatuses may be one of the EEBDs provided in accordance with **Chapter 13, Part R of the Rules for the Survey and Construction of Steel Ships**. EEBDs need not be required for *BWMS* category 1.

5 Personal ozone detectors, calibrated per manufacturer specifications, are to be provided for persons engaged in the servicing, maintenance and repair of ozone-based *BWMS*.

6 Two-way portable radiotelephones dedicated for *BWMS* service, maintenance and repair are to be provided, in addition to those required by **Part R of the Rules for the Survey and Construction of Steel Ships** for fire-fighting purposes. Such radiotelephones are to be properly identified in order to avoid mix-up with those radiotelephones intended for fire-fighting operations. When *BWMS* may release explosive gases, such radiotelephones are to be of a certified safe type suitable for use in hazardous area zone 1 as defined in **Part H of the Rules for the Survey and Construction of Steel Ships**. When *BWMS* store, use or generate chemical substances, such radiotelephones are to undergo deep cleaning or de-contamination after use. Two-way portable radiotelephones need not be required for *BWMS* category 1.

Contents

GUIDANCE FOR BALLAST WATER MANAGEMENT INSTALLATIONS

Part 2 SURVEYS

Chapter 1 GENERAL

1.1 General

1.1.1 Application

In applying **1.1.1, Part 2 of the Rules**, the Rules also apply to Mobile Offshore Units (*MOUs*) of 400 *gross tonnage* or above specified in *IMO* resolution *A*.828(19).

1.1.6 Modification of the Requirements

"In cases where considered appropriate" specified in **1.1.6-1, in Part 2 of the Rules** means those cases where examinations are carried out in accordance with measures specially approved by the Society. However, this regulation is not to be applied to surveys required by international regulations or the requirements of flag states.

1.2 Preparation for Survey and Other Items

1.2.5 Procedure for Tests, Wear and Tear, etc.

With respect to **1.2.5, Part 2 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).

1.4 Other

1.4.1 Remote Survey

The wording "the Society may approve the survey methods which it considers to be appropriate" in **1.4.1, Part 2 of the Rules** means those survey methods which the Society considers to be able to obtain information equivalent to that obtained through traditional ordinary surveys where a surveyor is in attendance and for which the Administration deems to be appropriate in accordance with 5.14 of *IMO* resolution *A*.1186(33).

Chapter 2 REGISTRATION SURVEYS

2.1 Registration Surveys during Construction

2.1.1 Registration Surveys

With respect to **2.1.1-2, Part 2 of the Rules**, surveyors are to confirm the asbestos-free declarations and supporting documents specified in **2.1.2-2(4), Part 2 of the Rules**. 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).

2.1.4 Inspections of Equipment

1 For the purpose of **2.1.4-2(10), Part 2 of the Rules**, commissioning testing of *BWMS* is to be carried out after all equipment (including associated piping, etc.) has been fully installed on board in consideration of BWM.2/Circ.70/Rev.1 *2020 Guidance for the Commissioning Testing of Ballast Water Management Systems* and in accordance with **Annex 2.1.3-2(10) "Guidance Procedure for Commissioning Testing"**.

Part 3 EQUIPMENT FOR THE BALLAST WATER MANAGEMENT

Chapter 1 GENERAL

1.5 Sampling Facilities

Sampling facilities are to comply with the requirements of *IMO* resolution *MEPC*.173(58) "*Guidelines for Ballast Water Sampling (G2)*", as amended.

Chapter 2 BALLAST WATER EXCHANGE

2.2 Ballast Water Exchange (*Regulation* B-4 of *Annex*)

Existing ships intended for operations in sea areas other than those specified in **2.2, Part 3 of the Rules** are to record the relevant reasons for which carrying out ballast water exchange is impossible in the Ballast Water Record Book specified in **1.2, Part 3 of the Rules**. In addition, such ships are to comply with the special requirements of Port States in cases where such requirements are in effect.

Chapter 3 BALLAST WATER MANAGEMENT

3.3 Ballast Water Management System (*Regulation* D-3 of *Annex*)

1 The wording "installed" in **3.3-1(1)(a)** and **(b), Part 3 of the Rules** refers to either the following **(1)** or **(2)**.

(1) The contractual date of delivery of the *BWMS* to the ship

(2) In the absence of the date of **(1)** above, the actual date of delivery of the *BWMS* to the ship

2 The wording "the guidelines developed by the *IMO*" in **3.3-1(1)(b), Part 3 of the Rules** refers to *MEPC*.174(58) or *MEPC*.279(70).

3.4 Prototype Ballast Water Treatment Technologies (*Regulation* D-4 of *Annex*)

The wording "guidelines developed by the *IMO*" in **3.4-2, Part 3 of the Rules** refers to **3.3-3**.

Part 4 REQUIREMNETS FOR BALLAST WATER MANAGEMENT SYSTEM INSALLATION

Chapter 2 ARRAGEMENT, PIPING, ELECTRICAL INSTALLATIONS, ETC.

