RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part S Ships Carrying Dangerous Chemicals in Bulk

2015 AMENDMENT NO.3

Rule No.63 25th December 2015
Resolved by Technical Committee on 28th July 2015
Approved by Board of Directors on 14th September 2015

Rule No.63 25th December 2015
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part S SHIPS CARRYING DANGEROUS CHEMICALS IN BULK

Chapter 1 GENERAL

1.3 Definitions

Paragraph 1.3.1 has been amended as follows;

1.3.1 Definitions (with reference to *IBC Code* 1.3)

The following definitions **(1)** to ~~**(27)**~~**(29)** in this part unless expressly provided otherwise.

((1) to (27) are omitted.)

(28) "Purging" means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

(29) "Gas-freeing" means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry.

Chapter 8 has been amended as follows;

Chapter 8 CARGO TANK VENTING AND GAS-FREEING ARRANGEMENTS

8.1 Cargo Tank Venting (*IBC Code* 8.2)

(8.1.1 to 8.1.4 are omitted.)

8.2 Types of Tank Venting Systems (*IBC Code* 8.3)

(8.2.1 to 8.2.8 are omitted.)

8.3 Venting Requirements for Individual Products (*IBC Code* 8.4)

(8.3.1 is omitted.)

8.4 Cargo tank purging (*IBC Code* 8.5)

8.4.1 Cargo tank purging

When the application of inert gas is required by **11.1.1**, before gas-freeing, the cargo tanks are to be purged with inert gas through outlet pipes with cross-sectional area such that an exit velocity of at least 20 *m/s* can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets are to extend not less than 2 *m* above the deck level. Purging is to continue until the concentration of hydrocarbon or other flammable vapours in the cargo tanks has been reduced to less than 2% by volume.

8.54 Cargo Tank Gas-freeing (*IBC Code* 8.65)

8.54.1 The Arrangements for Gas-freeing (*IBC Code* 8.65.1)

The arrangements for gas-freeing cargo tanks used for cargoes other than those for which open venting is permitted are to be such as to minimize the hazards due to the dispersal of flammable or toxic vapours in the atmosphere and to flammable or toxic vapour mixtures in a cargo tank. Accordingly, the gas-freeing system is to be such as to ensure that vapour is initially discharged:

(1) through the vent outlets specified in **8.2.4** and **8.2.5**; or
(2) through outlets at least 2*m* above the cargo tank deck level with a vertical efflux velocity of at least 30*m/s* maintained during the gas-freeing operation; or
(3) through outlets at least 2*m* above the cargo tank deck level with a vertical efflux velocity of at least 20*m/s* which are protected by suitable devices to prevent the passage of flame. When the flammable vapour concentration at the outlets has been reduced to 30% of the lower flammable limit and in the case of a toxic product the vapour concentration does not present a significant health hazard, gas-freeing may thereafter be continued at cargo tank deck level.

8.54.2 The Outlets in The Gas-freeing System (*IBC Code* 8.65.2)

The outlets referred to in **8.54.1(2)** and **8.54.1(3)** may be fixed or portable pipes.

8.54.3 Design of Gas-freeing System (*IBC Code* 8.65.3)

In designing a gas-freeing system in conformity with **8.54.1** particularly in order to achieve the required exit velocities of **8.54.1(2)** and **8.54.1(3)**, due consideration is to be given to the following:

(1) materials of construction of system;
(2) time to gas-free;
(3) flow characteristics of fans to be used;
(4) the pressure losses created by ducting, piping, cargo tank inlets and outlets;
(5) the pressure achievable in the fan driving medium (e.g. water or compressed air);
(6) the densities of the cargo vapour/air mixtures for the range of cargoes to be carried.

Chapter 9 ENVIRONMENTAL CONTROL (*IBC Code* Chapter 9)

9.1 General

Paragraph 9.1.3 has been amended as follows.

9.1.3 Inerting or Padding of Cargo Tanks

Where inerting or padding of cargo tanks is required by column "*h*" of Chapter 17 in this Part:

(1) An adequate supply of inert gas for use in filling and discharging the cargo tanks is to be carried or is to be manufactured on board unless a shore supply is available. In addition, sufficient inert gas is to be available on the ship to compensate for normal losses during transportation.

(2) The inert gas system on board the ship ~~are~~is to be able to maintain a pressure of at least 0.007*MPa* gauge within the containment system at all times. In addition, the inert gas system is not to raise the cargo tank pressure to more than the tank's relief valve setting.

