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MERCHANT SHIPPING ACT
(CHAPTER 179)

MERCHANT SHIPPING (SAFETY CONVENTION) (AMENDMENT NO. 2) REGULATIONS 2015

In exercise of the powers conferred by section 100 of the Merchant Shipping Act, the Maritime and Port Authority of Singapore, with the approval of the Minister for Transport, makes the following Regulations:

Citation and commencement

1. These Regulations may be cited as the Merchant Shipping (Safety Convention) (Amendment No. 2) Regulations 2015 and come into operation on 1 January 2016.

Amendment of Regulation 2 of Chapter I

2. Regulation 2 of Chapter I of the Merchant Shipping (Safety Convention) Regulations (Rg 11) (referred to in these Regulations as the principal Regulations) is amended —

(*a*) by inserting, immediately after the definition of "fishing vessel", the following definition:

" "IMO", "Organisation" or "Organization" means the International Maritime Organization;"; and

(*b*) by deleting the definition of "Organisation".

Amendment of Regulation 29 of Chapter II-1

3. Regulation 29 of Chapter II-1 of the principal Regulations is amended —

(*a*) by deleting sub-paragraph (ii) of paragraph (*c*) and substituting the following sub-paragraph:

"(ii) capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same

conditions, from 35° on either side to 30° on the other side in not more than 28 seconds, but where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch, the ship (regardless of the date of its construction) may demonstrate compliance with this requirement by one of the following methods:

(1) during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch;

(2) where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed must be calculated using the submerged rudder blade area in the proposed sea trial loading condition and the calculated ahead speed must result in a force and torque applied to the main steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch;

(3) the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition and the speed of the ship must correspond to the number of maximum continuous revolutions of the main engine and maximum design pitch of the propeller;"; and

(*b*) by deleting sub-paragraph (ii) of paragraph (*d*) and substituting the following sub-paragraph:

"(ii) capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater, but where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater, the ship (regardless of the date of its construction), including a ship constructed before 1 January 2009, may demonstrate compliance with this requirement by one of the following methods:

(1) during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater;

(2) where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed must be calculated using the submerged rudder blade area in the proposed sea trial loading condition and the calculated ahead speed must result in a force and torque applied to the auxiliary steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater;

(3) the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition; and".

Amendment of Regulation 1 of Chapter II-2

4. Regulation 1 of Chapter II-2 of the principal Regulations is amended by inserting, immediately after sub-paragraph (v) of paragraph (*b*), the following sub-paragraphs:

"(vi) Vehicle carriers constructed before 1 January 2016, including those constructed before 1 July 2012, must comply with paragraph (*b*)(ii) of Regulation 20-1, as adopted by resolution MSC.365(93).

(vii) Tankers constructed before 1 January 2016, including those constructed before 1 July 2012, must comply with Regulation 16(*c*)(iii) except sub-paragraph (3) of that Regulation.

(viii) Regulations 4(*e*)(v)(1)(A) and 4(*e*)(v)(1)(C) apply to ships constructed on or after 1 January 2002 but before 1 January 2016, and Regulation 4(*e*)(v)(2)(A) applies to all ships constructed before 1 January 2016.".

Amendment of Regulation 3 of Chapter II-2

5. Regulation 3 of Chapter II-2 of the principal Regulations is amended by inserting, immediately after paragraph (*aaa*), the following paragraphs:

"(*bbb*) "Fire damper" is, for the purpose of implementing Regulation 9(*g*) adopted by resolution MSC.365(93), as may be amended, a device installed in a ventilation duct, which under normal conditions remains open, allowing flow in the duct, and is closed during a fire, preventing the flow in the duct to restrict the passage of fire, and in relation to this —

(i) "automatic fire damper" is a fire damper that closes independently in response to exposure to fire products;

(ii) "manual fire damper" is a fire damper that is intended to be opened or closed by the crew by hand at the damper itself; and

(iii) "remotely operated fire damper" is a fire damper that is closed by the crew through a control located at a distance away from the controlled damper.

