# RULES

## FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS

ND No. 2-020101-174-E

## RULE CHANGE NOTICE

ENTERS INTO FORCE:

01.01.2026

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# RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS

The present Rule Change Notice to Rules for the Classification and Construction of Sea-Going Ships (hereinafter — RCN) has been approved in accordance with the established approval procedure and contains information on amendments, except for editorial amendments. RCN amendments come in force on 1 January 2026.

# REVISION HISTORY

## PART I. CLASSIFICATION

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Paras 2.2.5.1 and 2.2.5.1.1 (new) | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88 | New distinguishing mark for restricted area of navigation **R0** and its description have been introduced. Existing paras 2.2.5.1.1 — 2.2.5.1.6 and references thereto are renumbered 2.2.5.1.2 — 2.2.5.1.7 accordingly | |
| Para 3.2.17.11 | Deck machinery<br>Anchor handling winches<br>Documentation | List of documentation for anchor handling winches has been updated | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Para 3.2.17.11.10 | Deck machinery<br>Anchor handling winches<br>Documentation | List of documentation for anchor handling winches has been updated | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Para 3.2.17.11.11 | Deck machinery<br>Anchor handling winches<br>Documentation | Terminology has been unified | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Table 14.2-2 | Deck machinery<br>Anchor handling winches<br>Documentation | Table has been supplemented with the reference to applicable requirements in Part IX "Machinery" | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |

## PART II. HULL

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 1.1.1.1 | Ships having **CSR** distinguishing mark in the class notation<br>Hull | Scope of application has been updated | |
| Table 1.2.3.7-4, Footnote 1 | Material of hull structures | Requirements for selection of material for hull structures have been updated | IACS UR S6 (Corr.2 Nov 2021) |
| Para 1.2.3.14 (new) | Ships having **CSR** distinguishing mark in the class notation<br>Hull | Requirements for selection of material for the hull of the ship operating at low temperatures have been introduced | |
| Table 1.3.1.5 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Wave factor | Requirement for the area of navigation **R0** has been introduced for determining the reduction factor when calculating the wave factor | |
| Para 1.4.1.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Longitudinal strength | Application of Chapter 1.4 "Longitudinal Strength" has been extended taking into account the restricted area of navigation **R0** | |
| Table 1.4.4.3 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Wave bending moment and shear forces | Requirement for the area of navigation **R0** has been introduced for determining the reduction factor when calculating wave bending moment and shear forces | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 1.4.6.7 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Minimum hull section modulus within the midship region | Requirement for determining the reduction factor $\varphi$ when calculating minimum hull section modulus within the midship region has been specified taking into account the restricted areas of navigation **R1**-**R3** and **R0** | |
| Para 1.6.5.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88 | Restricted area of navigation **R0** has been added to the list of restricted areas of navigation | |
| Para 1.6.5.2 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Buckling strength of longitudinal members | Requirement for determining the coefficient $k$ when calculating buckling strength of longitudinal members has been introduced for ships of restricted area of navigation **R0** | |
| Para 2.2.4.8 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Minimum thickness of shell plating | Reduction of minimum thickness of shell plating has been permitted in proportion to the ratio of adopted spacing to standard spacing for ships of restricted area of navigation **R0** | |
| Para 2.4.4.4.2 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Minimum thickness of inner bottom plating | Reduction of minimum thickness of inner bottom plating has been permitted in proportion to the ratio of adopted spacing to the standard spacing for ships of restricted area of navigation **R0** | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 2.4.4.6.3 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Buckling strength of horizontal stiffeners on the centre girder (duct keel) and side girders in the midship region | Requirement for determining buckling strength of horizontal stiffeners on the centre girder (duct keel) and side girders in the midship region has been introduced for ships of restricted area of navigation **R0** | |
| Para 2.11.5.1.2 | Supporting structures for foundations | Last sentence has been deleted to avoid duplication of requirements | |
| Para 2.11.6 (new) | Supporting structures for foundations | Instructions have been introduced regarding strength calculations of supporting structures for technological equipment | |
| Para 2.12.4.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Minimum thickness of side plating of short bridges, forecastle and poop | Reduction of minimum thickness of side plating of short bridges, forecastle and poop has been permitted in proportion to the ratio of adopted spacing to standard spacing for ships of restricted area of navigation **R0** | |
| Para 2.12.4.2 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Minimum thickness of deck plating of short bridges, forecastle and poop, short deckhouses | Reduction of minimum thickness of deck plating of short bridges, forecastle and poop, short deckhouses has been permitted in proportion to the ratio of adopted spacing to standard spacing for ships of restricted area of navigation **R0** | |

## Part III. EQUIPMENT, ARRANGEMENTS AND OUTFIT

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 3.1.3 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Equipment Number | Requirement for determining the Equipment Number has been introduced for ships of restricted area of navigation **R0** | |
| Para 7.1.1 | Ships of restricted areas of navigation<br>Openings in hull, superstructures and deckhouses | Application of Section 7 "Openings in Hull, Superstructures and Deckhouses" has been extended taking into account the restricted area of navigation **R0** | |

## PART IV. STABILITY

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 2.1.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Weather criterion | Application of Chapter 2.1 "Weather Criterion" has been extended taking in account the restricted area of navigation **R0** | |
| Para 2.1.2 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Stability of ships of restricted areas of navigation | Restricted area of navigation **R0** has been added to the list of areas of navigation | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Table 2.1.4.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Calculation of heeling lever due to wind pressure | Requirement for determining the assumed wind pressure and wind gustiness addition for ships of restricted area of navigation **R0** has been introduced | |
| Table 2.1.5.1-3 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Roll amplitude | Requirement for determining the dimensionless factor proceeding from the area of navigation and the roll period for ships of restricted area of navigation **R0** has been introduced | |
| Para 3.5.5 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Additional requirements for stability | Requirement for determining wind pressure for fishing vessels of restricted area of navigation **R0** has been introduced for loading condition as defined in 3.4.5 | |

## PART VI. FIRE PROTECTION

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Paras 2.1.3.8 — 2.1.3.10<br>(deleted) | Structural fire protection<br>Open deck, ro-ro cargo spaces, vehicle spaces<br>Hatches, access doors, movable ramps, non-watertight doors used for loading/unloading of vehicles | Paras 2.1.3.8 — 2.1.3.10 and references thereto have been deleted. Requirements have been transferred to new paras 6.8.1.1.1 — 6.8.1.1.3 | IMO resolution MSC.550(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 2.1.4.7<br>(deleted) | Structural fire protection<br>Enclosed vehicle spaces, enclosed ro-ro spaces and special category spaces<br>Permanent openings in the side shell, ends and ceiling | Para 2.1.4.7 and references thereto have been deleted. Requirements have been transferred to new para 6.8.1.2.1 | IMO resolution MSC.550(108) |
| Para 2.1.5.5<br>(deleted) | Structural fire protection<br>Ro-ro cargo spaces, vehicle spaces and special category spaces | Para 2.1.5.5 and references thereto have been deleted. Requirements have been transferred to new para 6.8.1.1.6.<br>Paras 2.1.5.6 — 2.1.5.10 and references thereto have been renumbered 2.1.5.5 — 2.1.5.9 accordingly | IMO resolution MSC.550(108) |
| Para 2.2.3.2 | Passenger ships<br>Structural fire protection<br>Special category spaces and ro-ro spaces | Requirements for fire integrity of divisions duplicating requirements of Tables 2.2.1.5-1 and 2.2.1.5-2 have been deleted.<br>Requirements have been introduced for fire integrity of internal decks subdividing the specified spaces depending on their protection by fixed water-based fire extinguishing system, as well as for material of ramps and doors between decks and their tightness | IMO resolution MSC.550(108) |
| Para 3.2.3.8 | Passenger ships of 1000 gross tonnage and upwards<br>Water fire main system in internal spaces<br>Immediate supply of at least one effective water jet | Requirement has been specified regarding immediate supply of at least one effective water jet from any of fire hydrants only for internal spaces | Regulation II-2/10.2.1.2.1.1 of SOLAS-74 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 3.4.1 | Ro-ro passenger ships<br>Weather decks intended for the carriage of vehicles<br>Pressure water-spraying system | Requirement has been introduced for protection of weather deck sections by means of the fixed pressure water-spraying system | IMO resolution MSC.555(108) |
| Para 3.4.9 | Passenger ships<br>Ro-ro spaces, vehicle spaces and special category spaces<br>Pressure water-spraying system | Requirements have been introduced for provision of signage and marking on deckhead, bulkhead and on the vertical boundaries allowing easy identification of the sections of the fixed fire extinguishing system | IMO resolution MSC.550(108) |
| Para 4.1.2 | Fire detection and fire alarm system<br>Automatic fire detectors<br>Heat linear detector | New definition "Heat linear detector" has been introduced.<br>Classification of fire heat detectors has been added depending on configuration of the measuring zone | IMO resolution MSC.555(108) |
| Para 4.1.3 | Cargo ships<br>Fire detection and fire alarm system<br>Cargo control room and other spaces, in which a cargo control console is installed<br>Indicating unit | Examples have been given of other spaces, which does not serve as a cargo control room, where a cargo control console may be installed | IACS UI SC271 (Jan 2015)<br>(Corr.1 June 2025) |
| Para 4.2.1.1.4 | Passenger ships<br>Fire detection and fire alarm system<br>Weather decks used for the carriage of vehicles | Requirement has been added for protection by system of weather decks used for the carriage of vehicles with fuel in their tanks | IMO resolution MSC.550(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 4.2.1.2.4 | Cargo ships<br>Fire detection and fire alarm system<br>Protection by system of control stations, accommodation and service spaces using protection methods IC, IIC and IIIC | Requirement has been introduced for protection by system of all control stations, including cargo control room, using all protection methods | IMO resolution MSC.550(108) |
| Para 4.2.1.3 | Cargo and passenger ships<br>Fire detection and fire alarm system<br>Vehicle spaces, including weather decks, special category spaces and ro-ro spaces | Requirements have been specified for system installed on cargo ships | IMO resolution MSC.550(108) |
| Paras 4.2.1.3.1 and 4.2.1.3.2 (new) | Cargo and passenger ships<br>Fire detection and fire alarm system<br>Vehicle spaces, including weather decks, special category spaces and ro-ro spaces | Requirements have been introduced for fire detection and fire alarm system regarding:<br>equipment of system with individually identifiable fire detectors;<br>possible equipment of system with heat linear detectors;<br>reduction of false alarms during loading or unloading and during voyage;<br>identifiable section numbering of fire detection and fire alarm system that shall coincide with that of other fixed systems (water-based fire extinguishing system, video monitoring system) | IMO resolution MSC.550(108) |
| Para 4.2.1.4.7 | Fire detection and fire alarm system<br>Automatic fire detectors | Requirements have been specified for installation of combined smoke/heat detectors, sensor cables of the linear heat detection system, as well as detectors located below movable ro-ro decks | IMO resolution MSC.555(108)<br>IMO circular MSC.1/Circ.1695 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Chapter 6.8 (new) | Cargo and passenger ships<br>Vehicle spaces, special category spaces, open and closed ro-ro spaces, weather decks intended for the carriage of vehicles<br>Structural fire protection, fixed fire extinguishing systems, fixed fire detection and fire alarm systems | Requirements have been introduced for structural fire protection of ships carrying vehicles with fuel in their tanks, including requirements for arrangement of openings and arrangement of weather deck intended for the carriage of vehicles, for protection of weather decks of ro-ro passenger ships intended for carriage of vehicles by fire detection and fire alarm system and water-based fire extinguishing systems using monitors | IMO resolutions MSC.550(108) and MSC.555(108) |
| Para 8.4.1 | Cargo ships of less than 500 gross tonnage<br>Structural fire protection<br>Bulkheads and decks separating adjacent spaces | Separate requirements for fire integrity of bulkheads and fire integrity of decks to avoid misinterpretation of requirements | |
| Para 8.4.1.1 | Cargo ships of less than 500 gross tonnage<br>Structural fire protection<br>Membrane protection of "A" class divisions | Requirement has been introduced for provision of fire integrity by continuous "B" class ceilings and linings (membrane protection).<br>Requirements for combustible veneers have been transferred to para 8.5.10 | |
| Para 8.5.1 | Cargo ships of less than 500 gross tonnage<br>Machinery spaces and other compartments containing high fire risks<br>Pipe insulation | Requirement has been introduced for non-combustible materials for insulating pipes | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 8.5.3 | Cargo ships of less than 500 gross tonnage<br>Spaces where oil spillage is possible<br>Arrangement of insulation above surface of possible oil spillage | Requirement has been introduced for insulation boundaries in spaces where oil spillage is possible | |
| Para 8.5.4 | Cargo ships of less than 500 gross tonnage<br>Cooling water piping of the conditioning and cooling systems<br>Insulation of piping valves, fittings and joint | List of ship's systems covered by the requirements has been amended | |
| Para 8.5.5 | Cargo ships of less than 500 gross tonnage<br>Paints, varnishes and other finishes | Requirement has been introduced for using low flame spread type finishes only on exposed interior surfaces.<br>References to paras of Chapter 2.1 have been deleted | |
| Para 8.5.10 (new) | Cargo ships of less than 500 gross tonnage<br>Control stations, accommodation and service spaces<br>Exposed surfaces | Requirements have been introduced for veneer permissible thickness and calorific value | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 8.5.11 (new) | Cargo ships of less than 500 gross tonnage<br>Control stations, accommodation and service spaces<br>Automatic sprinkler system or equivalent fixed water-mist fire extinguishing system | Condition has been introduced when requirements of para 8.5.10 may be omitted | |
| Para 8.7.4.3 | Cargo ships of less than 500 gross tonnage<br>Water fire main system<br>Drain valves | Requirement has been introduced for provision of drain valves for drainage of exposed sections of water fire main system in frosty weather | |
| Para 8.7.6.5 | Cargo ships of less than 500 gross tonnage<br>Water fire main system<br>Exposed fire hydrants | Requirement has been introduced for positions of exposed fire hydrants. References to paras of Chapter 3.2 have been deleted | |