(3) Where padding is used, similar arrangements for supply of the padding medium are to be made as required for inert gas in **(1)** and **(2)**.

(4) Means are to be provided for monitoring ullage spaces containing a gas blanket to ensure that the correct atmosphere is being maintained.

(5) Inerting or padding arrangements or both, where used with flammable cargoes, are to be such as to minimize the creation of static electricity during the admission of the inerting medium.

Chapter 11 FIRE PROTECTION AND FIRE EXTINCTION

11.1 Application (with reference to *IBC Code* 11.1)

Paragraph 11.1.1 has been amended as follows.

11.1.1 Application

The requirements for tankers in **Part R** and corresponding requirements in **Part D** are to apply to ships covered by this Part, irrespective of tonnage including ships of less than 500 *gross tonnes*, except those specified in **(1)** to **(8)** below. Where alternative and supplementary arrangements are provided to the satisfaction of the Society, the requirements in **Part R** need not apply to ships covered by this Part. ~~Where alternative arrangements for inert gas systems are provided to ships covered by this Part, the requirements in **4.5.5-1** of **Part R** need not apply to these ships, even if these ships carry crude oil and petroleum products having a flashpoint not exceeding 60℃ and other liquid products having a similar fire hazard.~~

(1) **1.1.1** (except **1.1.1-2**), ~~**4.5.5,**~~ **10.8**, **10.9** and **Chapter 21, Part R** and **14.4, Part D** are not to apply;

(2) **4.5.1-2, Part R** i.e. the requirements for location of the main cargo control station need not apply;

(3) **10.2**, **10.4** and **10.5** (except **10.5.5**), **Part R** are to apply, regarding the ships to be tankers of 2,000 *tons* gross tonnage and over;

(4) **11.2** is to apply in lieu of **10.9, Part R**;

(5) **11.3** is to apply in lieu of **10.8, Part R**;

(6) **4.5.10**, **Part R** is to apply to ships of 500 *tons* gross tonnage and over, replacing "hydrocarbon gases" by "flammable vapours" in **4.5.10**, **Part R**;
(7) **13.3.3** and **13.4.7**, **Part R** are to apply to ships of 500 *tons* gross tonnage and over; and
(8) **10.5.5**, **Part R** is to apply to ships of 2,000 *tons* gross tonnage and over.

Chapter 12 MECHANICAL VENTILATION IN THE CARGO AREA

12.2 Spaces Normally Entered During Cargo Handling Operations

Title of Paragraph 12.2.10 has been amended as follows.

12.2.10 Protection Screens ~~filled~~ fitted in the Opening of Ventilation Ducts (*IBC Code* 12.1.10)

Protection screens of not more than 13*mm* square mesh are to be fitted in outside openings of ventilation ducts.

Chapter 15 SPECIAL REQUIREMENTS

15.13 Cargoes Protected by Additives

Paragraph 15.13.5 has been amended as follows.

15.13.5 A Product Containing an Oxygen Dependent Additive

~~A product containing an oxygen dependent additive is to be carried without inertion (in tanks of a size not greater than 3,000m^3). Such cargoes are not to be carried in a tank requiring inertion under the requirements of **4.5.5, Part R**.~~

When a product containing an oxygen-dependent inhibitor is to be carried,

(1) in a ship for which inerting is required under the requirements of **4.5.5, Part R,** the application of inert gas is not to take place before loading or during the voyage, but is to be applied before commencement of unloading.
(2) in a ship to which the requirements of **4.5.5, Part R** does not apply, the product may be carried without inertion (in tanks of a size not greater than 3,000 m^3). If inertion is to be applied on such a ship, then the application of inert gas is not to take place before loading or during the voyage, but is to be applied before commencement of unloading.

Chapter 17 SUMMARY OF MINIMUM REQUIREMENTS (with reference to *IBC Code* Chapter 17)

17.1 General

Paragraph 17.1.1 has been amended as follows.

17.1.1 Application

The requirements for each product mentioned in column "**e**" to "**o**" in the **Table S17.1** apply to the ship in accordance with the provisions in which refer to the table. The contents of each column in the **Table S17.1** are as follows. Further, Minimum requirements to ships intended to carry mixtures of noxious liquid substances presenting pollution hazards only and which are provisionally assessed under regulation 6.3 of Annex II of *MARPOL 73/78*, are to be to the satisfaction of the Society.