(*ccc*) "Smoke damper" is, for the purpose of implementing Regulation 9(*g*) adopted by resolution MSC.365(93), as may be amended, a device installed in a ventilation duct, which under normal conditions remains open, allowing flow in the duct, and is closed during a fire, preventing the flow in the duct to restrict the passage of smoke and hot gases (but is not expected to contribute to the integrity of a fire-rated division penetrated by a ventilation duct) and in relation to this —

(i) "automatic smoke damper" is a smoke damper that closes independently in response to exposure to smoke or hot gases;

(ii) "manual smoke damper" is a smoke damper intended to be opened or closed by the crew by hand at the damper itself; and

(iii) "remotely operated smoke damper" is a smoke damper that is closed by the crew through a control located at a distance away from the controlled damper.

(*ddd*) "Vehicle carrier" means a cargo ship with multi-deck ro-ro spaces designed for the carriage of empty cars and trucks as cargo.".

Amendment of Regulation 4 of Chapter II-2

6. Regulation 4 of Chapter II-2 of the principal Regulations is amended by deleting sub-paragraph (v) of paragraph (*e*) and substituting the following sub-paragraph:

"(v) Inert gas systems

(1) Application

(A) For tankers of 20,000 tonnes deadweight and upwards constructed on or after 1 July 2002 but before 1 January 2016, the protection of the cargo tanks must be achieved by a fixed inert gas system in accordance with the requirements of the Fire Safety Systems Code except that the Director may accept other equivalent systems or arrangements as described in paragraph (*e*)(v)(4).

(B) For tankers of 8,000 tonnes deadweight and upwards constructed on or after 1 January 2016, when carrying cargoes described in Regulation 1(*f*)(i) or 1(*f*)(ii), the protection of the cargo tanks must be achieved by a fixed inert gas system in accordance with the requirements of the Fire Safety Systems Code, except that the Director may accept other equivalent systems or arrangements as described in paragraph (*e*)(v)(4).

(C) Tankers operating with a cargo tank cleaning procedure using crude oil washing must be fitted with an inert gas system complying with the Fire Safety Systems Code and with fixed tank washing machines, but inert gas systems fitted on tankers constructed on or after 1 July 2002 but before 1 January 2016 must comply with the Fire Safety Systems Code.

(D) Tankers required to be fitted with inert gas systems must comply with the following provisions:

(I) double-hull spaces must be fitted with suitable connections for the supply of inert gas;

(II) where hull spaces are connected to a permanently fitted inert gas distribution system, means must be provided to prevent hydrocarbon gases from the cargo tanks entering the double-hull spaces through the system;

(III) where such spaces are not permanently connected to an inert gas distribution system, appropriate means must be provided to allow connection to the inert gas main.

(2) Inert gas systems of chemical tankers and gas carriers

(A) The requirements for inert gas systems contained in the Fire Safety Systems Code need not be applied to all chemical tankers constructed before 1 January 2016, including those constructed before 1 July 2012, and all gas carriers —

(I) when carrying cargoes described in Regulation 1(*f*)(i), provided that such chemical tankers or gas carriers comply with the requirements for inert gas systems on chemical tankers established by the Director, based on the guidelines developed by the Organisation*; or

(II) when carrying flammable cargoes other than crude oil or petroleum products such as cargoes listed in Chapters 17 and 18 of the International Bulk Chemical Code, provided that the capacity of tanks used for the carriage of the flammable cargoes does not exceed 3,000 m^3, the individual nozzle capacities of tank washing machines do not exceed 17.5 m^3/h and the total combined throughput from the number of machines in use in a cargo tank at any one time does not exceed 110 m^3/h.

* Refer to the Regulation for Inert Gas Systems on Chemical Tankers, adopted by the Organisation by resolution A.567(14), and Corr.1.

(3) General requirements for inert gas systems

(A) The inert gas system must be capable of inerting, purging and gas-freeing empty tanks and maintaining the atmosphere in cargo tanks with the required oxygen content.

(B) Tankers fitted with a fixed inert gas system must be provided with a closed ullage system.

(4) Requirements for equivalent systems

(A) The Director may, after having given consideration to the ship's arrangement and equipment, accept other fixed installations, in accordance with Regulation 5 of Chapter I and paragraph (*e*)(v)(4)(C).

(B) For tankers of 8,000 tonnes deadweight and upwards but less than 20,000 tonnes deadweight constructed on or after 1 January 2016, in lieu of fixed installations as required by paragraph (*e*)(v)(4)(A), the Director may accept other equivalent arrangements or means of protection in accordance with Regulation 5 of Chapter I and paragraph (*e*)(v)(4)(C).