## PART VII. MACHINERY INSTALLATIONS

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Paras 2.1.4 and 2.1.5 | Main machinery<br>Astern power | Requirements for astern power trials have been updated.<br>References to the applicable requirements have been introduced | IACS UR M25 (Rev.5 Dec 2024)<br>IACS UR S 10 (Corr.2 May 2024)<br>ISO 19019:2005 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 4.3.2 | Special purpose ships<br>Machinery spaces<br>Arrangement of free standing fuel oil tanks | The number of special personnel on board, used as a criterion for possibility to place free standing fuel oil tanks outside machinery spaces of category A, has been increased up to 60 | Chapter 6 of SPS Code 2008, Para.2.2.3.2 of regulation 4/II-2 of SOLAS- 74 |
| Para 4.5.13.3 (deleted) | Machinery spaces<br>Means of escape from machinery spaces | Redundant information has been deleted | IACS UI SC269 (Rev.2 Nov 2024) |
| Para 5.6.1 and Table 5.6.1 | Shafting<br>Shaft bearings | References to the applicable requirements have been supplemented to the type approval testing requirement for the nearest to the propeller shaft bearings made of synthetic materials.<br>The wordings have been specified | IACS UR M52 (Rev.3 Nov 2024) |

**PART VIII. SYSTEMS AND PIPING**

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 3.6.2 (new) | Passenger ships<br>Plastic piping | Requirements have been introduced for penetrations of plastic piping through watertight bulkheads and decks | IACS UR P4 (Rev.8 Sep 2024) |
| Para 5.1.2 | Piping laying through watertight and fire-resistant divisions<br>Shut-down valves on a collision bulkhead | Additional requirements have been introduced for shut-down valves fitted on a collision bulkhead. Requirements for length of cargo ships have been deleted | IACS UI SC306 (New Nov 2024) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 5.1.3 (deleted) | Piping laying through watertight and fire-resistant divisions<br>Shut-down valves on a collision bulkhead | Requirements duplicating para 5.1.2 have been deleted.<br>Paras 5.1.4 — 5.1.10 have been renumbered 5.1.3 — 5.1.9 accordingly | |
| Para 7.7.1 | Piping laying through watertight and fire-resistant divisions<br>Shut-down valves on a collision bulkhead | Requirements have been introduced for visual and audible alarm in the main machinery control room on a high level of liquid in the cargo pump room | IACS UI SC307 (Nov 2024) |
| Para 9.2.1 | Systems special for carriage of cargoes in bulk<br>Cargo area piping | Additional requirement has been introduced regarding arrangement of cargo piping in cargo area | IMO circular MSC.1/Circ.1683 |
| Para 9.8.2 | Cargo tanks<br>Fans for purging and gas freeing | Requirements have been introduced for fans arrangement | IMO circular MSC.1/Circ.1683 |
| Para 9.10.3 | Oil tankers<br>Forepeak ballast tanks and forward spaces<br>Access means, ventilation and gas freeing | Requirements have been introduced for access, ventilation and gas freeing of the forepeak ballast tank and forward spaces other than ballast tanks | IACS UR F44 ((Rev.3 Sep 2024) (Corr.1 Mar 2025) |
| Para 9.14.3 | Monitoring the composition of atmosphere in cargo area<br>Detector heads of gas analyzers | Requirements have been introduced for location of detector heads of gas analyzers in a pump room | UI SC307 (Nov 2024) |
| Para 11.4.5 (new) | Exhaust gas system<br>Systems for reducing $SO_x$ emissions | Requirements have been introduced for bypass arrangement of exhaust gas system, control and monitoring system and safety shutdown system | IACS UR M86 (Nov 2024) |
| Chapter 12.6 | Ventilation system<br>Ventilation of spaces | Chapter has been renamed | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 12.6.9 (new) | Ventilation system<br>Openings for ventilation system of ro-ro spaces and special category spaces | Requirements have been introduced for openings of mechanical ventilation arranged below accommodation spaces, service spaces and control stations in superstructures | IMO resolution MSC.550(108) |
| Para 12.6.10 (new) | Ventilation system<br>Openings for ventilation system of ro-ro spaces and special category spaces | Requirement has been introduced for air intake servicing the main propulsion plant | IMO resolution MSC.550(108) |
| Para 13.1.6 (new) | Fuel oil system<br>Positive displacement pumps | Requirements have been introduced for positive displacement pumps | IACS recommendation No.188 (May 2025) |

**PART IX. MACHINERY**

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 1.1.1 | Deck machinery<br>Anchor handling winches | Application has been supplemented by anchor handling winches | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Table 1.2.4 | Deck machinery<br>Anchor handling winches | Scope of surveys regarding materials for manufacture has been supplemented by anchor handling winches | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 2.3.3 | Internal Combustion Engines (ICE)<br>Engine frame<br>Protection against crankcase explosions | Requirements for crankcase explosion protection have been specified for gas fueled engines.<br>The wording "Engine bearing temperature monitors or equivalent devices" has been introduced.<br>Requirements for documentation for oil mist detection system and arrangements have been specified | IACS UR M10 (Rev.5 Nov 2024) |
| Chapter 6.7 | Deck machinery<br>Anchor handling winches | Requirements for anchor handling winches have been introduced | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |

## PART XI. ELECTRICAL EQUIPMENT

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 4.3.3 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Distribution of electrical power | For ships of restricted area of navigation **R0**, allowance has been introduced for the supply feeder of anchor gear to be connected to the distribution board of cargo winches or to another distribution board provided the boards are supplied directly from the main distribution board and adequate protection is available | |
| Para 7.5.7.5 (new) | Electrical equipment<br>Alarms<br>Fire detection and fire alarm system | Requirements for alarm notifications and for fire alarm interface of ro-ro passenger ships have been introduced. | IMO resolution MSC.555(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 7.5.10.3 | Electrical equipment<br>Alarms<br>Fire detection and fire alarm system | Requirements for linear heat detectors fitted in spaces with normal air temperature have been introduced | IMO resolution MSC.555(108) |
| Para 7.5.10.4 | Electrical equipment<br>Alarms<br>Fire detection and fire alarm system | Requirements for linear heat detectors fitted in spaces with high air temperature have been introduced | IMO resolution MSC.555(108) |
| Para 7.5.10.8 (new) | Electrical equipment<br>Alarms<br>Fire detection and fire alarm system | Requirements for acceptability of disconnecting automatic fire alarm and manual call points on ro-ro passenger ships have been introduced | IMO resolution MSC.555(108) |
| Para 7.12.9 | Electrical equipment<br>Alarms<br>Indication of door position in ro-ro passenger ships and ro-ro cargo ships | Requirements for monitoring by means of television surveillance to identify fire location have been introduced. | IMO resolution MSC.550(108) |
| Para 7.14.17 (new) | Electrical equipment<br>Internal communication and signaling<br>Television surveillance and indication systems | Requirements for recorded videos from video cameras and their replays have been introduced. | IMO resolution MSC.550(108) |
| Para 9.3.1 | Ships of restricted areas of navigation in sea areas limited by the northern and southern boundaries of the summer zone as defined in the LL-66/88<br>Emergency electrical installations | Requirements for the duration of supply from emergency sources of electrical power for ships of restricted area of navigation **R0** have been introduced | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 16.8.1.9 | Electrical equipment<br>Cables and wires<br>Cabling | Additional space categories related to high fire risk spaces have been introduced | IACS UI SC11 (Rev.2 Nov 2024) |
| Para 16.8.10.2 (deleted) | Electrical equipment<br>Cables<br>Cable connection | Requirements of para 16.8.10.2 have been deleted in connection with their transfer to the Guidelines on Technical Supervision of Ships under Construction. Existing paras 16.8.10.3 and 16.8.10.4 are renumbered 16.8.10.2 and 16.8.10.3 accordingly. | |
| Para 17.3.1.6 | Electric propulsion plants<br>Configuration of electric propulsion plants<br>Electric propulsion motors | Requirements for a number of electric propulsion motors as a part of the electric propulsion plant has been amended | IACS unified interpretation (UI) SC305 (Dec 2024) |
| Para 17.3.2 | Electric propulsion plants<br>Configuration of electric propulsion plants<br>Electric propulsion motors | Requirements have been introduced to ensure reliability of an electric propulsion plant in case of single failure of an electric propulsion motor | IACS unified interpretation (UI) SC305 (Dec 2024) |
| Para 23.1.3 | Electrical equipment<br>Ship's electric power system with electrical power distribution for direct current | List of sources of d.c. electric power for ship’s electric power system has been supplemented with accumulator battery | |

## PART XIII. MATERIALS

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 2.2.10.4 | Steel for structures used at low temperatures<br>Steel with "Arc" index | Reference to requirements for determination of temperature *DWTT* based on measurement results of the absorbed energy has been introduced. | |
| Para 2.2.10.4.1 (new) | Steel for structures used at low temperatures<br>Steel with "Arc" index | Requirements for determination of temperature *DWTT* based on the results of measurement of the absorbed energy have been introduced. | |
| Para 2.3.10.1 | Plastics and materials of organic origin | Parameters of ultra-violet irradiation impact during ageing tests have been specified | |
| Para 2.3.10.4 | Plastics and materials of organic origin<br>Retro-reflective materials | Parameters of ultra-violet irradiation impact during ageing tests have been specified | |
| Para 3.5.3.3.1.2.2 | Steel for structures used at low temperatures<br>Steel with "Arc" index | Para has been supplemented with a reference to requirements for determination of design temperature of structure | |
| Para 3.5.3.3.4 | Steel for structures used at low temperatures<br>Steel with "Arc" index | Phrasing has been specified. | |
| Tables 3.5.3.3.4-1 and 3.5.3.3.4-2 (new) | Steel for structures used at low temperatures<br>Steel with "Arc" index | New values of temperature $T_{D(DWTT)}$ for rolled products of different strength level have been introduced | Instead of obsolete Table 3.5.3.3.4 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 3.5.3.3.7 (new) | Steel for structures used at low temperatures<br>Steel with "Arc" index | Requirements for the scope of testing when determining ductile-brittle transition temperatures at СПИ renewal have been introduced. | |
| Table 3.7.3.1-2, Footnote 3 | Ice class ships<br>Steel forgings of propeller shafts | Requirements for impact tests have been amended | |
| Para 3.16.1.1 | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | Application of stainless steel castings has been expanded | |
| Table 3.16.1.1 | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | Additional steel mark has been added in connection with introduction of requirements for stainless steel castings | |
| Para 3.16.1.6 | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | References to new Tables with requirements for chemical composition and mechanical properties of stainless steel castings have been added | |
| Table 3.16.1.6 | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | Name of Table has been updated in connection with the introduction of requirements for stainless steel castings | |
| Para 3.16.1.8 | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | Name of para has been updated in connection with the introduction of requirements for stainless steel castings | |
| Para 3.16.5 (new) | Products for ships, shipboard equipment, ship machine building<br>Stainless steel castings | Requirements for stainless steel castings have been introduced | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 5.1.1.1 | Ship's hull structures, superstructures<br>Semi-finished products of wrought aluminium alloys | Requirements for temper condition have been specified in connection with introduction of requirements for castings made of corrosion-resistant (stainless) steel | |
| Table 5.1.3-1 | Ship's hull structures, superstructures<br>Semi-finished products of wrought aluminium alloys | For alloy 1565ч, temper condition has been divided into "O" and "H112" and relevant mechanical properties have been introduced for temper condition "H112" | |
| Para 6.13.2 | Synthetic materials used for bearings of marine shafts and rudder stocks | Requirements for sampling for tests and content of testing program have been updated. | IACS UR M85 (New Nov 2024) |
| Para 6.13.3 | Synthetic materials used for bearings of marine shafts and rudder stocks | Requirement wordings for tests have been updated | IACS UR M85 (New Nov 2024) |
| Table 6.13.3-1 | Synthetic materials used for bearings of marine shafts and rudder stocks | Requirements for types of tests, applicable standards, conditions, number of test samples have been amended | IACS UR M85 (New Nov 2024) |
| Table 6.13.3-3 | Synthetic materials used for bearings of marine shafts and rudder stocks | Reference to the standard has been updated, misprints have been eliminated | |
| Para 6.13.3.3.1 | Synthetic materials used for bearings of marine shafts and rudder stocks | For purposes of wear tests, liner made of copper alloys has been added to the mating materials | IACS UR M85 (New Nov 2024) |
| Para 6.13.3.3.2 | Synthetic materials used for bearings of marine shafts and rudder stocks | Values of set parameters upon wear test results have been updated | IACS UR M85 (New Nov 2024) |
| Chapter 6.15 (new) | Long-term positioned floating facilities<br>Polymer buoyancy modules | Requirements for material of buoyancy modules have been introduced | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Section 11 | Hull structural members, parts of machinery, arrangements and other shipboard components obtained by additive manufacture | requirements have been amended considering development of standards of current condition of additive manufacture | |