((1) to (6) are omitted.)

(7) Tank environmental control* (column **h**)

Inert: inerting (*See* **9.1.2(1)**)

Pad: liquid or gas padding (*See* **9.1.2(2)**)

Dry: drying (*See* **9.1.2(3)**)

Vent: natural or force ventilation (*See* **9.1.2(4)**)

~~A blank indicates no special guidance given for tank environmental control.~~

No: no special requirements under this Part

(Inerting may be required under the requirements of **Part R**)

((8) to (13) are omitted.)

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2016.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1%* of the estimated mass of all structural material, whichever is the less.

* For high speed craft, "1%" is to be read as "3%".

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part S Ships Carrying Dangerous Chemicals in Bulk

2015 AMENDMENT NO.2

Notice No.82 25th December 2015
Resolved by Technical Committee on 28th July 2015

Notice No.82 25th December 2015
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part S SHIPS CARRYING DANGEROUS CHEMICALS IN BULK

S3 SHIP ARRANGEMENTS

S3.2 Accommodation, Service and Machinery Spaces and Control Stations

S3.2.1 Arrangements

Sub-paragraph -1 has been amended as follows.

1 With respect to the requirements specified in **3.2.1**, **Part S of the Rules**, paint lockers, regardless of their use, are not to be located within the cargo area. However, seldom-accessed lockers that are provided at bow sections may comply with the requirements given in **R4.5.1-~~5~~7**.
2 (Omitted)

S8 CARGO TANK VENTING AND GAS-FREEING ARRANGEMENT

Section S8.4 has been amended as follows.

S8.4~~4~~5 Cargo Tank Gas-freeing

S8.4~~4~~5.3 Design of Gas-freeing System

In designing the gas-freeing system, it is to be taken account for the relevant requirements in **S8.1.4**.

S9 ENVIRONMENTAL CONTROL

S9.1 General

Paragraph S9.1.3 has been amended as follows.

S9.1.3 Inerting or Padding of Cargo Tanks

1 The inert gas systems for use in filling and discharging the cargo tanks specified in **9.1.3(1), Part S of the Rules** are to comply with the following requirements, except where the installation of inert gas system is required by **4.5.5, Part R of the Rules**.

(1) Inert gas systems using oil fired inert gas generators are to comply with the requirements of ~~**S11.1.1-2(1)(a)** to **(c)**~~**R4.5.5-4(3)**

(2) Inert gas systems using nitrogen generators are to comply with the requirements of ~~**the Annex R35.2.2-2** "GUIDANCE FOR INERT GAS SYSTEMS USING NITROGEN GENERATORS"~~**R4.5.5-4(2)**.

(3) Inert gas systems using boiler flue gases are to comply with the requirements of ~~**Chapter 35**~~**R4.5.5-4(4), Part R of the Rules**. ~~As an alternative to the water seal required by **35.2.6-4(1), Part R of the Rules**, an arrangement as referred to in **S11.1.1-2(1)(b)** may be accepted.~~

2 Except where the installation of inert gas system is required by **4.5.5, Part R of the Rules,** ~~T~~the inert gas system for ensuring "sufficient inert gas available on the ship to compensate for normal losses during transportation" referred to in **9.1.3(1), Part S of the Rules** is to be as ~~follows:~~following **(1)**, **(2)** and **R4.5.5-4**.

(1) The nitrogen generator that separates nitrogen from the air may be used in combination of the inert gas contained in a pressure vessel as a make-up system at sea.

(2) The required quantity of inert gas to be carried on board the ship is to be determined for each ship in consideration of the construction and equipment of the ship, but it, as a rule, is to be not less than 5% of the total volume of cargo spaces to be inerted.

~~(3) Inert gas systems using oil fired inert gas generators are to comply with the requirements of **S11.1.1-2(1)(a)** to **(c)**, except the requirements of **1.2.1-1**, **1.2.1-4**, **1.2.1-5**, **1.2.2-1**, **1.2.3-3**, **1.2.4-1** and **1.2.8 of the Annex S11.1.1-2(1)(a)** "INERT GAS SYSTEMS USING OIL FIRED INERT GAS GENERATORS ON CHEMICAL TANKERS".~~

~~(4) Inert gas systems using nitrogen generators are to comply with the requirements of **the Annex R35.2.2-2** "GUIDANCE FOR INERT GAS SYSTEMS USING NITROGEN GENERATORS", except the requirements of **1.2.1-1** and **1.2.2-1 of the Annex R35.2.2-2**.~~