(C) Equivalent systems or arrangements must —

(I) be capable of preventing dangerous accumulations of explosive mixtures in intact cargo tanks during normal service throughout the ballast voyage and necessary in-tank operations; and

(II) be so designed as to minimise the risk of ignition from the generation of static electricity by the system itself.".

Amendment of Regulation 9 of Chapter II-2

7. Regulation 9 of Chapter II-2 of the principal Regulations is amended by deleting paragraph (*g*) and substituting the following paragraph:

"(*g*) *Ventilation systems*

(This paragraph applies to ships constructed on or after 1 January 2016)

(i) General

(1) Ventilation ducts, including single and double wall ducts, must be of steel or equivalent material, except flexible bellows of short length not exceeding 600 mm used for connecting fans to the ducting in air-conditioning rooms. Unless expressly provided otherwise in paragraph (*g*)(i)(6), any other material used in

the construction of ducts, including insulation, must also be non-combustible. However, short ducts, not generally exceeding 2 m in length and with a free cross-sectional area* not exceeding 0.02 m^2, need not be of steel or equivalent material, subject to the following conditions:

(A) the ducts must be made of non-combustible material, which may be faced internally and externally with membranes having low flame-spread characteristics and, in each case, a calorific value** not exceeding 45 MJ/m^2 of the ducts' surface area for the thickness used;

(B) the ducts are only used at the end of the ventilation device;

(C) the ducts must be situated at least 600 mm, measured along the duct, from an opening in an "A" or "B" class division, including continuous "B" class ceiling.

* The term "free cross-sectional area" means, even in the case of a pre-insulated duct, the area calculated on the basis of the inner dimensions of the duct itself and not the insulation.

** Refer to the recommendations published by the International Organization for Standardization, in particular publication ISO 1716:2002, Reaction to the Fire Tests for Building Products – Determination of the Heat of Combustion.

(2) The following arrangements must be tested in accordance with the Fire Test Procedures Code:

(A) Fire dampers, including their relevant means of operation. However, the testing is not required for fire dampers located at the lower end of the duct in exhaust ducts for galley ranges (which must be of steel and capable of stopping the draught in the duct).

(B) Duct penetrations through "A" class divisions. However, the test is not required where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed connections or by welding.

(3) Fire dampers must be easily accessible. Where they are placed behind ceilings or linings, these ceilings or linings must be provided with an inspection hatch on which the identification number of the fire damper is marked. The fire damper identification number must also be marked on any remote controls provided.

(4) Ventilation ducts must be provided with hatches for inspection and cleaning. The hatches must be located near the fire dampers.

(5) The main inlets and outlets of ventilation systems must be capable of being closed from outside the spaces being ventilated. The means of closing must be easily accessible as well as prominently and permanently marked and must indicate the operating position of the closing device.

(6) Combustible gaskets in flanged ventilation duct connections are not permitted within 600 mm of openings in "A" or "B" class divisions and in ducts required to be of "A" class construction.

(7) Ventilation openings or air balance ducts between two enclosed spaces must not be provided except as permitted by paragraphs (*d*)(i)(2)(A) and (*d*)(ii)(3).

(ii) Arrangement of ducts

(1) The ventilation systems for machinery spaces of category A, vehicle spaces, ro-ro spaces, galleys, special category spaces and cargo spaces must, in general, be separated from each other and from the ventilation systems serving other spaces. However, the galley ventilation systems on cargo ships of less than 4,000 gross tonnage and in passenger ships carrying not more than 36 passengers need not be completely separated from other ventilation systems, but may be served by separate ducts from a ventilation unit serving other spaces. In such a case, an automatic fire damper must be fitted in the galley ventilation duct near the ventilation unit.

(2) Ducts provided for the ventilation of machinery spaces of category A, galleys, vehicle spaces, ro-ro spaces or special category spaces must not pass through accommodation spaces, service spaces, or control stations, unless they comply with paragraph (*g*)(ii)(4).

(3) Ducts provided for the ventilation of accommodation spaces, service spaces or control stations must not pass through machinery spaces of category A, galleys, vehicle spaces, ro-ro spaces or special category spaces, unless they comply with paragraph (*g*)(ii)(4).