**PART XIV. WELDING**

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Chapter 2.9 | Ships under construction<br>Ship copper piping<br>Flame brazing | Provisions regulating the use of flame brazing have been introduced | |

**PART XVII. DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION SPECIFYING STRUCTURAL AND OPERATIONAL PARTICULARS OF SHIPS**

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 3.1.2 | Ships with the distinguishing mark ECO-S in the class notation | New definition "Bilge primary tank" has been introduced considered the applicable international requirements | IMO circular MEPC.1/Circ.642 |
| Para 3.6.3.4.4 | Ships with the distinguishing mark ECO-S in the class notation<br>Arrangements for the prevention of pollution at oily bilge water discharge | Requirements have been amended considered new definition "Bilge primary tank" | IMO circular MEPC.1/Circ.642 |
| Para 3.6.3.4.7 | Ships with the distinguishing mark ECO-S in the class notation<br>Arrangements for the prevention of pollution at oily bilge water discharge | Requirements have been amended considered new definition "Bilge primary tank" | IMO circular MEPC.1/Circ.642 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 7.8.1.3<br>(deleted) | Ships equipped for long-term operation at a low temperature<br>Lifesaving appliances | Requirement for special marking of lifesaving appliances has been deleted as no longer relevant<br>Existing para 7.8.1.4 and references thereto have been renumbered 7.8.1.3 | |
| Para 7.8.2.1.2<br>(deleted) | Ships equipped for long-term operation at a low temperature<br>Lifeboats | Requirement for lifeboat keel protection by steel strip has been deleted as no longer relevant<br>Existing paras 7.8.2.1.3 — 7.8.2.1.14 and references thereto have been renumbered 7.8.2.1.2 — 7.8.2.1.13 accordingly | |
| Para 7.8.6.3<br>(deleted) | Ships equipped for long-term operation at a low temperature<br>Personal survival kit | List of recommended additional items for the personal survival kit has been deleted as no longer relevant<br>Existing para 7.8.6.4 and references thereto have been renumbered 7.8.6.3 | |
| Para 7.8.6.5<br>(deleted) | Ships equipped for long-term operation at a low temperature<br>Group survival kit | List of recommended additional items for the group survival kit has been deleted as no longer relevant<br>Existing para 7.8.6.6 and references thereto have been renumbered 7.8.6.4 | |
| Para 7.8.6.7<br>(deleted) | Ships equipped for long-term operation at a low temperature<br>Equipment | Requirement for location of the weapon has been deleted as no longer relevant | |
| Para 9.1.3 | Ships equipped for using gases or low-flashpoint fuels<br>Terms and definitions | Definition "unacceptable loss of power" has been introduced | IGF Code<br>para 2.2.40 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 9.2.2.3.3 | Ships using gas as fuel<br>Fuel containment systems | Requirement has been amended for measuring protective distance for independent fuel storage tanks considering the 2024 amendments to para 5.3.3.3 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.2.7.1 | Ships using gas as fuel<br>Air locks | Clarification has been given for purpose of doors subject to requirement of coaming height considering the 2024 amendments to para 5.12.1 of the IGF Code | IMO resolution MSC.551(108) |
| Paras 9.2.8 — 9.2.8.2.5 (new) | Ships equipped for the use of gas fuel<br>Tanks and piping for gas fuel<br>Welded joints | Requirements have been introduced for welding and non-destructive testing of welded joints with regard for both the international and similar requirements of Part IX "Materials and Welding" of the LG Rules | The IGF Code as amended |
| Para 9.3.2.2 | Ships using gas as fuel<br>Liquefied gas fuel storage tanks | Requirements have been amended for providing pressure relief valves for LNG tanks considering the 2024 amendments to para 6.7.3.1.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.4.1 | Ships using gas as fuel<br>Stored fuel pressure and temperature control system | Possibility of using several methods to maintain pressure and temperature has been introduced for liquefied gas fuel storage tanks considering the 2024 amendments to para 6.9.1.1 of the IGF Code | IMO resolution MSC.551(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 9.5.1.5 | Ships using gas as fuel<br>Fuel system | References to the formula of Part VIII "Systems and Piping" of the RS Rules/C and requirements of Part VI "Systems and Piping" of the LG Rules have been replaced by direct requirements for wall thickness determination considering the 2024 amendments to para 7.3.2.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.1.6 (new) | Ships using gas as fuel<br>Fuel system | Requirements have been introduced for determination of design pressure of fuel system piping according to para 7.3.3 of the IGF Code.<br>Existing para 9.5.1.6 has been renumbered 9.5.1.9 | |
| Para 9.5.1.7 (new) | Ships using gas as fuel<br>Fuel system | Requirements have been introduced for determination of allowable normal stresses for piping calculations based on para 7.3.2.1 of the IGF Code | |
| Para 9.5.1.8 (new) | Ships using gas as fuel<br>Fuel system | Requirements have been introduced for determination of strength factor for piping calculations based on para 7.3.4 of the IGF Code | |
| Paras 9.5.2.7 and 9.5.2.7.1 — 9.5.2.7.3 (new) | Ships using gas as fuel<br>Fuel system<br>Bunkering manifold | Requirements have been introduced for means of providing "dry disconnect" at bunkering station connections considering the 2024 amendments to paras 8.4.1 — 8.4.3 of the IGF Code | IMO resolution MSC.551(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 9.5.3.1 | Ships using gas as fuel<br>Fuel system<br>Fuel supply system | Requirements have been amended for redundancy of fuel supply systems for single fuel installations considering the 2024 amendments to para 9.3.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.4.7 | Ships using gas as fuel<br>Fuel system | Requirements have been amended for gas venting during safety system activation, considering the 2024 amendments to para 9.4.7 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.4.8 | Ships using gas as fuel<br>Fuel system | Term "engines" has been replaced by term "consumers" according to the 2024 amendments to para 9.4.8 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.5.1.1 | Ships using gas as fuel<br>Fuel system | Requirement has been deleted regarding automatic purging of gas piping with inert gas when the master gas valve is closed considering the 2024 amendments to para 9.6.1.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.7.1 | Ships using gas as fuel<br>Fuel system | Possibility of using an alternative method to determine design pressure of outer pipes and ducts has been added for all piping according to the 2024 amendments to para 9.8.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.5.7.2 | Ships using gas as fuel<br>Fuel system | Scope of application has been amended for an alternative method to determine design pressure considering the 2024 amendments to para 9.8.2 of the IGF Code | IMO resolution MSC.551(108) |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 9.5.7.4 | Ships using gas as fuel<br>Fuel system | Requirements have been deleted for dimensions of low-pressure fuel piping duct considering the 2024 amendments to para 9.8.4 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.7.7.1 | Ships using gas as fuel<br>Fire protection<br>Bunkering station<br>Fuel preparation room | Requirement has been introduced for arrangement of a fire extinguisher in the fuel preparation room considering the 2024 amendments to para 11.6.2 of the IGF Code | IMO resolution MSC.551(108) |
| Paras 9.10.2.5 and 9.10.2.5.1 — 9.10.2.5.3 (new) | Ships using gas as fuel<br>Liquefied gas storage tanks<br>Level monitoring system | Requirements for level indicators have been revised based on para 15.4.1 of the IGF Code. Possibility has been introduced regarding usage of closed devices penetrating tank walls according to the 2024 amendments to para 15.4.1.3 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.11.2.2 | Ships using gas as fuel<br>Electrical equipment<br>Hazardous zones | Interbarrier spaces have been included into zone 0 considering the 2024 amendments to para 12.5.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para 9.11.2.3, second paragraph | Ships using gas as fuel<br>Electrical equipment<br>Hazardous zones | Interbarrier spaces have been deleted from zone 1 considering the 2024 amendments to para 12.5.2.1 of the IGF Code | IMO resolution MSC.551(108) |
| Para13.3.1.2 | Anchor handling vessels<br>Terms and definitions | New terms and definitions have been introduced as per international requirements | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Paras 13.3.2 — 13.3.2.3 | Anchor handling vessels<br>Documentation | Requirements have been introduced regarding presentation of results of bollard pull tests | Transfer from para 13.3.10 |
| Paras 13.3.4 — 13.3.4.4.3 | Anchor handling vessels | Requirements have been amended for equipment of anchor handling vessels to meet international requirements | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Para 13.3.7 | Anchor handling vessels<br>Anchor handling winches | References to requirements for mechanical equipment have been updated | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Para 13.3.8 | Anchor handling vessels<br>Anchor handling winches<br>Control stations | Requirements have been amended for control stations of anchor handling winches | IMO resolution MSC.532(107)<br>IMO circular MSC.1/Circ.1662 |
| Para 13.3.9 (deleted) | Anchor handling vessels<br>Tests | Requirements for bollard pull testing have been deleted due to their transfer to the Guidelines on Technical Supervision of Ships under Construction | |
| Para 13.3.10 (deleted) | Anchor handling vessels<br>Records | Requirements related to entry into the Classification Certificate have been transferred to para 13.3.2.3. Remaining requirements have been deleted due to presence of similar requirements in other RS normative documents | |
| Para 15.2.6.1 | NAABSA ships<br>Hull structures | Requirements have been introduced for determination of local pressures on the structural members depending on sea bed type | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Paras 23.6.6.2 and 23.6.6.3 (new) | Ships equipped to use methanol/ethanol as fuel<br>Fixed carbon dioxide smothering system | Requirements have been introduced for amount of carbon dioxide in a fixed carbon dioxide smothering system and other fire extinguishing equipment designed to protect a machinery space or a fuel preparation room.<br>Existing para 23.6.6.2 and references thereto have been renumbered 23.6.6.4 | IACS UI GF21 (Oct 2024) |

## PART XX. ADDITIONAL REQUIREMENTS FOR YACHTS

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 5.3.3.6 (new) | Yachts not carrying more than 12 passengers and cargoes, of length $L_1 < 80$ m<br>Damage stability | Para has been introduced on the possibility not to comply with requirements for damage stability | Part A Red Ensign Group Yacht Code (REGYC) |
| Para 5.4.1.1 | Yachts of 500 gross tonnage and over, with hulls constructed of steel or other equivalent material<br>Fire protection | Instruction on requirement applicability has been amended | |
| Para 5.4.3 | Yachts of 300 gross tonnage and over but less than 500<br>Structural fire protection | Requirements have been revised regarding main hull material, gross tonnage and number of passengers on board | |

| Item | Applicability | Description | Remarks |
|---|---|---|---|
| Para 5.4.4 | Yachts of 500 gross tonnage and over but less than 2000, with hulls constructed of non-combustible and/or fire-restricting materials<br>Structural fire protection | Title has been amended considering actual content of the para. Application instructions have been revised | |
| Para 5.4.4.1.2 | Yachts of 500 gross tonnage and over but less than 2000, with hulls constructed of non-combustible and/or fire-restricting materials<br>Fire protection for accommodation and service spaces with combustible finishes | Requirements have been introduced for maximum thickness and caloric value of combustible veneers and the condition under which the rated thickness and caloric value may be exceeded | |

# PART I. CLASSIFICATION

## 2 CLASS OF A SHIP

### 2.2 CLASS NOTATION OF A SHIP. MANDATORY AND OPTIONAL DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION ASSIGNED BY RUSSIAN MARITIME REGISTER OF SHIPPING

**Para 2.2.5.1** is amended as follows:

"**2.2.5.1** Ships complying with these Rules requirements provided for ships operating only in restricted areas of navigation are assigned one of the following distinguishing marks: **R0**, **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** or **R3** added to the character of classification to clarify restrictions of the ship navigation as follows:".