~~(5) Inert gas systems using boiler flue gases are to comply with the requirements of **Chapter 35, Part R of the Rules,** except the requirements of **35.2.2-2**, **35.2.2-5**, **35.2.4-1, Part R** and the requirement for alternative supply of cooling water specified in **35.2.3-1, Part R of the Rules.**~~

3 The "means to be provided for monitoring" referred to in **9.1.3(4), Part S of the Rules** are to be as follows:

(1) Continuous monitoring system
   (a) Continuous monitoring by fixed oxygen content meter, or
   (b) Combined use of continuous pressure measurement of tank atmosphere and portable oxygen content meter.

(2) In the case of the cargo where the "closed type" is required for measurement instruments and inerted method is applied, the measurements by a portable oxygen content meter are to be taken at such measuring line from which no cargo is leaked onto the deck during and after the measurements, and means are provided to lead the exhaust gas to the cargo vent lines. In the

case of the cargo where the “restricted type” is required, means are to be provided so that the opening for measurement are automatically closed.

S11 FIRE PROTECTION AND FIRE EXTINCTION

S11.1 General

Paragraph S11.1.1 has been amended as follows.

S11.1.1 Application

1 The ships, which are other than ships exclusively engaged in the carriage of the cargo exempted the application of the requirements for tankers in **Part R** of the Rules (except **10.2.1-4(4)** and **10.10.2-2**) and **Chapter 14**, **Part D** of the Rules in according to **11.1.2**, **Part S** of the Rules, are to be comply with the requirements for tankers in **Part R** of the Rules (except **4.5.1-2**) and **Chapter 14**, **Part D of the Rules.**

~~**2** The wording of “alternative arrangements for inert gas system” as referred to in **11.1.1, Part S of the Rules** means either of the followings, for ships carrying crude oil and petroleum products having a flashpoint not exceeding 60℃ and having Reid vapour pressure below atmospheric pressure, or other liquid cargoes having a similar fire hazard.~~

~~(1) The inert gas systems using oil fired inert gas generators complying with the following requirements:~~

~~(a) The requirements of **the Annex S11.1.1-2(1)(a)** “INERT GAS SYSTEMS USING OIL FIRED INERT GAS GENERATORS ON CHEMICAL TANKERS”~~

~~(b) In **(a)** above, the water seal required by **1.2.6-1 of the Annex S11.1.1-2(1)(a)** may be substituted for an arrangement consisting of two shut-off valves in series with a venting valve in between and complying with the following conditions:~~

~~i) The operation of the valves is to be automatically executed.~~

~~ii) Signals for opening/closing are to be taken from the process directly, *e.g.* inert gas flow or differential pressure.~~

~~iii) Alarm for faulty operation of the valves is to be provided, *e.g.* the operation status of “blower stop” and “supply valve(s) open” is an alarm condition.~~

~~(c) The following requirements:~~

~~i) When two blowers are provided, the total required capacity of the inert gas system is preferably to be divided equally between the two blowers, and in no case is one blower to have a capacity less than 1/3 of the total capacity required.~~

~~ii) In particular those parts of scrubbers, blowers, non-return devices, scrubber effluent and other drain pipes which may be subjected to corrosive action of the gases and/or liquids are to be either constructed of corrosion resistant material or lined with rubber, glass fiber epoxy resin or other equivalent coating material.~~

~~(2) The inert gas systems complying with the requirements of **the Annex R35.2.2-2** “GUIDANCE FOR INERT GAS SYSTEMS USING NITROGEN GENERATORS”.~~

~~(3) In case where carriage of flammable cargoes other than crude oil or petroleum products specified in **Chapter 17** and **18, Part S of the Rules** by ships carrying dangerous chemicals in bulk is intended and where the capacity of each tank carrying such cargo does not exceed~~

~~3,000 m^3, the discharge rate of each nozzle of the tank washing machine does not exceed 17.5 m^3/hr and the aggregate total discharge rate of the tank washing machines simultaneously used in one tank does not exceed 110 m^3/hr.~~

S12 MECHANICAL VENTILATION IN THE CARGO AREA

S12.2 Spaces Normally Entered During Cargo Handling Operations

Paragraph S12.2.8 has been amended as follows.