(4) As permitted by paragraphs (*g*)(ii)(2) and (*g*)(ii)(3), ducts must be either —

(A) (I) constructed of steel having a thickness of at least 3 mm for ducts with a free cross-sectional area of less than 0.075 m^2, at least 4 mm for ducts with a free cross-sectional area of between 0.075 m^2 and 0.45 m^2, and at least 5 mm for ducts with a free cross-sectional area of over 0.45 m^2;

(A) (II) suitably supported and stiffened;

(A)(III) fitted with automatic fire dampers close to the boundaries penetrated; and

(A)(IV) insulated to "A-60" class standard from the boundaries of the spaces they serve to a point at least 5 m beyond each fire damper;

or —

(B) (I) constructed of steel in accordance with paragraphs (*g*)(ii)(4)(A)(I) and (*g*)(ii)(4)(A)(II); and

(B) (II) insulated to "A-60" class standard throughout the spaces they pass through, except for ducts that pass through spaces of category (9) or (10) as defined in paragraph (*b*)(ii)(3)(B)(II).

(5) For the purposes of paragraphs (*g*)(ii)(4)(A)(IV) and (*g*)(ii)(4)(B)(II), ducts must be insulated over their entire cross-sectional external surface. Ducts that are outside but adjacent to the specified space, and share one or more surfaces with the space, are considered to pass through the specified space and must be insulated over the surface they share with the space for a distance of 450 mm past the duct*.

(6) Where it is necessary that a ventilation duct passes through a main vertical zone division, an automatic fire damper must be fitted adjacent to the division. The damper must also be capable of being manually closed from each side of the division. The control location must be readily accessible and be clearly and prominently marked. The duct between the division and the damper must be constructed of steel in accordance with paragraphs (*g*)(ii)(4)(A)(I) and (*g*)(ii)(4)(A)(II) and insulated to at least the same fire integrity as the division penetrated. The damper must be fitted on at least one side of the division with a visible indicator showing the operating position of the damper.

* Sketches of such arrangements are contained in the Unified Interpretations of SOLAS Chapter II-2 (MSC.1/Circ.1276).

(iii) Details of fire dampers and duct penetrations

(1) Ducts passing through "A" class divisions must meet the following requirements:

(A) Where a thin plated duct with a free cross-sectional area equal to, or less than, 0.02 m^2 passes through "A" class divisions, the opening must be fitted with a steel sheet sleeve having a thickness of at least 3 mm and a length of at least 200 mm, divided preferably into 100 mm on each side of a bulkhead or, in the case of a deck, wholly laid on the lower side of the decks penetrated.

(B) Where ventilation ducts with a free cross-sectional area exceeding 0.02 m^2, but not more than 0.075 m^2, pass through "A" class divisions, the openings must be lined with steel sheet sleeves. The ducts and sleeves must have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length must be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, must be provided with fire insulation. The insulation must have at least the same fire integrity as the division through which the duct passes.

(C) Automatic fire dampers must be fitted in all ducts with a free cross-sectional area exceeding 0.075 m^2 that pass through "A" class divisions. Each damper must be fitted close to the division penetrated and the duct between the damper and the division penetrated must be constructed of steel in accordance with paragraphs (*g*)(ii)(4)(B)(I) and (*g*)(ii)(4)(B)(II). The fire damper must operate automatically, but must also be capable of being closed manually from both sides of the division. The damper must be fitted with a visible indicator which shows the operating position of the damper. Fire dampers are not required, however, where ducts pass through spaces surrounded by "A" class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they penetrate. A duct of cross-sectional area exceeding 0.075 m^2 must not be divided into smaller ducts at the penetration of an "A" class division and then recombined into the original duct once through the division to avoid installing the damper required by this provision.

(2) Ventilation ducts with a free cross-sectional area exceeding 0.02 m^2 passing through "B" class bulkheads must be lined with steel sheet sleeves of 900 mm in length, divided preferably into 450 mm on each side of the bulkheads, unless the duct is of steel for this length.

(3) All fire dampers must be capable of manual operation. The dampers must have a direct mechanical means of release or, alternatively, be closed by electrical, hydraulic or pneumatic operation. All dampers must be manually operable from both sides of the division. Automatic fire dampers, including those capable of remote operation, must have a failsafe mechanism that will close the damper in a fire even upon loss of electrical power or hydraulic or pneumatic pressure loss. Remotely operated fire dampers must be capable of being reopened manually at the damper.