**New para 2.2.5.1.1** is introduced reading as follows:

"**.1 R0** — navigation in sea areas restricted by the northern and southern boundaries of the summer zone as defined in the LL-66/88;".

**Existing paras 2.2.5.1.1 — 2.2.5.1.6** and references thereto are renumbered **2.2.5.1.2 — 2.2.5.1.7** accordingly.

## 3 TECHNICAL DOCUMENTATION

### 3.2 DESIGN DOCUMENTATION

**Para 3.2.17.11** is amended as follows:

**"3.2.17.11 Anchor handling vessel.**

| No. | Description of documentation | Stamp | TD | DD | PAD | Remarks |
|---|---|---|---|---|---|---|
| **.1** | Arrangement plan of anchor handling equipment: anchor handling winches, ~~shark jaws,~~ chain stoppers, towing pins, stern rollers, loose gear, cargo handling gear, where available, including standard cargo placing on the deck (anchors, cables, chains, etc.) indicating the towing line path, extreme sectors, maximum design towing pull, maximum design load for each component | FI | ● | | ● | |
| **.2** | Drawings of foundations and supports for winches, ~~shark jaws,~~ chain stoppers, stern rollers and towing pins indicating the maximum design load | A | | ● | ● | At the DD stage refer also to 3.2.2.19 based on the calculations of 3.2.2.1 |
| **.3** | Electrical power supply circuits and control system configuration of towing equipment and anchor handling equipment | A | ● | ● | ● | |
| **.4** | Arrangement plan of operator control stands (user interface) of towing equipment control systems and anchor handling equipment | A | ● | ● | ● | |
| **.5** | Technical specification of operator control stands (user interface) of towing equipment control systems and anchor handling equipment | AG | ● | | ● | |
| **.6** | Arrangement plan of communication means between the anchor operations control station and wheelhouse | A | ● | ● | ● | |
| **.7** | Technical specification of communication means between the anchor operations control station and wheelhouse | AG | ● | | ● | |
| **.8** | Bollard pull estimation | FI | ● | | ● | |
| **.9** | Bollard pull test procedure | A | | ● | ● | |
| **.10** | Arrangement plan of control stations | A | ● | | ● | |
| **.11** | Technical specification of emergency release system | FI | ● | | ● | |

".

**Para 3.2.17.11.10** is amended as follows:

"**3.2.17.11.1~~0~~2 For anchor handling winches.**

| No. | Description of documentation | Stamp | TD | DD | PAD | Remarks |
|---|---|---|---|---|---|---|
| **.1** | Design criteria, including design loads and characteristics of emergency ~~quick~~ release system of towing line indicating the response time and remaining holding force after release) | FI | ● | | ● | |
| **.2** | Strength calculation of winch drum with flanges, shaft couplings, housing and brakes | AG | ● | | ● | |
| **.3** | General view | A | ● | | ● | |
| **.4** | Assembly drawing | A | | ● | ● | |

".

**Para 3.2.17.11.11** is amended as follows:

"**3.2.17.11.~~11~~13. For ~~shark jaw~~ chain stopper, towing pins, stern rollers.**

| No. | Description of documentation | Stamp | TD | DD | PAD | Remarks |
|---|---|---|---|---|---|---|
| **.1** | Design criteria, including design loads and characteristics of emergency ~~quick~~ release system in operational and dead ship conditions | FI | ● | | ● | |
| **.2** | Strength calculation | AG | ● | | ● | |
| **.3** | General view | A | ● | | ● | |
| **.4** | Assembly/installation drawing | A | | ● | ~~●~~ | |
| **.5** | Technical specification of emergency release device | FI | ● | | ● | |

".

*APPENDIX 1*

## 14 ADDITIONAL NOTATIONS (SUMMARY LIST)

**Table 14.2-2, Section 3. Line "anchor-handling"** is amended as follows:

"

| | | | |
|---|---|---|---|
| **anchor-handling** | Ship fitted for servicing (handling, heaving-up and shifting) anchors (anchor handling vessel) | All self-propelled ships | **RS Rules/C**<br>Part II "Hull", 3.8<br>Part IX "Machinery", 6.7<br>Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", 13.3 |

".

# PART II. HULL

## 1 DESIGN PRINCIPLES

### 1.1 GENERAL

**Para 1.1.1.1** is amended as follows:

"**1.1.1.1** Unless provided otherwise, requirements of this Part of the Rules for the Classification and Construction of Sea-Going Ships[1] apply to steel ships of welded construction, from 12 to 350 m in length.

The requirements of this Part (except for 1.2.3 and 3.10) do not apply to self-propelled double hull oil tankers of 150 m in length and above and to bulk carriers of 90 m in length and above, contracted for construction on or after 1 July 2015. The scantlings of hull members, essential to the strength of hull and the construction of the said ships are regulated by the Common Structural Rules for Bulk Carriers and Oil Tankers[2]. The list of types of ships to be excluded is given in the CSR.

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[1] Hereinafter referred to as "these Rules, RS Rules/C".

[2] Hereinafter referred to as "the ~~Common Structural Rules~~ CSR".".

### 1.2 MATERIALS

**Table 1.2.3.7-4**. **Footnote 1** is amended as follows:

"[1] Single strakes required to be of Grade D/DH or Grade E/EH and within 0,4$L$ amidships shall have breadths not less than 800 + 5$L$ mm, need not be greater than 1800 mm, unless limited by the geometry of the ship's design.".

**New para 1.2.3.14** is introduced reading as follows:

"**1.2.3.14** Steel grades for hull structural members of double hull self-propelled oil tankers of 150 m in length and above and bulk carriers of 90 m in length and above, contracted for construction on or after 1 July 2015, of unrestricted service and not exposed to low temperatures are selected in accordance with the CSR.".

### 1.3 DESIGN LOADS

**Table 1.3.1.5** is amended as follows:

"Table 1.3.1.5

| Area of navigation | $\varphi_r$ |
|---|---|
| **R0, R1** | 1 |
| **R2** | $1,25 - 0,25L \cdot 10^{-2} \leq 1$ |
| **R2-RSN** | $1,0 - 0,20L \cdot 10^{-2}$ |
| **R2-RSN(4,5)** | $0,94 - 0,19L \cdot 10^{-2}$ |
| **R3-RSN** | $0,86 - 0,18L \cdot 10^{-2}$ |
| **R3** | $0,75 - 0,18L \cdot 10^{-2}$ |

".

## 1.4 LONGITUDINAL STRENGTH

**Para 1.4.1.1. The first paragraph** is amended as follows:

"**1.4.1.1** The requirements of this Chapter apply to ships of unrestricted service and of restricted areas of navigation **R0**, **R1** and **R2**, 65 m in length and upwards, as well as to ships of restricted areas of navigation **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** and **R3**, 60 m in length and upwards.".

**Table 1.4.4.3** is amended as follows:

"Table 1.4.4.3

| Area of navigation | $\varphi$ |
|---|---|
| **R0** | 0,9 |
| **R1** | $1,1 - 0,23L \cdot 10^{-2} \leq 1$ |
| **R2** | $1,0 - 0,25L \cdot 10^{-2}$ |
| **R2-RSN** | $0,94 - 0,26L \cdot 10^{-2}$ |
| **R2-RSN(4,5)** | $0,92 - 0,29L \cdot 10^{-2}$ |
| **R3-RSN** | $0,71 - 0,22L \cdot 10^{-2}$ |
| **R3** | $0,60 - 0,20L \cdot 10^{-2}$ |

".

**Para 1.4.6.7** is amended as follows:

"**1.4.6.7** In any case, the hull section modulus, in cm$^3$, within the midship region (for deck and bottom) shall not be less than

$$W_{\min} = c_w BL^2(C_b + 0,7)\eta, \qquad (1.4.6.7\text{-}1)$$

where for $c_w$, refer to 1.3.1.4.

For ships of restricted area of navigation, the minimum hull section modulus, in cm$^3$, within the midship region (for deck and bottom) shall not be less than $W_{\min 1}$ or $W_{\min 2}$, whichever is the greater, determined by the following formulae:

$$W_{\min 1} = \varphi W_{\min}; \qquad (1.4.6.7\text{-}2)$$

$$W_{\min 2} = 0,95\psi\nu\varphi W_{\min} \qquad (1.4.6.7\text{-}3)$$

where ~~for~~ $\varphi$, ~~refer to~~ is obtained from Table 1.4.4.3 for areas of navigation **R1 — R3**; for area of navigation **R0**, $\varphi = 0,95$;
for $\psi$, refer to Formula (1.4.4.3-1);
for $\nu$, refer to Formula (1.4.4.3-2).".

## 1.6 REQUIREMENTS FOR SCANTLINGS OF HULL STRUCTURAL MEMBERS

**Para 1.6.5.1. The first paragraph** is amended as follows:

"**1.6.5.1** The buckling strength of longitudinals, shell plates and hull structure plating shall be ensured in ships of unrestricted service and ships of restricted areas of navigation **R0**, **R1** and **R2**, 65 m and greater in length, of restricted areas of

navigation **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** and **R3**, 60 m and greater in length subject to compressive stresses due to longitudinal bending of the hull girder.".

**Para 1.6.5.2** is amended as follows:

"**1.6.5.2** The buckling strength of longitudinal members is considered sufficient if the following conditions are met:

$$k\sigma_c \leq \sigma_{cr}; \qquad (1.6.5.2\text{-}1)$$

$$\tau_c \leq \tau_{cr}$$

where $k$ = 1 for plating and for web plating of stiffeners;
$k$ = 1,1 for stiffeners;
for $\sigma_c$,$\tau_c$, refer to 1.6.5.1;
for $\sigma_{cr}$,$\tau_{cr}$, refer to 1.6.5.3.

For plate panels, the factor *k* may be reduced in respect of ships of restricted navigation areas: **R0** and **R1** — by 10 %, **R2**, **R2-RSN** and **R2-RSN(4,5)** — by 15 %, **R3-RSN**, **R3** and for ~~berth-connected ships~~ long-term positioned ships — by 20 %. In this case, when determining the actual section modulus of hull in accordance with 1.4.8, the strength reduction of compressed plate shall be considered, i.e. where $\sigma_{cr} < \sigma_c$ the plates shall be included in the hull girder section, except for the areas adjoining the longitudinals and having a breadth equal to 0,25 of the shorter side of supporting contour, with the reduced factor $\psi_n$ to be determined by the formula

$$\psi_n = \sigma_{cr}/\sigma_c. \qquad (1.6.5.2\text{-}2)".$$

## 2 GENERAL REQUIREMENTS FOR HULL STRUCTURES

### 2.2 SHELL PLATING

**Para 2.2.4.8** is amended as follows:

"**2.2.4.8** In any case, the thickness of shell plating $s$, in mm, shall not be less than:

$$s_{min} = 3{,}1 + 0{,}12L \text{ for } L < 30 \text{ m}; \qquad (2.2.4.8\text{-}1)$$

$$s_{min} = (5{,}5 + 0{,}04L)\sqrt{\eta} \text{ for } L \geq 30 \text{ m} \qquad (2.2.4.8\text{-}2)$$

where for $\eta$, refer to 1.1.4.3.

Where $L > 300$ m, $L$ shall be taken equal to 300 m.

Where the adopted spacing is less than the standard one (refer to 1.1.3) for ships of unrestricted service and restricted areas of navigation **R0** and **R1**, a reduction of minimum thickness of shell plating is permitted in proportion to the ratio of adopted spacing to standard spacing but not more than 10 %.".

## 2.4 DOUBLE BOTTOM

**Para 2.4.4.4.2. The third paragraph** is amended as follows:

"Where the adopted spacing is less than the standard one (refer to 1.1.3) for ships of unrestricted service and restricted areas of navigation **R0** and **R1**, the minimum thickness of inner bottom plating may be reduced in proportion to the ratio of adopted spacing to the standard spacing, but not more than by 10 %. In any case, the minimum thickness shall not be less than 5,5 mm.".

**Para 2.4.4.6.3** is amended as follows:

"**.3** in the midship region of ships of unrestricted service and of restricted areas of navigation **R0**, **R1** and **R2**, 65 m and greater in length, as well as of ships of restricted areas of navigation **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** and **R3**, 60 m and greater in length, the buckling strength of horizontal stiffeners on the centre girder (duct keel) and side girders shall be ensured in accordance with 1.6.5.".