2.2 Installation

2.2.3 Requirements for Tankers

When providing the alternative means of isolation described in **2.2.3-14, Part 4 of the Rules**, the following **(1)** and **(2)** are recommended.

(1) The means of isolation provides suitable protection measures for hydrocarbon, flammable or toxic liquids or vapours emanating from the hazardous areas.

(2) The means of isolation is located on either the following **(a)** or **(b)**.

(a) Open decks

(b) As high as possible in machinery spaces (in principle, just below the main deck). When piping penetrates bulkheads between engine rooms and hazardous areas (such as cargo pump rooms), the safety and gastightness of such penetrations are to be taken into account.

Annex 2.1.3-2(10) "Guidance Procedure for Commissioning Testing"

1.1 Equipment

1.1.1 General

1 Testing are to be conducted using indicative analysis equipment accepted by the Society.

2 Information and reference to the acceptance documents for the equipment used are to be submitted to the Society in the report which includes the results from the commissioning test performed in accordance with *BWM*.2/*Circ*.70/*Rev*.1(as amended).

3 In case the indicative analysis equipment used at the testing has not previously been accepted by the Society, the following information is to be submitted to the Society:

(1) Equipment information (type, model, technology used, evidence of calibration, detection range, organism type/size classes that can be analyzed);

(2) Test results conduct for the verification of accuracy, detection range and repeatability; and

(3) Certificate of standards, if applicable

4 In case the commissioning test requires the operators to work in hazardous areas (e.g., pump room for tankers, etc.), the service suppliers are to have the equipment certified for use in such spaces.

5 For indicative analysis equipment planned to be used, the equipment *OEM* instruction manuals are to be available.

6 The manuals specified in **-5** above is to include, at least, clear guidance for the proper storage, handling, operation, maintenance, repair, and calibration of the equipment.

7 Service suppliers may use specialty devices (e.g., sieves, screens, etc.) to separate the different organism sizes classes (i.e., ≥ 10 μm to < 50 μm, and ≥ 50 μm, and indicator microbes) to support analysis of each size class.

8 Equipment used for the analysis of physical and/or chemical water parameters other than those specified in **Table 1.1** is to be suitable for the intended use.

9 Indicative analysis equipment is to be properly stored or transported to avoid damage and disturbance to calibrations, etc. when transporting from the service suppliers' facilities to the vessels.

Table 1.1

Sizes of viable organisms	Number of viable organisms
Greater than or equal to 50 μm	less than 10 /m^3
less than 50 μm and greater than or equal to 10 μm	less than 10/ml

1.2 Sampling and Analysis of Ballast Water

1.2.1 Sampling

1 Service suppliers are to follow relevant guidelines on sampling of ballast water.

2 A standard operating procedure is to be defined for sampling of uptake water. Discharge sampling are to follow *IMO Res. MEPC*.173(58).

1.2.2 Analysis

1 The representative samples are, at least, to be analyzed with indicative analysis methods if the standards as per **Table 1.1** are met.

2 Detailed analysis of all organism type/size classes or combination of detail and indicative analysis can also be performed.

3 In such cases as specified in **-2** above, equipment, procedures and methods for such analysis, where applicable, are to be in

accordance with relevant international standard and/or industry standards accepted by the Society. For all equipment planned to be used, the instruction manuals are to be available.

1.3 Records and Reporting

1.3.1 Records

Service suppliers are to maintain a record of the following:

(1) Operation of the *BWMS* during test period, including any recorded data or operator observations associated with the performance deviations, alarms or abnormal/unexpected operations; and

(2) Applicable self-monitoring parameters

1.3.2 Reporting

1 Service suppliers are to provide reports detailing the results of sampling and analysis of ballast water and assessment of self-monitoring parameters during commissioning testing.

2 Information and reference to the acceptance documents for the equipment used for the testing should be included in the report.

3 The format of the report is to be acceptable to Society and contain the following information as a minimum:

(1) Manufacturer's name of the *BWMS*

(2) Model name of the *BWMS*

(3) *SDL* and the *BWMS* technology limiting operating conditions

(4) Operation required (e.g., ballasting, de-ballast, circulation, one pass, in tank, etc)

(5) Treatment rated capacity of the *BWMS* (m^3/h)

(6) Relevant performance parameters (e.g. flow rate, pressure, Total Residual Oxidants (*TRO*), *UV* intensity, *UV* dose, or other relevant parameters)

(7) Alarms developed during the testing

(8) Installation location the *BWMS*

(9) Type Approval issued by and Certificate No . of the *BWMS*

(10) Installation date of the *BWMS*

(11) Method used for the testing

(12) Results of sample analysis (includes the record as specified in 1.3.1 and the raw data generated from the used testing equipment)

(13) Flow rate of ballast pump and volume of ballast tanks, used for the testing

(14) Comments/Notes (information on filter and other major components and process measurements etc.)

1.4 Other

1.4.1 General

For commissioning testing, attention is to be paid to complying with national regulations of the flag states in which the ships are registered, if any.