(iv) Ventilation systems for passenger ships carrying more than 36 passengers

(1) In addition to the requirements in paragraphs (*g*)(i), (*g*)(ii) and (*g*)(iii), the ventilation system of a passenger ship carrying more than 36 passengers must also meet the following requirements.

(2) In general, the ventilation fans must be so arranged that the ducts reaching the various spaces remain within a main vertical zone.

(3) Stairway enclosures must be served by an independent ventilation fan and duct system (exhaust and supply) which must not serve any other spaces in the ventilation system.

(4) A duct, irrespective of its cross-section, serving more than one 'tween-deck accommodation space, service space or control station, must be fitted, near the penetration of each deck of such spaces, with an automatic smoke damper that must also be capable of being closed manually from the protected deck above the damper. Where a fan serves more than one 'tween-deck

space through separate ducts within a main vertical zone, each duct must be dedicated to a single 'tween-deck space and each duct must be provided with a manually operated smoke damper fitted close to the fan.

(5) Vertical ducts must, if necessary, be insulated as required by Tables 9.1 and 9.2. Ducts must be insulated as required for decks between the space they serve and the space being considered, as applicable.

(v) Exhaust ducts from galley ranges

(1) Requirements for passenger ships carrying more than 36 passengers

(A) In addition to the requirements in paragraphs (*g*)(i), (*g*)(ii) and (*g*)(iii), exhaust ducts from galley ranges must be constructed in accordance with paragraphs (*g*)(ii)(4)(B)(I) and (*g*)(ii)(4)(B)(II) and insulated to "A-60" class standard throughout accommodation spaces, service spaces, or control stations they pass through. They must also be fitted with —

(I) a grease trap readily removable for cleaning, unless an alternative approved grease removal system is fitted;

(II) a fire damper located in the lower end of the duct at the junction between the duct and the galley range hood which is automatically and remotely operated and, in addition, a remotely operated fire damper located in the upper end of the duct close to the outlet of the duct;

(III) a fixed means for extinguishing a fire within the duct*;

* Refer to the recommendations published by the International Organization for Standardization, in particular publication ISO 15371:2009, Ships and Marine Technology – Fire-extinguishing Systems for Protection of Galley Cooking Equipment.

(IV) remote-control arrangements for shutting off the exhaust fans and supply fans, for operating the fire dampers mentioned in paragraph (*g*)(v)(1)(A)(II) and for operating the fire-extinguishing system, which must be placed in a position outside the galley close to the entrance to the galley. Where a multi-branch system is installed, a remote means located with the above controls must be provided to close all branches exhausting through the same main duct before an extinguishing medium is released into the system; and

(V) suitably located hatches for inspection and cleaning, including one provided close to the exhaust fan and one fitted in the lower end where grease accumulates.

(B) Exhaust ducts from ranges for cooking equipment installed on open decks must conform to paragraph (*g*)(v)(1)(A), as applicable, when passing through accommodation spaces or spaces containing combustible materials.

(2) Requirements for cargo ships and passenger ships carrying not more than 36 passengers

When passing through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges must be constructed in accordance with

paragraphs (*g*)(ii)(4)(A)(I) and (*g*)(ii)(4)(A)(II). Each exhaust duct must be fitted with —

(A) a grease trap readily removable for cleaning;

(B) an automatically and remotely operated fire damper located in the lower end of the duct at the junction between the duct and the galley range hood and, in addition, a remotely operated fire damper in the upper end of the duct close to the outlet of the duct;

(C) arrangements, operable from within the galley, for shutting off the exhaust and supply fans; and

(D) fixed means for extinguishing a fire within the duct.*

* Refer to the recommendations published by the International Organization for Standardization, in particular publication ISO 15371:2009, Ships and Marine Technology – Fire-extinguishing Systems for Protection of Galley Cooking Equipment.

(vi) Ventilation rooms serving machinery spaces of category "A" containing internal combustion machinery

(1) Where a ventilation room serves only an adjacent machinery space of category "A" containing internal combustion machinery and there is no fire division between the ventilation room and the machinery space, the means for closing the ventilation duct serving the machinery space must be located outside of the ventilation room and machinery space.