## 2.11 SEATINGS FOR MACHINERY AND BOILERS, SUPPORTING HULL STRUCTURES FOR EQUIPMENT, MACHINERY AND ARRANGEMENTS

**Para 2.11.5.1.2**. **The last sentence** is deleted.

**New para 2.11.6** is introduced reading as follows:

"**2.11.6 Supporting structures for deck technological equipment foundations.**

**2.11.6.1** Dimensions of deck and platform structures under the foundations for deck technological equipment shall be confirmed by means of finite element analysis or by means of grillage analysis taking into account the following:

**.1** when preparing design model, the corrosion addition taken according to 1.1.5 for deck shall be deducted from the as-built thickness;

**.2** calculations are performed in accordance with 2.11.4.2.3 and 2.11.4.2.4;

**.3** loads are determined taking into account environmental conditions (transit conditions, ship passage, on-site operation, loading conditions, including light-ship).".

## 2.12 SUPERSTRUCTURES, DECKHOUSES AND QUARTER DECKS

**Para 2.12.4.1. The last paragraph** is amended as follows:

"For ships of unrestricted service and ships of restricted areas of navigation **R0** and **R1**, the reduction of ~~minimal~~ minimum thickness, but not more than 10 %, is permitted in proportion to the ratio of adopted spacing to standard spacing, where the adopted spacing is less than the standard one (refer to 1.1.3). In any case, for ships of 30 m and greater in length, the minimum thickness shall be not less than 5 mm.".

**Para 2.12.4.2. The last paragraph** is amended as follows:

"For ships of unrestricted service and ships of restricted area of navigation **R0** and **R1**, the reduction of ~~minimal~~ minimum thickness, but not more than 10 %, is permitted in proportion to the ratio of adopted spacing to standard spacing, where the adopted spacing is less than the standard one (refer to 1.1.3). In any case, for ships of 50 m and greater in length, the minimum thickness shall be not less than 5 mm. The minimum thickness may be

reduced to 4 mm for ships of length ~~$L \geq 50$~~ $L$ less than 50 m, and to 3 mm for ships of length ~~$L < 20$~~ $L$ less than 20 m.".

## PART III. EQUIPMENT, ARRANGEMENTS AND OUTFIT

### 3 ANCHOR ARRANGEMENT

### 3.1 GENERAL

**Para 3.1.3. The second paragraph** is amended as follows:

"The Equipment Number is determined in compliance with 3.2 for ships of unrestricted service and of restricted areas of navigation **R0** and **R1**, and is reduced:

by 15 % for ships of restricted areas of navigation **R2**, **R2-RSN**, **R2-RSN(4,5)** and **R3-RSN**;

by 25 % for ships of restricted area navigation **R3**, taking into account of the provisions specified in 3.1.4, 3.3.1, 3.3.2, 3.4.1, 3.4.2 and 3.4.3.".

### 7 OPENINGS IN HULL, SUPERSTRUCTURES AND DECKHOUSES AND THEIR CLOSING APPLIANCES

### 7.1 GENERAL

**Para 7.1.1** is amended as follows:

"**7.1.1** The requirements of this Section apply to ships of unrestricted service as well as to ships of restricted areas of navigation **R0**, **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)** and **R3-RSN** engaged on international voyages. The requirements for ships of restricted areas of navigation **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)** and **R3-RSN** not engaged on international voyages, as well as for ships of restricted area of navigation **R3** may be relaxed; the extent of relaxation shall be confirmed by technical background.".

## PART IV. STABILITY

### 2 GENERAL REQUIREMENTS FOR STABILITY

### 2.1 WEATHER CRITERION

**Para 2.1.1** is amended as follows:

"**2.1.1** The requirements for stability set forth in this Chapter apply to ships of unrestricted area of navigation and of restricted areas of navigation **R0**, **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)** and **R3-RSN**.".

**Para 2.1.2** is amended as follows:

"**2.1.2** Stability of ships of unrestricted area of navigation and of restricted areas of navigation **R0**, **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)** and **R3-RSN** shall be considered sufficient as to weather criterion *K* if the requirements of 2.1.2.5 are met under the assumed effects of wind and seas mentioned below, and:".

**Table 2.1.4.1** is amended as follows:

"Table 2.1.4.1

| Area of navigation | Assumed wind pressure $p_v$, in Pa | Wind gustiness addition $m$ |
|---|---|---|
| Unrestricted, restricted R0 | 504 | 0,5 |
| Restricted R1 | 353 | 0,5 |
| Restricted R2 | 252 | 0,52 |
| Restricted R2-RSN | 252 | 0,52 |
| Restricted R2-RSN(4,5) | 166 | 0,54 |
| Restricted R3-RSN | 119 | 0,55 |

".

**Table 2.1.5.1-3** is amended as follows:

"Table 2.1.5.1-3

**Factor $S$**

| Area of navigation | $T$, c | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ≤5 | 6 | 7 | 8 | 10 | 12 | 14 | 16 | 18 | ≥20 |
| Unrestricted, restricted **R0** | 0,100 | 0,100 | 0,098 | 0,093 | 0,079 | 0,065 | 0,053 | 0,044 | 0,038 | 0,035 |
| Restricted **R1**, **R2**, **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** | 0,100 | 0,093 | 0,083 | 0,073 | 0,053 | 0,040 | 0,035 | 0,035 | 0,035 | 0,035 |

".

## 3 ADDITIONAL REQUIREMENTS FOR STABILITY

### 3.5 FISHING VESSELS

**Para 3.5.5** is amended as follows:

"**3.5.5** The vessel's amplitude of roll in the loading condition specified in 3.5.4 is assumed to be 10° and the angle of heel at which the coaming of a cargo hatch immerses is regarded as the angle of the ship's flooding through openings considered open. Wind pressure in this loading condition for vessels of unrestricted area of navigation and of restricted area of navigation **R0** is assumed as that for vessels of restricted area of navigation **R1**, the wind pressure for vessels of restricted area of navigation **R1** as that for vessels of restricted area of navigation **R2**, the wind pressure for vessels of restricted area of navigation **R2** as that for these vessels reduced by 30 %.

For vessels having a length between 24 and 45 m, the initial wind pressure shall be adopted from Table 2.1.4.1.".

# PART VI. FIRE PROTECTION

## 2 STRUCTURAL FIRE PROTECTION

### 2.1 GENERAL

**Paras 2.1.3.8 — 2.1.3.10 and references thereto** have been deleted.

**Para 2.1.4.7 and references thereto** have been deleted.

**Para 2.1.5.5 and references thereto** have been deleted.

**Existing paras 2.1.5.6 — 2.1.5.10 and references thereto** have been renumbered **2.1.5.5 — 2.1.5.9** accordingly.

## 2.2 PASSENGER SHIPS

**Para 2.2.3.2** is amended as follows:

"**2.2.3.2** In ships carrying more than 36 passengers the boundary bulkheads and decks of special category spaces shall be "A-60" class. However, where category 2.2.1.3 (*5*), 2.2.1.3 (*9*) or 2.2.1.3 (*10*) space is on one side of the division the class may be reduced to "A-0". If fuel oil tanks are located under special category spaces, the fire integrity of decks between such spaces may be of "A-0" class.

~~In ships carrying not more than 36 passengers the boundary bulkheads of special category spaces shall be as required for category (11) spaces in 2.2.1.5-1 and the horizontal boundaries as required for category (11) spaces in Table 2.2.1.5-2.~~

~~In passenger ships carrying not more than 36 passengers, the bulkheads and decks forming boundaries of enclosed and open ro-ro spaces shall have fire integrity required for spaces of category (8) according to 2.2.1.5-1, while the horizontal boundaries shall have fire integrity required for spaces of category (8) according to 2.2.1.5-2.~~

Where a special category space or ro-ro space is subdivided with internal decks, the fire rating of these decks shall be determined based on the capacity and arrangement of the fixed water-based fire extinguishing system. If the fixed water-based fire extinguishing system cannot simultaneously cover the applicable area above and below a given deck, this deck shall be of "A-30" standard while any ramps and doors between decks shall be made of steel and of a design being as tight as practical.".

## 3 FIRE-FIGHTING EQUIPMENT AND SYSTEMS

### 3.2 WATER FIRE MAIN SYSTEM

**Para 3.2.3.8**. The **first paragraph** is amended as follows:

"**3.2.3.8** In passenger ships of 1000 gross tonnage and upwards and in all passenger ships with periodically unattended machinery spaces, as well as other ship's spaces containing fire pumps, the water fire main system shall constantly be under pressure providing immediate the supply of at least one effective water jet from any of fire hydrants located in internal spaces and automatic start of one of the required fire pumps at a drop of pressure.".

### 3.4 PRESSURE WATER-SPRAYING SYSTEM

**Para 3.4.1**. The **third paragraph** is supplemented by the following text:

"Protection of ro-ro passenger ships' weather deck sections intended for the carriage of vehicles (refer to 1.5.4.5) by means of the fixed pressure water-spraying system is provided according to 6.8.3.5.".

**Para 3.4.9** is amended as follows:

"**3.4.9** In passenger ships, vehicle, special category and ro-ro spaces, where fixed pressure water-spraying systems are fitted, shall be provided with suitable signage and

marking on deckhead and bulkhead and on the vertical boundaries allowing easy identification of the sections of the fixed fire extinguishing system. Suitable signage and markings shall be adapted to typical patterns of crew movement taking into consideration obstruction by cargo or fixed installations. Section number signs shall be of photoluminescent material (for the evaluation and testing of photoluminescent material refer to Chapter 11 of the FSS Code). The section numbering indicated inside the space shall be same as section valve identification and section identification at the safety centre or continuously manned control station.

Fixed pressure water-spraying system of an approved type complying with the provisions of IMO circular MSC.1/Circ.1268 "Guidelines for the Approval of Fixed Pressure Water Spraying and Water Based Fire Extinguishing Systems for Cabin Balconies" shall be installed to protect cabin balconies of passenger ships where furniture and furnishings on such balconies are not as defined in 2.1.1.9.".

## 4 FIRE DETECTION AND ALARM SYSTEMS

### 4.1 GENERAL

**Para 4.1.2**. After the definition "Heat differential detector" a **new definition "Heat linear detector"** is introduced reading as follows:

"Heat linear detector is an automatic detector, which sensitive element is located along the line.".

After the definition "Differential-maximum heat detector" a **new paragraph** is introduced reading as follows:

"According to the configuration of the measuring zone, fire heat detectors are divided into:
point;
linear.".

**Para 4.1.3**. The **second paragraph** is amended as follows:

"In cargo ships, the control panel shall be located on the navigation bridge or in the fire control station. In cargo ships, an indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station. If there is a cargo control room or any other space, in which a cargo control console is installed, which does not serve as a dedicated cargo control room (e.g. ship's office, machinery control room) but is regarded as a cargo control room for purpose of this requirement, ~~and therefore~~ such spaces shall be provided with an additional indicating unit.".

### 4.2 FIRE DETECTION AND FIRE ALARM SYSTEMS

**Para 4.2.1.1.4** is amended as follows:

"**.4** spaces for carriage of vehicles, special category spaces and ro-ro spaces (refer to 4.2.1.3)~~. The fire detection and fire alarm system shall not be installed on~~ including weather decks of passenger ships used for the carriage of vehicles with fuel in their tanks;".

**Para 4.2.1.2.4** is amended as follows:

"**.4** in cargo ships accommodation and service spaces and control stations depending on a protection method adopted according to 2.3.2 shall be protected by a fixed fire detection and fire alarm system and/or by an automatic sprinkler system and fire alarm and detection system as follows:

**.4.1** when method IC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces, as well as in all control stations, including cargo control room;

**.4.2** when method IIC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces, as well as in all control stations, including cargo control room. In addition, an automatic sprinkler, fire detection and fire alarm system shall be so installed and arranged as to protect accommodation spaces, galleys and other service spaces except spaces posing no substantial fire risk such as void spaces, sanitary spaces, etc.;

**.4.3** when method IIIC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to detect the presence of fire in all accommodation and service spaces, providing smoke detection in corridors, stairways and escape routes within accommodation spaces, except spaces posing no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces, as well as in all control stations, including cargo control room. However, there is no need to provide fixed fire detection and fire alarm system in service spaces built away from the accommodation block;".

**Para 4.2.1.3** is amended as follows:

"**4.2.1.3** On cargo ships ~~T~~the fire detection and fire alarm system installed in spaces intended for the carriage of vehicles, special category spaces and in ro-ro spaces shall provide early detection of fire. The type of automatic detectors and arrangement thereof shall be determined with consideration of effect of ventilation and other appropriate factors. After installation, the system shall be tested under normal ventilation conditions to determine the average time of its responding. ~~The fire detection and fire alarm system may not be fitted in special category spaces if an effective watching in the form of continuous fire watch is maintained in the spaces throughout the voyage.~~".