S12.2.8 Electric Motors Driving Fans

With respect to the requirements specified in **12.2.8, Part S of the Rules**, ~~T~~the ventilation fans are to ~~be~~ comply~~ied~~ with the requirements of **12.2.8, Part S of the Rules** and to be of non-sparking type compli~~ed~~ying with the requirements of **R4.5.4-1(2)**.

Paragraph S12.2.10 has been amended as follows.

S12.2.10 Protection Screens Fitted in the Opening of Ventilation Ducts

The protection screens may be ~~of wire gauze~~ of not more than 13*mm*~~×13*mm*~~ square mesh without having the function of flame screen. However, the ~~wire gauze is~~ protection screens are to have suitable strength against the falling impact of foreign objects.

S12.3 Pump Rooms and Other Enclosed Spaces Normally Entered

S12.3.1 Pump Rooms and Other Enclosed Spaces Normally Entered

Sub-paragraph -3 has been amended as follows.

3 The ballast pump room where no cargo piping whatsoever penetrates therethrough but cargo pipings are connected thereto, or where cargo pipings without having flange joints and valves penetrate therethrough is to be dealt with in accordance with the following requirements:

(1) (Omitted)

(2) The exhaust outlet of the mechanical ventilation fans serving the ballast pump room is to be provided with a ~~protective wire gauge~~ protection screen of not more than 13*mm*~~×13*mm*~~ square mesh. However, no flame screens may be provided.

((3) and (4) are omitted.)

S15 SPECIAL REQUIREMENTS

Section S15.4 has been added as follows.

S15.4 Diethyl Ether (*IBC Code* 15.4)

S15.4.1 Environmental Control for Void Space Surrounding the Cargo Tanks

With respect to the requirements specified in **15.4.1, Part S of the Rules**, the ventilation fans are to comply with the requirements of **15.4.1, Part S of the Rules** and to be of non-sparking type complying with the requirements of **R4.5.4-1(2)**. For the purpose of this requirement, protection screens of not more than 13*mm* square mesh are to be fitted in the inlet and outlet ventilation openings of the ducts fitted with such fans on the open deck.

S15.13 Cargoes Protected by Additives

Paragraph S15.13.3 has been added as follows.

S15.13.3 Chemical Inhibition

With respect to the requirements specified in **15.3.3(2), Part S of the Rules**, in case where additives have oxygen-dependent inhibitor, *MSC-MEPC.2/Circ.14*, as amended, is to be applied.

S15.13.5 A Product Containing an Oxygen Dependent Additive

Sub-paragraphs -2 and -3 have been added as follows.

2 With respect to the requirements specified in **15.13.5, Part S of the Rules**, in case where additives have oxygen-dependent inhibitor, *MSC-MEPC.2/Circ.14*, as amended, is to be applied.

3 With respect to the requirements specified in **15.13.5, Part S of the Rules**, in case a product containing an oxygen dependent inhibitor is carried, *MSC-MEPC.5/Circ.10*, as amended, is to be applied.

Annex S11.1.1-2(1)(a) has been deleted.

~~Annex S11.1.1-2(1)(a) INERT GAS SYSTEMS USING OIL FIRED INERT GAS GENERATORS ON SHIPS CARRYING DANGEROUS CHEMICALS IN BULK~~

~~1.1 Scope~~

~~1.1.1 Scope~~

~~The requirements in this Annex apply to inert gas systems using oil fired inert gas generators (hereinafter referred to as "the inert gas system" in this Annex).~~

~~1.1.2 Definition~~

~~"Inert gas generator" means the machinery dedicated to the production and supply of flue gas as the inert gas and includes the inert gas blowers, combustion chambers, oil fuel pumps and burners, gas coolers/scrubbers and automatic combustion control devices and monitoring, alarm and safety devices.~~

~~1.1.3 Drawings and Data~~

~~Drawings and data to be submitted are generally as follows:~~

~~(1) Drawings and data for approval~~

~~(a) General arrangements and piping diagrams of the inert gas system (with materials, dimensions, design pressure of pipes, valves, etc.).~~

~~(b) Details of each component consisting of the inert gas system.~~

~~(c) Diagrams of control, monitoring, alarm and safety devices of the inert gas system.~~

~~(d) Other drawings and data considered necessary by the Society.~~

~~(2) Drawings and data for reference~~

~~(a) Instructions and operation manual of the inert gas system (including the matter to be attended to the safety of the operators, notes for maintenance and measures to be taken in case of failure).~~