(2) Where a ventilation room serves a machinery space of category "A" containing internal combustion machinery, as well as other spaces, and is separated from the machinery space by a "A-0" class division, including penetrations, the means for closing the ventilation duct for the machinery space can be located in the ventilation room.

(vii) Ventilation systems for laundries in passenger ships carrying more than 36 passengers

Exhaust ducts from laundries and drying rooms of category (13) spaces as defined in paragraph (*b*)(ii)(3)(B)(II) must be fitted with —

(1) filters readily removable for cleaning purposes;

(2) a fire damper located in the lower end of the duct which is automatically and remotely operated;

(3) remote-control arrangements for shutting off the exhaust fans and supply fans from within the space and for operating the fire damper mentioned in paragraph (*g*)(vii)(2); and

(4) suitably located hatches for inspection and cleaning.".

Amendment of Regulation 10 of Chapter II-2

8. Regulation 10 of Chapter II-2 of the principal Regulations is amended —

(*a*) by deleting paragraph (*a*) and substituting the following paragraph:

"(*a*) *Purpose*

(i) The purpose of this Regulation is to suppress and swiftly extinguish a fire in the space of origin, except for paragraph (*a*)(ii). For this purpose, the following functional requirements must be met:

(1) fixed fire-extinguishing systems must be installed having due regard to the fire growth potential of the protected spaces;

(2) fire-extinguishing appliances must be readily available.

(ii) For open-top container holds* and on-deck container stowage areas on ships designed to carry containers on or above the weather deck, constructed on or after 1 January 2016, fire protection arrangements must be provided for the purpose of containing a fire in the space or area of origin and cooling adjacent areas to prevent the spread of fire and structural damage.

* For a definition of this term, refer to the Interim Guidelines for Open-top Containerships (MSC/Circ.608/Rev.1).";

(*b*) by inserting, immediately after the words "cargo ships" in paragraph (*b*)(i)(3), the words ", other than those included in paragraph (*g*)(iii)(2),";

(*c*) by inserting, immediately after the words "no cargo ship" in paragraph (*b*)(ii)(4)(A)(II), the words ", other than those included in paragraph (*g*)(iii)(2),"; and

(*d*) by inserting, immediately after sub-paragraph (ii) of paragraph (*g*), the following sub-paragraph:

"(iii) Firefighting for ships constructed on or after 1 January 2016 designed to carry containers on or above the weather deck

(1) Ships must carry, in addition to the equipment and arrangements required by sub-paragraphs (i) and (ii), at least one water mist lance.

(A) The water mist lance must consist of a tube with a piercing nozzle which is capable of penetrating a container wall and producing water mist inside a confined space (container, etc.) when connected to the fire main.

(2) Ships designed to carry 5 or more tiers of containers on or above the weather deck must carry, in addition to the requirements of paragraph (*g*)(iii)(1), mobile water monitors* as follows:

(I) ships with breadth less than 30 m: at least 2 mobile water monitors; or

(II) ships with breadth of 30 m or more: at least 4 mobile water monitors.

* Refer to the Guidelines for the design, performance, testing and approval of mobile water monitors used for the protection of on-deck cargo areas of ships designed and constructed to carry five or more tiers of containers on or above the weather deck (MSC.1/Circ.1472).

(A) The mobile water monitors, all necessary hoses, fittings and required fixing hardware must be kept ready for use in a location outside the cargo space area not likely to be cut-off in the event of a fire in the cargo spaces.

(B) A sufficient number of fire hydrants must be provided such that —

(I) all provided mobile water monitors can be operated simultaneously for creating effective water barriers forward and aft of each container bay;

(II) the 2 jets of water required by paragraph (*b*)(i)(5)(A) can be supplied at the pressure required by paragraph (*b*)(i)(6); and

(III) each of the required mobile water monitors can be supplied by separate hydrants at the pressure necessary to reach the top tier of containers on deck.

(C) The mobile water monitors may be supplied by the fire main, provided the capacity of fire pumps and fire main diameter are adequate to simultaneously operate the mobile water monitors and 2 jets of water from fire hoses at the required pressure values. If carrying dangerous goods, the capacity of fire pumps and fire main diameter must also comply with Regulation 19(*c*)(i)(5), as far as applicable to on-deck cargo areas.