**New paras 4.2.1.3.1** and **4.2.1.3.2** are introduced reading as follows:

"**4.2.1.3.1** On passenger ships the fire detection and fire alarm system installed in spaces intended for the carriage of vehicles, special category spaces and in ro-ro spaces shall be:

**.1** equipped with individually identifiable fire detectors rapidly detecting the onset of fire by the smoke and heat detection in all specified spaces. The use of heat linear detectors is acceptable. The location of automatic detectors shall be defined, taking into account the effects of ventilation and other relevant factors. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time;

**.2** provided for the area on the weather deck intended for the carriage of vehicles. The system shall be capable of rapidly detecting the onset of the fire anywhere on the area. The types of detectors and their location shall be to the satisfaction of the Register, taking into account the effects of weather conditions, cargo obstruction and other relevant factors. Different settings may be used for specific operation sequences, such as during loading or unloading and during voyage, in order to reduce the false alarms.

**4.2.1.3.2** If a fixed water-based deluge system is used for vehicle, special category and

ro-ro spaces, then the fire detection and fire alarm system identifiable to the same sections of the deluge system shall be arranged. Section numbering of the alarm system shall coincide with that of other systems, such as a fixed water-based fire extinguishing system or video monitoring system, if available.".

**Para 4.2.1.4.7** is amended as follows:

"**4.2.1.4.7** The maximum areas and spacing of detectors shall be in accordance with Table 4.2.1.4.7.

The Register may permit deviation from the requirements of Table 4.2.1.4.7 based upon characteristics of detectors obtained during tests and agreed with the Register.

Detectors located below movable ro-ro decks shall be in accordance with the specified requirements.

~~When heat-pulse detectors are used in machinery spaces, the deck area served by one detector shall be 50 m$^2$, and distance between centres shall be not more than 6 m.~~

Table 4.2.1.4.7

**Spacing of detectors**

| Type of detector | Maximum floor area per detector, in m$^2$ | Maximum distance apart between centres, in m | Maximum distance away from bulkheads, in m |
|---|---|---|---|
| Heat | 37 | 9 | 4,5 |
| Smoke | 74 | 11 | 5,5 |
| Combined (smoke/heat) | 74 | 9 | 4,5 |

When determining the spacing of combined smoke/heat detectors in order to optimize their quantity in spaces they protect, the arrangement schemes of combined detectors 1 and 2 given in IMO circular MSC.1/Circ.1695 shall be followed.

The distance between two sensor cables of the linear heat detection system shall not be more than 9,0 m, while the distance between such cables and bulkheads shall not be more than 4,5 m.

Heat linear detectors shall comply with the requirements in 7.5.10.3 и 7.5.10.4, Part XI "Electrical Equipment".".

## 6 REQUIREMENTS FOR FIRE PROTECTION OF SPECIAL PURPOSE SHIPS AND SPECIAL FACILITIES ON SHIPS

**New Chapter 6.8** introduced reading as follows:

## "6.8 FIRE PROTECTION OF VEHICLE, SPECIAL CATEGORY, OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES

### 6.8.1 Structural fire protection, arrangement of openings and arrangement of weather deck.

#### 6.8.1.1 Structural fire protection.

The requirements supplementing those given in 2.1 — 2.3 shall be met, namely:

**.1** hatches fitted on weather deck adjacent to ro-ro cargo spaces (refer to 1.5.4.3) or vehicle spaces (refer to 1.5.4.4) as well as on decks separating such spaces, shall be constructed of steel but may not be "A" class divisions;

**.2** access doors to ro-ro cargo spaces (refer to 1.5.4.3) or vehicle spaces (refer to 1.5.4.4) fitted on weather deck shall be constructed of steel but may not be doors insulated to "A-0" class;

**.3** movable ramps installed on decks, which are insulated to "A-30" class and form boundaries of single space protected by its own fire extinguishing system, shall be constructed of steel and insulated to "A-30" class, except for the working parts of such movable ramps (e.g. hydraulic cylinders, associated pipes and accessories) and members supporting such fittings, which do not contribute to the structural strength of the boundary. Such movable ramps may not be subjected to fire tests. This is applicable to non-watertight doors used for loading/unloading of vehicles;

**.4** where a special category space or ro-ro space is subdivided with internal decks, the fire rating of these decks shall be determined based on the capacity and arrangement of the fixed water-based fire extinguishing system. If the fixed water-based fire extinguishing system cannot simultaneously cover the applicable area above and below a given deck, this deck shall be of "A-30" standard while any ramps and doors between decks shall be made of steel and of a design being as tight as practical;

**.5** in passenger ships carrying more than 36 passengers, the requirements of 2.2.3.2 shall be met;

**.6** entrances to the cargo spaces from accommodation, machinery and special electrical spaces shall be equipped with self-closing permanently closed doors. The coamings height of these doors shall not be less than 450 mm; warning plates prohibiting smoking shall be provided near the entrances to the cargo spaces.

**6.8.1.2 Arrangement of openings in ro-ro spaces and special category spaces**

**6.8.1.2.1** Openings in the side plating, the ends or deckhead of the ro-ro space shall be situated and arranged so that a fire in the ro-ro space does not endanger

**.1** stowage areas for survival craft;

**.2** embarkation stations and assembly stations, including access to such stations; and

**.3** control stations, accommodation spaces and normally occupied service spaces in superstructures and deckhouses above the ro-ro spaces.

Openings are not permitted for all decks directly below these objects and within a safety distance of not less than 6,0 m measured horizontally.

**6.8.1.2.2** The requirement in 6.8.1.2.1 does not apply to openings fitted with closing arrangements, such as ramps and doors. Ramps and doors shall be of steel for all decks directly below control stations, accommodation spaces and normally occupied service spaces, and minimum "A-0" for all decks directly below survival craft, embarkation stations and assembly stations.

**6.8.1.2.3** Openings are accepted in ro-ro spaces below control stations, accommodation spaces and normally occupied service spaces, when the fire integrity of the ship's side, including windows and doors, is "A-60" on boundaries in a rectangular area measured 6,0 m horizontally forward and aft of the openings and vertically minimum two deck levels above the deck level with the opening. "A-0" windows protected by a water-based fire extinguishing system with an application rate of at least 5,0 l/min per $m^2$ may be accepted as equivalent to "A-60" windows. Ventilation inlets shall be designed to minimize the risk of contamination (refer to 12.1.7, 12.1.10, 12.2.3 and 12.3.8, Part VIII "Systems and Piping").

**6.8.1.2.4** Openings for mechanical ventilation of ro-ro and special category spaces are permitted below accommodation spaces, service spaces and control stations in superstructures, if the opening is protected by a closing device, with a closing arrangement not likely to be cut off in case of a fire in the ro-ro spaces, capable of being closed from a readily accessible position. The closing device shall be made of steel or other fire-resistant material. Such openings are not permitted below survival craft, the emergency generator and air intakes for the engine room(s).

**6.8.1.2.5** Air intakes serving machinery used for the ship's main propulsion, power generation and emergency power generation shall be in a position minimizing the risk of being contaminated by a fire in the ro-ro space or special category space.

**6.8.1.3 Arrangement of weather deck intended for the carriage of vehicles.**

**6.8.1.3.1** Appropriate arrangements shall be made so that a fully developed fire on weather decks intended for the carriage of vehicles does not endanger:

**.1** stowage areas for survival craft;

**.2** embarkation stations and assembly stations including access to these; and

**.3** control stations, accommodation spaces and normally occupied service spaces in superstructures and deckhouses adjacent to the weather deck.

**6.8.1.3.2** Appropriate arrangements shall be made providing a safety distance, measured horizontally, from the designated vehicle lanes of more than 6,0 m to control stations, accommodation spaces and normally occupied service spaces in superstructures and deckhouses adjacent to the weather deck.

**6.8.1.3.3** The safety distance can be reduced to 3,0 m when boundaries, including windows and doors, within 6,0 m are of "A-60" integrity. Alternatively, "A-0" boundaries protected by a water-based fire extinguishing system with an application rate of at least 5,0 l/min per $m^2$ may be accepted as equivalent.

**6.8.1.3.4** Survival craft and embarkation stations, including access to these, shall be protected with a safety distance of more than 12,0 m. Safety distances shall be measured horizontally.

**6.8.1.3.5** Air intakes serving machinery used for the ship's main propulsion, power generation and emergency power generation shall be in a position minimizing the risk of being contaminated by a fire on the weather deck intended for carriage of vehicles.

**6.8.2 Fixed fire extinguishing systems.**

**6.8.2.1** Vehicle spaces and ro-ro spaces, which are not special category spaces and are capable of being sealed from a location outside of the cargo spaces, shall be fitted with one of the following fixed fire extinguishing systems:

**.1** fixed gas fire extinguishing system;

**.2** fixed high-expansion foam fire extinguishing system;

**.3** fixed water-based fire extinguishing system for ro-ro spaces and special category spaces complying with the requirements of 6.8.2.2.1 — 6.8.2.2.4.

**6.8.2.2** Vehicle spaces and ro-ro spaces not capable of being sealed and special category spaces shall be fitted with a fixed water-based fire extinguishing system for ro-ro spaces and special category spaces which shall protect all parts of any deck and vehicle platform in such spaces. Such a water-based fire extinguishing system shall have:

**.1** pressure gauge on the valve manifold;

**.2** clear marking on each manifold valve indicating the spaces served;

**.3** instructions for maintenance and operation located in the valve room; and

**.4** sufficient number of drainage valves to ensure complete drainage of the system.

**6.8.2.3** The use of any other fixed fire extinguishing system may be permitted that has been shown, by a full-scale test in conditions simulating a flowing petrol fire in a vehicle space or a ro-ro space, to be not less effective in controlling fires likely to occur in such a space.

**6.8.2.4** When pressure water-spraying systems are provided, in view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks during the operation of the fixed pressure water-spraying system, the drainage system shall comply with the requirements in 7.6.12, Part VIII "Systems and Piping".

**6.8.3 Fixed water-based fire extinguishing system on ro-ro passenger ships' weather decks intended for the carriage of vehicles.**

**6.8.3.1** In passenger ships, a fixed water-based fire extinguishing system based on monitor(s) shall be installed in order to cover weather decks intended for the carriage of vehicles.

**6.8.3.2** The protected area shall be the entire length and width of the weather deck intended for the carriage of vehicles. The fixed monitor(s) shall be capable of delivering water to:

**.1** the area of weather decks intended for carriage of vehicles; and

**.2** the area, including superstructure boundaries located up to 8,0 m, measured horizontally, from the area intended for vehicle storage, or the next vertical boundaries, whichever is less.

**6.8.3.3** The combined capacity of all fixed monitors shall be minimum 2,0 l/min per $m^2$ of the protected area, but in no case shall the output of any monitor be less than 1,250 l/min. Even distribution of water shall be ensured.

**6.8.3.4** The distance from the monitor to the farthest extremity of the protected area forward of that monitor shall not be more than 75% of the monitor throw in still air conditions.

**6.8.3.5** Each monitor shall be located outside the area which it protects, in a safe position, with access not likely to be cut off in case of fire.

Monitors shall be installed in positions which allow for unobstructed water coverage with vehicles stowed to maximum capacity of the weather deck. However, areas that cannot be covered by water monitors shall be protected by water nozzles. Nozzles shall be designed and installed taking into account weather conditions and provide 5,0 l/min per $m^2$ for the area they cover and have release controls in a position being accessible in case of a fire.

**6.8.3.6** The system shall be available for immediate use and capable of continuously supplying water. The water supply shall be capable of simultaneously supplying water at the required rate for the entire width of the weather deck intended for carriage of vehicles and a length of 40 m, or the entire length of the weather deck if this is less than 40 m. In no case shall the supply capacity be less than that required for the largest monitor.

**6.8.3.7** The system may be supplied by the fire main, the pump(s) serving other fixed water-based fire extinguishing systems or a dedicated pump providing a continuous supply of seawater.

Where the ship's fire pumps are used to feed the monitor(s):

**.1** it shall be possible to segregate the ship's fire main from the monitor(s) by means of a valve in order to operate both systems separately or simultaneously; and

**.2** capacity of the pumps shall be sufficient to serve both systems simultaneously, including two jets of water at the required pressure from the fire main system. In case the weather deck shall also carry dangerous goods, capacity for four jets of water at the required pressure shall be provided.

Where another fixed water-based fire extinguishing system is used to feed the monitor(s):

**.3** it shall be possible to segregate the other fixed water-based fire extinguishing system from the monitor(s) by means of a valve in order to operate both systems separately or simultaneously; and

**.4** the capacity of the pump(s) shall, in case of open ro-ro spaces, be sufficient to serve both systems simultaneously, minimum two sections of the fixed water-based fire extinguishing system being close to the openings facing weather deck and one monitor serving the weather deck. For closed ro-ro spaces and special category spaces, simultaneous operation is not required.

**6.8.3.8** In passenger ships, drainage shall be provided where a fixed water-based fire extinguishing system is installed to cover weather decks intended for carriage of vehicles.

The system shall be sized to remove no less than 125 % of the combined capacity of both the monitor(s) and the required number of fire hose nozzles.