~~(b) Other drawings and data considered necessary by the Society.~~

~~(3) The instructions and operation manual specified in **(2)(a)** are to be carried on board the ship.~~

~~1.2 Construction of Inert Gas Systems~~

~~1.2.1 General Requirements for Inert Gas Systems~~

~~**1** The inert gas system is to be capable of inerting empty cargo tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported.~~

~~**2** The inert gas system is to be capable of maintaining the atmosphere, in all parts of each cargo tank designated to carry flammable products requiring protection by an inert gas system, with an oxygen content not exceeding 8% by volume and at a positive pressure at all times in port and at sea except when it is necessary for such a tank to be gas-free.~~

~~**3** The inert gas system is to be capable of eliminating the need for air to enter a tank during normal operations except when it is necessary for such a tank to be gas-free.~~

~~**4** The inert gas system is to be capable of purging empty cargo tanks of flammable vapour, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank.~~

5 — The inert gas system is to be capable of delivering inert gas to the cargo tanks at a rate of at least 125% of the maximum rate of discharge capacity of the ship expressed as a volume.
The Society may accept inert gas systems having a lower delivery capacity provided that the maximum rate of discharge of cargoes from cargo tanks being protected by the system is restricted to 80% of the inert gas capacity.
6 — The inert gas system is to be capable of delivering inert gas with an oxygen content of not more than 5% by volume in the inert gas supply main to the cargo tanks at any required rate of flow.
7 — Suitable fuel in sufficient quantity is to be provided for the inert gas generators.
8 — The inert gas generators are to be located outside the cargo area as defined in **1.3.1(4), Part S of the Rules**. Spaces containing inert gas generators are to have no direct access to accommodation, service or control station spaces, but may be located in machinery spaces. If they are not located in machinery spaces they are to be located in a compartment reserved solely for their use. Such a compartment is to be separated by a gastight steel bulkhead and/or deck from accommodation, service and control station spaces. Adequate positive-pressure-type mechanical ventilation is to be provided for such a compartment. Access to such compartments located aft is to be only from an open deck outside the cargo area. Access is to be located on the end bulkhead not facing the cargo area and/or on the outboard side of the superstructure or deckhouse at a distance of at least 25% of the length of the ship but not less than 5 *m* from the end of the superstructure or deckhouse facing the cargo area. In the case of such a compartment being located in the forecastle, access is to be through the deckhouse forward of the cargo area.
9 — Inert gas piping systems are not to pass through accommodation, service and control station spaces.

1.2.2 — Source of Inert Gas Supply
1 — Two fuel oil pumps are to be fitted to each inert gas generator. The Society may permit only one fuel oil pump on condition that sufficient spares for the fuel oil pump and its prime mover are carried on board to enable any failure on the fuel oil pump and its prime mover to be rectified by the ship's crew.
2 — Where more than one inert gas generator is provided, suitable shutoff arrangements are to be provided on the discharge outlet of each generator plant.
3 — Arrangements are to be made to vent the inert gas to the atmosphere in case the inert gas produced is off-specification, *e.g.* during starting up or in case of equipment failure.

1.2.3 — Gas Scrubbers
1 — A flue gas scrubber is to be provided which will effectively cool the volume of gas specified in **1.2.1-5** and remove solids and sulphur combustion products.
2 — The cooling water arrangements for the scrubber (including the precooler) are to be such that an adequate supply of water will, under the inert gas system being used, be available without interfering with any essential services on the ship.
3 — A stand-by cooling water pump is to be included in the cooling water arrangements.
4 — Demisters or equivalent devices are to be fitted in or just after the scrubber to minimize the amount of water carried over to the inert gas main.

1.2.4 — Inert Gas Blowers
1 — Two inert gas blowers are to be fitted to each inert gas generator, which together are to be capable of delivering at least the volume of gas required by **1.2.1-5** to the cargo tanks, required to be protected by the system. The Society may permit only one blower if it is capable of delivering the total volume of gas required by **1.2.1-5** to the protected cargo tanks, provided that sufficient

spares for the air blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified.

2 The inert gas system is to be so designed that the maximum pressure which the system can exert on any cargo tank will not exceed the test pressure of any cargo tank.

3 Where inert gas generators are served by positive displacement blowers, a pressure relief device is to be provided to prevent excess pressure being developed on the discharge side of the blower.