(D) The operational performance of each mobile water monitor must be tested during initial survey on board the ship to the satisfaction of the Director. The test must verify that —

(I) the mobile water monitor can be securely fixed to the ship structure ensuring safe and effective operation; and

(II) the mobile water monitor jet reaches the top tier of containers with all required monitors and water jets from fire hoses operated simultaneously.".

Amendment of Regulation 13 of Chapter II-2

9. Regulation 13 of Chapter II-2 of the principal Regulations is amended —

(*a*) by inserting, immediately after sub-paragraph (4) of paragraph (*d*)(i), the following sub-paragraphs:

"(5) Inclined ladders and stairways

For ships constructed on or after 1 January 2016, all inclined ladders or stairways fitted to comply with paragraph (*d*)(i)(1) with open treads in machinery spaces being part of or providing access to escape routes but not located within a protected enclosure must be made of steel. Such ladders or stairways must be fitted with steel shields attached to the undersides of the ladders or stairways, such as to provide escaping personnel protection against heat and flame from beneath.

(6) Escape from main workshops within machinery spaces

For ships constructed on or after 1 January 2016, two means of escape must be provided from the main workshop within a machinery space. At least one of these escape routes must provide a continuous fire shelter to a safe position outside the machinery space."; and

(*b*) by inserting, immediately after sub-paragraph (3) of paragraph (*d*)(ii), the following sub-paragraphs:

"(4) Inclined ladders and stairways

For ships constructed on or after 1 January 2016, all inclined ladders or stairways fitted to comply with paragraph (*d*)(ii)(1) with open treads in machinery spaces being part of or providing access to escape routes but not located within a protected enclosure must be made of steel. Such ladders or stairways must be fitted with steel shields attached to the undersides of the ladders or stairways, such as to provide escaping personnel protection against heat and flame from beneath.

(5) Escape from machinery control rooms in machinery spaces of category "A"

For ships constructed on or after 1 January 2016, two means of escape must be provided from the machinery control room located within a machinery space. At least one of these escape routes must provide a continuous fire shelter to a safe position outside the machinery space.

(6) Escape from main workshops in machinery spaces of category "A"

For ships constructed on or after 1 January 2016, two means of escape must be provided from the main workshop within a machinery space. At least one of these escape routes must provide a continuous fire shelter to a safe position outside the machinery space.".

Amendment of Regulation 16 of Chapter II-2

10. Regulation 16 of Chapter II-2 of the principal Regulations is amended by inserting, immediately after sub-paragraph (ii) of paragraph (*c*), the following sub-paragraph:

"(iii) Operation of inert gas system

(1) The inert gas system for tankers required in accordance with Regulation 4(*e*)(v)(1) must be so operated as to render and maintain the atmosphere of the cargo tanks non-flammable, except when such tanks are required to be gas-free.

(2) Despite the above, for chemical tankers, the application of inert gas may take place after the cargo tank has been loaded, but before commencement of unloading, and must continue to be applied until that cargo tank has been purged of all flammable vapours before gas-freeing. Only nitrogen is acceptable as inert gas under this provision.

(3) Despite Regulation 1(*b*)(ii)(2), the provisions of this paragraph must only apply to tankers constructed on or after 1 January 2016. If the oxygen content of the inert gas exceeds 5% by volume, immediate action must be taken to improve the gas quality.

Unless the quality of the gas improves, all operations in those cargo tanks to which inert gas is being supplied must be suspended so as to avoid air being drawn into the cargo tanks, the gas regulating valve, if fitted, must be closed and the off-specification gas must be vented to atmosphere.

(4) In the event that the inert gas system is unable to meet the requirement in paragraph (*c*)(iii)(1) and it has been assessed that it is impractical to effect a repair, then cargo discharge and cleaning of those cargo tanks requiring inerting must only be resumed when suitable emergency procedures have been followed, taking into account guidelines developed by the Organisation*.

* Refer to the Clarification of Inert Gas System Requirements under the Convention (MSC/Circ.485) and to the Revised Guidelines for Inert Gas Systems (MSC/Circ.353), as amended by MSC/Circ.387.".