**6.8.4 Fixed fire detection and fire alarm system and sample extraction smoke detection system.**

**6.8.4.1** On cargo ships the fixed fire detection and fire alarm system shall comply with the requirements of 4.2.1.3, and on passenger ships — with the requirements of 4.2.1.3.1.1, 4.2.1.3.1.2 and 4.2.1.3.2.

**6.8.4.2** Except open ro-ro spaces (refer to 1.5.4.3.2), open vehicle spaces (refer to 1.5.4.4.2) and special category spaces (refer to 1.5.9), a sample extraction smoke detection system complying with the requirements of 4.2.1.6 may be used as an alternative for the fixed fire detection and fire alarm system required in 6.8.1.1.

**6.8.4.3** Special category spaces shall comply with the following requirements:

**.1** manual call points shall be spaced so that no part of the space is more than 20 m from a manual call point, and one shall be placed close to each exit from such spaces;

**.2** efficient fire patrol system shall be maintained in special category spaces.".

## 8 REQUIREMENTS FOR FIRE PROTECTION OF CARGO SHIPS OF LESS THAN 500 GROSS TONNAGE

### 8.4 STRUCTURAL FIRE PROTECTION

**Para 8.4.1** is replaced by the following text:

"**8.4.1** The minimum fire integrity of bulkheads and decks separating adjacent spaces shall meet the requirements of Tables 8.4.1-1 and 8.4.1-2.

For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, the spaces are classified according to their fire risk according to 2.3.3.

Table 8.4.1-1

**Fire integrity of bulkheads separating adjacent spaces**

| Spaces | | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* | *(11)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control stations | *(1)* | A-0[1] | B-0 | A-60[2] | B-0 | A-0[2] | A-60 | A-0[2] | A-60 | A-60[3] | * | A-60 |
| Corridors | *(2)* | | C | B-0 | B-0 | B-0 | A-60 | A-0 | A-0 | A-0[3] | * | A-0 |
| Accommodation spaces | *(3)* | | | C | B-0 | B-0 | A-60 | A-0 | A-0 | A-0[3] | * | A-0 |
| Stairways | *(4)* | | | | B-0 | B-0 | A-60 | A-0 | A-0 | A-0[3] | * | A-0 |
| Service spaces (low risk) | *(5)* | | | | | C | A-0 | A-0 | A-0 | A-0[3] | * | A-0 |
| Machinery spaces of category A | *(6)* | | | | | | * | A-0 | A-0[4] | A-60 | * | A-60[5] |
| Other machinery spaces | *(7)* | | | | | | | A-0 | A-0 | A-0 | * | A-0 |
| Cargo spaces | *(8)* | | | | | | | | * | A-0 | * | A-0 |
| Service spaces (high risk) | *(9)* | | | | | | | | | A-0[3, 6] | * | A-0 |
| Open decks | *(10)* | | | | | | | | | | — | A-0 |
| Ro-ro and vehicle spaces (except open deck) | *(11)* | | | | | | | | | | | A-30 |

[1] Bulkheads separating the wheelhouse, chartroom and radio room from each other may be "B-0" class.

[2] If a fire detection and alarm system or a sprinkler system is installed in both concerned spaces, "B-0" class bulkhead may be accepted instead of "A-0" or "A-60".

[3] For spaces other than galleys or spaces containing flammable products (like paint stores) and fitted with fire detection, "B-15" class bulkheads may be accepted.

[4] For cargo spaces intended for carriage of dangerous goods refer to 7.2.12.

[5] "A-0" class bulkheads may be used if no dangerous goods are intended to be carried.

[6] Where spaces are used for the same purpose, divisions between them need not be fitted. For instance, it is not necessary to divide a galley of category (*9*) and buffet of category (*9*) which is part thereof with a bulkhead, provided the buffet bulkheads have the same fire resistance equal to that of structures bordering the galley. However, it is necessary to erect "A-0" class bulkhead between the galley/buffet and provision storeroom although both spaces have the same category (*9*).

N o t e s : 1. Where an asterisk appears in the Table, the divisions shall be of steel or equivalent but is not required to be of "A" class. However, if in the deck except for the decks in a space of category (*10*), there are penetrations for electric cables, piping and ventilation ducts, such penetrations shall be flame and smoke tight. Divisions between control stations (emergency generators) and open decks may have air intake openings without closing appliances, except cases when fixed gas fire-fighting system is installed.
2. Small enclosed spaces inside the room are treated as separate spaces if square of doorways to adjacent spaces is less than 30 % of openings (doorways). Fire integrity of bulkheads and decks surrounding such spaces shall comply with the requirements set forth in tables of the paragraph.

T a b l e 8.4.1-2

**Fire integrity of decks separating adjacent spaces**

| Spaces | | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* | *(11)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control stations | *(1)* | A-0 | A-0 | A-0 | A-0 | A-0 | A-60 | A-0 | A-0 | A-0 | * | A-60 |
| Corridors | *(2)* | A-0 | * | * | A-0 | * | A-60 | A-0 | A-0 | A-0 | * | A-0 |
| Accommodation spaces | *(3)* | A-60 | A-0 | * | A-0 | * | A-60 | A-0 | A-0 | A-0 | * | A-0 |
| Stairways | *(4)* | A-0 | A-0 | A-0 | * | A-0 | A-60 | A-0 | A-0 | A-0 | * | A-0 |
| Service spaces (low risk) | *(5)* | A-0 | A-0 | A-0 | A-0 | * | A-0 | A-0 | A-0 | A-0 | * | A-0 |
| Machinery spaces of category A | *(6)* | A-60 | A-60 | A-60 | A-60 | A-60 | * | A-60[1] | A-30 | A-60 | * | A-60 |
| Other machinery spaces | *(7)* | A-0 | A-0 | A-0 | A-0 | A-0 | A-0 | * | A-0 | A-0 | * | A-0 |
| Cargo spaces | *(8)* | A-60 | A-0 | A-0 | A-0 | A-0 | A-0 | A-0 | * | A-0 | * | A-0 |
| Service spaces (high risk) | *(9)* | A-60 | A-0 | A-0 | A-0 | A-0 | A-60 | A-0 | A-0 | A-0[2] | * | A-0 |
| Open decks | *(10)* | * | * | * | * | * | * | * | * | * | – | A-0 |
| Ro-ro and vehicle spaces (except open deck) | *(11)* | A-60 | A-0 | A-0 | A-0 | A-0 | A-60 | A-0 | A-0 | A-0 | A-0 | A-30 |

[1] Where other machinery spaces of category (*7*) are the spaces of low fire risk, i.e. they do not contain machinery operating on fuel oil or having a pressure lubrication systems, "A-0" class divisions are permitted.
[2] Refer to Note 6 to Table 8.4.1-1.
N o t e s : 1. Refer to Note 1 to Table 8.4.1-1.
2. Refer to Note 2 to Table 8.4.1-1.

".

**Para 8.4.1.1** is replaced by the following text:

"**8.4.1.1** Continuous "B" class ceilings and linings with the relevant decks or bulkheads may be considered as fully or partially ensuring insulation and fire integrity of "A" class structures (membrane protection) required by Tables 8.4.1-1 and 8.4.1-2 based on test results according to Part 3 of the FTP Code.".

## 8.5 REQUIREMENTS FOR MATERIALS

**Para 8.5.1** is supplemented by a **new paragraph** reading as follows:

"Materials used for insulating pipes in machinery spaces and other compartments containing high fire risks shall be non-combustible.".

**Para 8.5.3** is supplemented by a **new paragraph** reading as follows:

"Insulation boundaries shall be arranged to avoid immersion in oil spillage.".

**Para 8.5.4** is replaced by the following text:

"**8.5.4** Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of piping valves, fittings and joints of cooling water piping of the conditioning and cooling systems may be combustible, but they shall be kept to the minimum, as far as practicable, while their exposed surfaces shall be low-flame spread.".

**Para 8.5.5** is amended to read:

"**8.5.5** Paints, varnishes and other finishes used on exposed interior surfaces inside service and accommodation spaces, control stations and stairways enclosures shall ~~comply with the requirements of 2.1.1.7, 2.1.1.8.2.1, 2.1.1.8.2.2 and 2.1.1.8.3 accordingly as regards producing~~ not generate excessive quantit~~ies~~y of smoke, toxic ~~gases or~~ vapours and shall be of the low flame spread type in accordance with Parts 2 and 5 of the FTP Code.".

**Chapter 8.5** is supplemented by **new paras 8.5.10** and **8.5.11** reading as follows:

"**8.5.10** Exposed surfaces in control stations, accommodation and service spaces may have veneer, mouldings, decorations made of combustible materials that shall have:

**.1** calorific value not exceeding 45 MJ/m$^2$ of the area for the thickness used; and

**.2** total volume not exceeding the volume equivalent to a 2,5 mm combustible veneer on the combined area of the walls and ceiling.

**8.5.11** Requirements of 8.5.10 do not apply to the furniture fixed to linings or bulkheads and may be omitted if the spaces are fitted with automatic sprinkler system or equivalent fixed water-mist fire extinguishing system.".

### 8.7 WATER FIRE MAIN SYSTEM

**Para 8.7.4.3** is replaced by the following text:

"**8.7.4.3** All exposed water pipes for fire-extinguishing shall be provided with drain valves or plugs for use in frosty weather. The pipes with valves located on decks where the deck cargo may be carried shall be located where they will not be damaged by cargo.".

**Para 8.7.6.5** is replaced by the following text:

"**8.7.6.5** The positions of exposed fire hydrants shall be such that they are readily accessible and will not be damaged by cargo.".

## PART VII. MACHINERY INSTALLATIONS

### 2 GENERAL REQUIREMENTS

### 2.1 POWER OF MAIN MACHINERY AND GENERAL TECHNICAL REQUIREMENTS

**Para 2.1.4** is replaced by the following text:

"**2.1.4** The minimum astern power shall be determined by the ship designer and shall not exceed the maximum permissible astern power (MPAP) for which the propulsion plant is designed. Astern trials are to be conducted in accordance with the provisions of ISO 19019:2005, Section 5.4: Astern trials.

The astern tests shall be carried out from control positions. A test program shall be provided by the yard and accepted by RS. If specific operational characteristics have been defined by the manufacturer these shall be included in the test program.".

**Para 2.1.5** is amended as follows:

"**2.1.5** In propulsion plants with reversing gears or CP-propellers as well as in electric propulsion plants, precautions shall be taken against possible overload of main engines in excess of permissible values, including MPAP.

The designed maximum astern power defining the maximum astern speed for the design of the main steering gear and rudder stock as per chapter 2 of Part III "Equipment, Arrangements and Outfit" and UR S10.2.1.1 (IACS unified requirement (UR) S10, the document is available at the IACS website: www.iacs.org.uk), shall not to be taken less than the MPAP.".

## 4 MACHINERY SPACES, ARAANGEMENT OF MACHINERY AND EQUIPMENT

### 4.3 ARRANGEMENT OF FUEL OIL TANKS

**Para 4.3.2** is amended as follows:

"**4.3.2** Where the use of free standing fuel oil tanks is permitted by the Register, they shall be placed in oil-tight spill trays, and on passenger ships and special purpose ships carrying more than ~~5~~60 special personnel, outside machinery spaces of category A as well.".

### 4.5 MEANS OF ESCAPE FROM MACHINERY SPACES

**Para 4.5.13.3** is deleted.

## 5 SHAFTING

### 5.6 SHAFT BEARINGS

**Para 5.6.1** is amended as follows:

"**5.6.1** The propeller shaft bearing nearest to the propeller, whether the bearing is in stern tube or in a strut, shall meet the requirements of Table 5.6.1. ~~Those~~ Other propeller shaft bearings~~, which are located forward of the bearing mentioned above,~~ shall meet the condition in formula (5.6.1)

$$l \geq R/qd \ , \qquad (5.6.1)$$

where the symbols and values for $q$ are taken from Table 5.6.1.

Table 5.6.1

| Bearing material | $l/d$[1], not less than | $q$[2], in MPa, not more than |
|---|---|---|
| Oily-lubricated white metal (babbitt) | 2[3] | 1,0[3] |
| Rubber or other water-lubricated materials approved by the Register | 4[4] | 0,25[4] |
| Rubber or other synthetic oil- or environment-friendly oily liquid-lubricated materials approved by the Register | 2[5] | 1,0[5] |

[1] $l$ = length of bearing; $d$ = design shaft journal diameter in way of bearing.
[2] $q$ = contact pressure taken up by the bearing, $q = R/(l \times d)$, where $R$ – reaction of support.
[3] The ~~L~~length of the bearing may be reduced if the contact pressure does not exceed 0,8 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft.

~~and if the results of the operational check are satisfactory~~. In all cases, the length of the bearing shall not be less than 1,5 times of the actual shaft diameter in way of the bearing.