1.2.5 Inert Gas Regulating Valves

An inert gas regulating valve with an indicator to show whether it is open or closed is to be fitted in the inert gas supply main. This valve is to be automatically controlled to close as required in **1.2.9-3(1)** and **(2)**. It is also to be capable of automatically regulating the flow of inert gas to the cargo tanks unless other means are provided to automatically control the inert gas flow rate.

1.2.6 Non-return Devices

1 At least two non-return devices, one of which is to be a water seal, are to be fitted in the inert gas supply main in order to prevent the return of flammable vapour to the inert gas generator and to any gas-safe space (gas safe space means a space in which the entry of hydrocarbon vapours would produce hazards with regard to flammability or toxicity. The same is referred hereinafter.). They are to be located between the inert gas regulating valve required by **1.2.5** and the first connection to any cargo tank or cargo pipeline. However, the Society may permit an alternative arrangement or device providing a measure of safety equivalent to that of a water seal, *e.g.* the arrangements as referred to in **S11.1.1-2(1)(b) of the Guidance**.

2 The non-return devices are to be effective under all normal conditions including trim, list and motion of the ship.

3 The non-return devices are to be located in the cargo tank area on deck.

4 The water seal specified in **-1** is to comply with the following requirements.

(1) The water seal is to be capable of being supplied by two separate pumps, each of which is to be capable of maintaining an adequate supply at all times.

(2) The arrangement of the seal and its associated provisions is to be such that it will prevent back-flow of flammable vapours and will ensure the proper functioning of the water seal under operating conditions.

(3) Provisions are to be made to ensure that any water seal is protected against freezing, in such a way that the integrity of water seal is not impaired by overheating.

(4) A water loop or other approved arrangement is to be fitted to each associated water supply and drain pipe and to all venting or pressure sensing pipe leading to gas safe spaces. Means are to be provided to prevent such loops from being emptied by vacuum.

(5) Any water seal or equivalent device and all loop arrangements are to be capable of preventing the return of flammable vapours to an inert gas generator at a pressure equal to the test pressure of the cargo tanks.

5 The second non-return device other than water seal specified in **-1**, is to comply with the followings:

(1) The non-return device is to be a non-return valve or equivalent capable of preventing the return of vapours or liquids;

(2) The non-return device is to be fitted between the water seal (or the equivalent device) required in **-1** and the first connection from the inert gas main to a cargo tank; and

(3) The non-return device is to be provided with positive means of closure. As an alternative to the positive means of closure, an additional valve having such means of closure may be provided between the non-return valve and the first connection to the cargo tanks to isolate the water seal (or equivalent device).

6 As an additional safeguard against the possible leakage of flammable liquids or vapours back from the deck main, means are to be provided to permit this section of line between the valve having positive means of closure referred to in **-5** and the inert gas regulating valve referred to in **1.2.5** to be vented in a safe manner when the first of these valves is closed.

1.2.7 Inert Gas Distribution Lines

1 The inert gas main may be divided into two or more branches between the non-return devices required by **1.2.6** and the cargo tanks.

2 Inert gas supply mains are to be fitted with branch piping leading to each cargo tank designated for the carriage of flammable products required to be inerted. Each cargo tank containing or loading products not required to be inerted is to be separated from the inert gas main by either of the followings:

(1) removing spool pieces, valves or other pipe sections, and blanking the pipe ends;

(2) arrangement of two spectacle flanges in series with provisions for detecting leakage into the pipe between the two spectacle flanges.

3 Means are to be provided to protect cargo tanks against the effect of overpressure or vacuum caused by thermal variations when the cargo tanks are isolated from the inert gas mains.

4 Piping systems are to be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.

5 Suitable arrangements are to be provided to enable the inert gas main to be connected to an external supply of inert gas.

6 Unless the arrangements for venting of all vapours displaced from the cargo tanks during loading and ballasting comply with the requirements of **Chapter 8, Part S of the Rules** for controlled venting, such arrangements are to comply with **4.5.3** and **11.6** (except **11.6.3-4**), **Part R of the Rules** and are to consist either of one or more mast risers or a number of high velocity vents.

1.2.8 Safety Measures during Inerting, Purging or Gas Freeing of Empty Tanks

The arrangements for inerting, purging or gas freeing of empty tanks are to be subjected to the approval by the Society and to comply with the following requirements:

(1) The accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is to be minimized.