Amendment of Regulation 20 of Chapter II-2

11. Regulation 20 of Chapter II-2 of the principal Regulations is amended by deleting the words "Regulations 9(*g*)(ii)(1)(A) and (B)" in paragraph (*c*)(i)(4)(B) and substituting the words "Regulation 9(*g*)(ii)(4)(A)(I) and (II)".

New Regulation 20-1 of Chapter II-2

12. Chapter II-2 of the principal Regulations is amended by inserting, immediately after Regulation 20, the following Regulation:

"Regulation 20-1

Requirements for Vehicle Carriers Carrying Motor Vehicles with Compressed Hydrogen or Natural Gas in the Motor Vehicles' Tanks for their own Propulsion as Cargo

(*a*) *Purpose*

The purpose of this Regulation is to provide additional safety measures in order to address the fire safety objectives of this chapter for vehicle carriers with vehicle and ro-ro spaces intended for carriage of motor vehicles with compressed hydrogen or compressed natural gas in the motor vehicles' tanks for their own propulsion as cargo.

(*b*) *Application*

(i) In addition to complying with the requirements of Regulation 20, as appropriate, vehicle spaces of vehicle carriers constructed on or after 1 January 2016 intended for the carriage of motor vehicles with compressed hydrogen or compressed natural gas in the motor vehicles' tanks for their own propulsion as cargo must comply with the requirements in paragraphs (*c*) to (*e*) of this Regulation.

(ii) In addition to complying with the requirements of Regulation 20, as appropriate, vehicle carriers constructed before 1 January 2016, including those constructed before 1 July 2012*, must comply with the requirements in paragraph (*e*) of this Regulation.

* Refer to the Recommendation on Safety Measures for Existing Vehicle Carriers Carrying Motor Vehicles with Compressed Hydrogen or Natural Gas in their Tanks for their own Propulsion as Cargo (MSC.1/Circ.1471).

(*c*) *Requirements for spaces intended for carriage of motor vehicles with compressed natural gas in the motor vehicles' tanks for their own propulsion as cargo*

(i) Electrical equipment and wiring

All electrical equipment and wiring must be of a certified safe type for use in an explosive methane and air mixture*.

* Refer to the recommendations of the International Electrotechnical Commission, in particular, publication IEC 60079.

(ii) Ventilation arrangement

(1) Electrical equipment and wiring, if installed in any ventilation duct, must be of a certified safe type for use in explosive methane and air mixtures.

(2) The fans must be designed such as to avoid the possibility of ignition of methane and air mixtures. Suitable wire mesh guards must be fitted over inlet and outlet ventilation openings.

(iii) Other ignition sources

Other equipment which may constitute a source of ignition of methane and air mixtures are not permitted.

(*d*) *Requirements for spaces intended for carriage of motor vehicles with compressed hydrogen in the motor vehicles' tanks for their own propulsion as cargo*

(i) Electrical equipment and wiring

All electrical equipment and wiring must be of a certified safe type for use in an explosive hydrogen and air mixture*.

* Refer to the recommendations of the International Electrotechnical Commission, in particular, publication IEC 60079.

(ii) Ventilation arrangement

(1) Electrical equipment and wiring, if installed in any ventilation duct, must be of a certified safe type for use in explosive hydrogen and air mixtures and the outlet from any exhaust duct must be sited in a safe position, having regard to other possible sources of ignition.

(2) The fans must be designed such as to avoid the possibility of ignition of hydrogen and air mixtures. Suitable wire mesh guards must be fitted over inlet and outlet ventilation openings.

(iii) Other ignition sources

Other equipment which may constitute a source of ignition of hydrogen and air mixtures are not permitted.

(*e*) *Detection*

When a vehicle carrier carries as cargo one or more motor vehicles with either compressed hydrogen or compressed natural gas in the motor vehicles' tanks for their own propulsion, at least 2 portable gas detectors must be provided. Such detectors must be suitable for the detection of the gas fuel and be of a certified safe type for use in the explosive gas and air mixture.".

[G.N. Nos. S 287/99; S 40/2000; S 511/2000; S 533/2001; S 314/2002; S 613/2002; S 645/2003; S 217/2004; S 697/2005; S 282/2006; S 691/2006; S 339/2008; S 686/2008; S 286/2009; S 664/2009; S 366/2010; S 793/2010; S 622/2011; S 284/2012; S 621/2012; S 847/2013; S 432/2014; S 866/2014; S 375/2015]

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