(2) On individual cargo tanks the gas outlet pipe, if fitted, is to be positioned as far as practicable from the inert gas/air inlet and in accordance with the requirements in **4.5.3** and **11.6** (except **11.6.3-4**), **Part R of the Rules**, or **8.2.3, Part S of the Rules**. The inlet of such outlet pipes may be located either at deck level or at not more than 1 *m* above the bottom of the tank.

(3) The cross-sectional area of such gas outlet pipe referred to in **(2)** is to be such that an exit velocity of at least 20 *m/sec* can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets are to extend not less than 2 *m* above deck level.
When, in accordance with **1.2.1-5**, the Society permits a system designed to supply only one or two tanks simultaneously, the outlet pipes are to be sized such that an exit velocity in the outlet pipes of 20 *m/sec* can be maintained.

(4) Each gas outlet referred to in **(3)** is to be fitted with suitable blanking arrangements.

1.2.9 Means for Measuring and Controlling

1 Measuring devices

(1) Means are to be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the system, whenever it is operating.

(2) Instruments are to be fitted for continuously indicating and permanently recording those in **(a)** and **(b)**, when the inert gas is being supplied. These instruments are to be placed in the cargo control room where provided. Where no cargo control room is provided, they are to be placed

in a position easily accessible during cargo operations.

(a) The pressure of the inert gas supply mains between the non-return devices required by **1.2.5-1** and the cargo tanks; and

(b) the oxygen content of the inert gas supply main.

(3) In addition, meters are to be fitted:

(a) in the navigating bridge to indicate at all times the pressure referred to in **(2)(a)**; and

(b) in the machinery control room or in the machinery space to indicate the oxygen content referred to in **(2)(b)**.

(4) At least each two sets of portable instruments for oxygen and flammable vapour concentrations are to be provided on board. The portable instruments for flammable vapours concentrations are to be capable of measurement in an inerted atmosphere. In addition, a suitable arrangement is to be made on each cargo oil tank such that the condition of the tank atmosphere can be determined using these portable instruments.

(5) Suitable means are to be provided for the zero and span calibration of both fixed and portable gas concentration measurement instruments, referred to in **(1)** to **(4)**.

2 Alarm devices

(1) Audible and visual alarms are to be provided to indicate the followings:

(a) low water pressure or low water flow rate to the cooling and scrubbing arrangement;

(b) low fuel supply;

(c) high gas temperature as referred to in **-1(1)**;

(d) failure of the power supply to the inert gas generators;

(e) oxygen content in excess of 8% by volume as referred to in **-1(2)(b)**;

(f) failure of the power supply to the indicating instruments as referred to in **-1(2)** and to the automatic control systems for the gas regulating valve and the inert gas generator;

(g) low water level in the water seal;

(h) gas pressure less than 100 *mm* water gauge as referred to in **-1(2)(a)**;

(i) high gas pressure as referred to in **-1(2)(a)**.

(2) In the requirements of **(1)**, the alarms required in **(e)**, **(f)** and **(h)** are to be fitted in the machinery space and cargo control room, where provided, but in each case in such a position that they are immediately received by responsible members of the crew either as individual alarms or as a group alarm.

3 Safety devices

(1) Automatic shut-down of the gas regulating valve and of the fuel oil supply to the inert gas generator is to be arranged on predetermined limits being reached in respect of **-2(1)(a)** and **(c)**.

(2) Automatic shut-down of the gas regulating valve is to be arranged in respect of **-2(1)(d)**.

(3) In respect of **-2(1)(c)**, when the oxygen content of the inert gas exceeds 8% by volume, immediate action is to be taken to improve the gas quality. Unless the quality of the gas improves, all operations in those tanks to which inert gas is being supplied are to be suspended so as to avoid air being drawn into the tanks. The deck isolation valve referred to in **1.2.6-5** is to be closed and the off-specification gas shall be vented to atmosphere.

(4) In respect of **-2(1)(g)**, safety measures are to be taken for the maintenance of an adequate reserve of water at all times and the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases. The audible and visual alarm on the low level of water in the water seal is to operate even when the inert gas is not being supplied.

(5) An audible alarm system independent of that required in **-2(1)(h)** or automatic shut-down of cargo pumps is to be provided to operate on predetermined limits of low pressure in the inert gas mains being reached.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2016.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1%* of the estimated mass of all structural material, whichever is the less.

* For high speed craft, "1%" is to be read as "3%".