[4] The ~~L~~length of the bearing of synthetic material may be reduced ~~to twice the design,~~ however shall not be less than 2,0 times of the actual shaft diameter in way of the ~~aft~~ bearing ~~and contact pressure may be increased~~, provided the results of the operational check (of the bearing design and material) are satisfactory. Synthetic materials ~~for application as~~ used for water lubricated ~~stern tube~~ bearings shall be Type Approved. The type approval requirements shall be applied to all nearest to the propeller shaft bearings made of synthetic materials. (The type approval testing requirement shall comply with the requirements of 6.13, Part XIII "Materials").

[5] ~~On ships contracted for construction before 1 January 2021, the length of bearing may be less provided the nominal bearing pressure as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft is not more than 0,6 MPa and provided the results of the operational check are satisfactory. However, the minimum length shall be not less than 1,5 times the actual diameter.~~

~~On ships contracted for construction on or after 1 January 2021, t~~The length of the bearing may be less provided the nominal bearing pressure is not more than 0,6 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the ~~aft~~ bearing divided by the projected area of the shaft. ~~is not more than 0,6 MPa and provided the results of the operational check are satisfactory.~~ However, the minimum length shall be not less than 1,5 times the actual shaft diameter in way of the bearing.

The nominal bearing pressure may be increased in case the material has proven satisfactory testing and operating experience as well as technical justification is provided. Synthetic materials ~~for application as~~ used for oil lubricated ~~stern tube~~ bearings shall be Type Approved. The type approval requirements shall be applied to all nearest to the propeller shaft bearings made of synthetic materials. (The type approval testing requirement shall comply with the requirements of 6.13, Part XIII "Materials").

N o t e . ~~On ships contracted for construction on or after 1 January 2021, t~~The length of a grease lubricated bearing shall be not less than 4,0 times the ~~rule~~ actual shaft diameter ~~of the shaft~~ in way of the bearing.

".

## PART VIII. SYSTEMS AND PIPING

### 3 PLASTIC PIPING

### 3.6 PLASTIC PIPING LAYING

**New para 3.6.2** is introduced reading as follows:

"**3.6.2** For passenger ships, the penetrations used for the passage of plastic piping systems through watertight bulkheads and decks shall be successfully tested for watertight integrity according to 5.1.9 after the fire test. These requirements shall not be applied to cable penetrations.".

### 5 PIPING LAYING

### 5.1 PIPING LAYING THROUGH WATERTIGHT AND FIRE-PROOF DIVISIONS

**Para 5.1.2** is amended as follows:

"**5.1.2** ~~In cargo ships of 80 m in length and more and in passenger ships irrespective of their length the collision bulkhead~~ The collision bulkhead may be pierced below the

bulkhead deck of passenger ships and the freeboard deck of self-propelled cargo ships of 500 gross tonnage and upwards by not more than one pipe for dealing with liquid in the forepeak tank. This pipe, at its piercing the collision bulkhead, shall be fitted with the normally closed shut-down valves ~~directly on the collision bulkhead inside the forepeak operated from a readily accessible place above the bulkhead deck of passenger ships and the freeboard deck of cargo ships~~ with a fail-close arrangement, remotely controlled from the above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The fail-close arrangement of a valve shall be of an automatic type.

If the valve remote control system should fail during operation of the valve, the valve shall close automatically or be capable of being closed manually from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be fitted at the collision bulkhead on either the forward or aft side, provided that the valve is readily accessible under all service conditions and the space on the aft side is not a cargo space.

If the forepeak is divided by a longitudinal bulkhead into two watertight compartments to hold two different kinds of liquids, the collision bulkhead may be allowed to be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by two pipes, each of which is fitted with such valve. ~~Such valve may be fitted on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space.~~

On pipes piercing the collision bulkhead above the bulkhead deck or freeboard deck a shut-down valve may be omitted.

For cargo ships, Figs. 5.1.2-1 and 5.1.2-2 show examples of suitable butterfly valve arrangements.

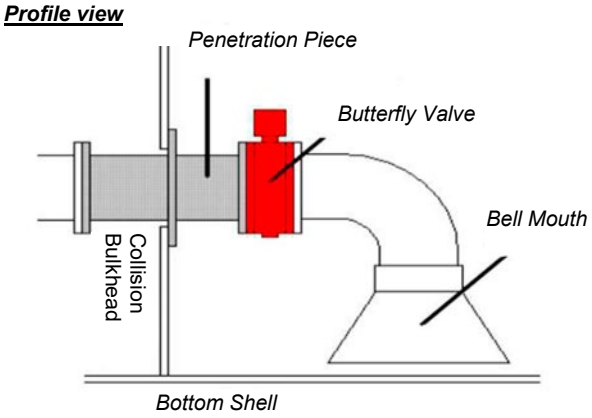
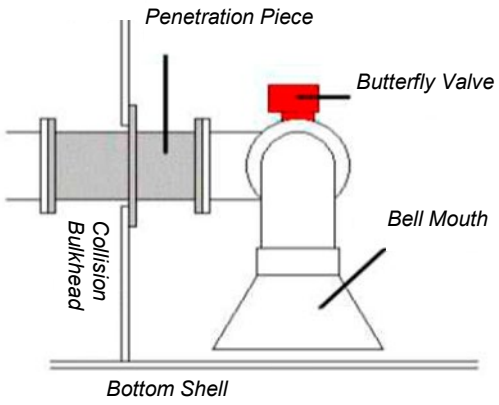



Fig. 5.1.2-1

***Profile view***




***Plan view***

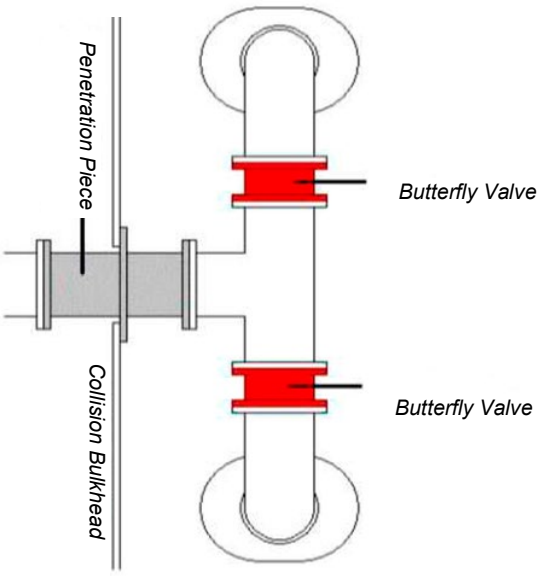



Fig. 5.1.2-2

As butterfly valves shall be capable of being remotely operated, the following shall apply:

**.1** the actuator shall be of a double acting type;

**.2** when subject to loss of power, ~~the actuator shall remain in its current position~~ the valve shall be automatically closed;

**.3** when subject to loss of power, the valve shall be able to be manually operated.".

**Para 5.1.3** is deleted. **Paras 5.1.4 – 5.1.10** are renumbered **5.1.3 — 5.1.9** accordingly.

## 7 BILGE SYSTEM

### 7.7 DRAINAGE OF CARGO PUMP SPACES OF OIL TANKERS/OIL TANK BARGES

**Para 7.7.1** is amended as follows:

"**7.7.1** The cargo pump rooms of oil tankers/oil tank barges shall be drained by separate pumps or ejectors arranged in these rooms. Stripping pumps may be used as bilge

pumps, provided non-return shut-off valves are fitted at the open ends of the bilge suctions and a shutoff valve is arranged on a pipe connecting the valve box and the stripping pump.

The pump rooms in oil tankers/oil tank barges of up to 500 gross tonnage may be drained by hand pumps.

Construction of the pumps shall preclude the possibility of spark formation to a maximum. Arrangement of the driving machinery of the pumps shall meet the requirements of 4.2.5, Part VII "Machinery Installations".

The cargo pump rooms shall be provided with a visual and audible high ~~bilge~~ water level alarm to give warning to the pump room, cargo control station, ~~and~~ navigation bridge and main machinery control room.".

## 9 SYSTEMS SPECIAL FOR CARRIAGE OF CARGOES IN BULK

### 9.2 GENERAL REQUIREMENTS FOR PIPING IN CARGO AREA

**Para 9.2.1** is amended as follows:

"All cargo piping (including cargo tank venting piping, relief valve discharge piping, cargo tank purging and gas-freeing piping/ducts), except those serving for inerting gas supply and for bow or stern loading and unloading arrangement, shall be arranged within the cargo areas, as defined in 9.1.4.

Remote-controlled valves shall comply with the requirements of 4.1.1.2 — 4.1.1.4".

### 9.8 PURGING AND GAS FREEING OF CARGO TANKS

**Para 9.8.2** is amended as follows:

"**9.8.2** On the ships not fitted with IGS, special fans, which may be portable, shall be provided for purging and gas freeing empty tanks. Fans used for purging and gas freeing shall be arranged within the cargo area. Fans and related air-supply piping/ducts may be located in the forecastle area, outside of the cargo area, provided that the requirements set out in IMO circular MSC.1/Circ.1683 are met. Fans shall meet the requirements in 5.3.3, Part IX "Machinery". During gas freeing operations, in addition to the arrangements specified in 9.7.10 and 9.7.11, hydrocarbon vapours may be vented through special pipes, which shall comply with the following requirements:

the pipe outlets shall extend not less than 2 m above deck level;

gas exit velocity of at least 30 m/s in the vertical direction shall be maintained;

the pipe outlets shall be arranged horizontally not less than 10 m away from openings to enclosed spaces containing sources of ignition, from air intakes, deck machinery and other equipment which may present ignition hazard.

Gas exit velocity may be reduced to 20 m/s, provided the device is fitted to prevent the passage of flame, as required by 9.7.14.".

### 9.10 SHIP SERVICE SYSTEMS IN CARGO AREA

**Para 9.10.3** is replaced by the following text:

"**9.10.3** Forepeak ballast tank and access arrangements.

**9.10.3.1** On oil tankers, the forepeak tank can be ballasted with the system serving other ballast tanks within the cargo area, provided:

**.1** the vent pipe openings are located on open deck at a distance of 3 m from the sources of ignition or as required by 20.2.3 of Part XI "Electrical Equipment". These provisions shall not apply to sounding pipes;

**.2** access to the forepeak tank (ballast tank) shall be direct from open deck. Alternatively, access to the forepeak tank may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space, bosun's store or similar compartment not intended for the carriage of oil or hazardous cargoes. Electrical equipment in such indirect access shall be of the safe type (refer to 2.9.2, Part XI "Electrical Equipment") or shall be isolated before entry into the enclosed compartment;

**.3** continuous ventilation shall be maintained while accessing the forepeak tank;

**.4** the sounding arrangement to the forepeak tank shall be direct from open deck;

**.5** the forepeak tank shall be gas freed direct from open deck, or through a dedicated trunk to open deck. Before the manhole and the entrance of the dedicated trunk are opened, the trunk and the forepeak tank shall be confirmed as made gas free. Means shall be provided to free the space of gas without opening manholes or the entrance to a dedicated trunk. Hatches/manholes on the open deck and away from sources of ignition are allowed to be opened to gas-free the space;

**.6** the forepeak ballast tank shall be considered as hazardous zone 2 if segregated from a cargo tank with a cofferdam, or as a hazardous zone 1, if located adjacent to a cargo tank. For oil tankers where a bow thruster is provided, the piping passing through the non-hazardous bow thruster room shall be fully welded. The valve shall be located on the collision bulkhead on the forepeak side.

**.7** means shall be provided on the open deck by a suitable portable instrument to allow detection of toxic and flammable vapours within the forepeak ballast tank (based on the cargoes carried in current voyage, and since last de-ballasting of the forepeak tank was carried out) in order to ensure that the forepeak tank is fully gas freed. In case when sounding arrangements are used as means for the portable instrument, the additional means for the purpose shall not be required.

**9.10.3.2** Additional requirements for forward spaces not being defined as ballast tanks:

**.1** any spaces, void and/or indirect access from the open deck or intermediate space adjacent to cargo tanks, and/or defined as hazardous zones 1 or 2, shall follow the same requirements to openings and access as specified for the forepeak ballast tanks in 9.10.3.1.

**.2** in case any spaces or voids are defined as non-hazardous spaces and have access to other non-hazardous spaces (such as bosun store), the following shall apply:

**.2.1** for any non-hazardous space with access to a hazardous space (e.g., forepeak ballast tank), the non-hazardous space shall have direct access to open deck and shall be gas freed directly from open deck, and not through the non-hazardous space (e.g., bosun store).

**.2.2** access from bosun store to a non-hazardous space (e.g., void) having access to a hazardous space (e.g., forepeak ballast tank) may be accepted through a gas tight bolted manhole, with signboard stating that the non-hazardous space shall not be entered until the space is confirmed gas free.

Figs. 9.10.3-1 — 9.10.3-4 illustrate examples of arrangement of access and sounding means:

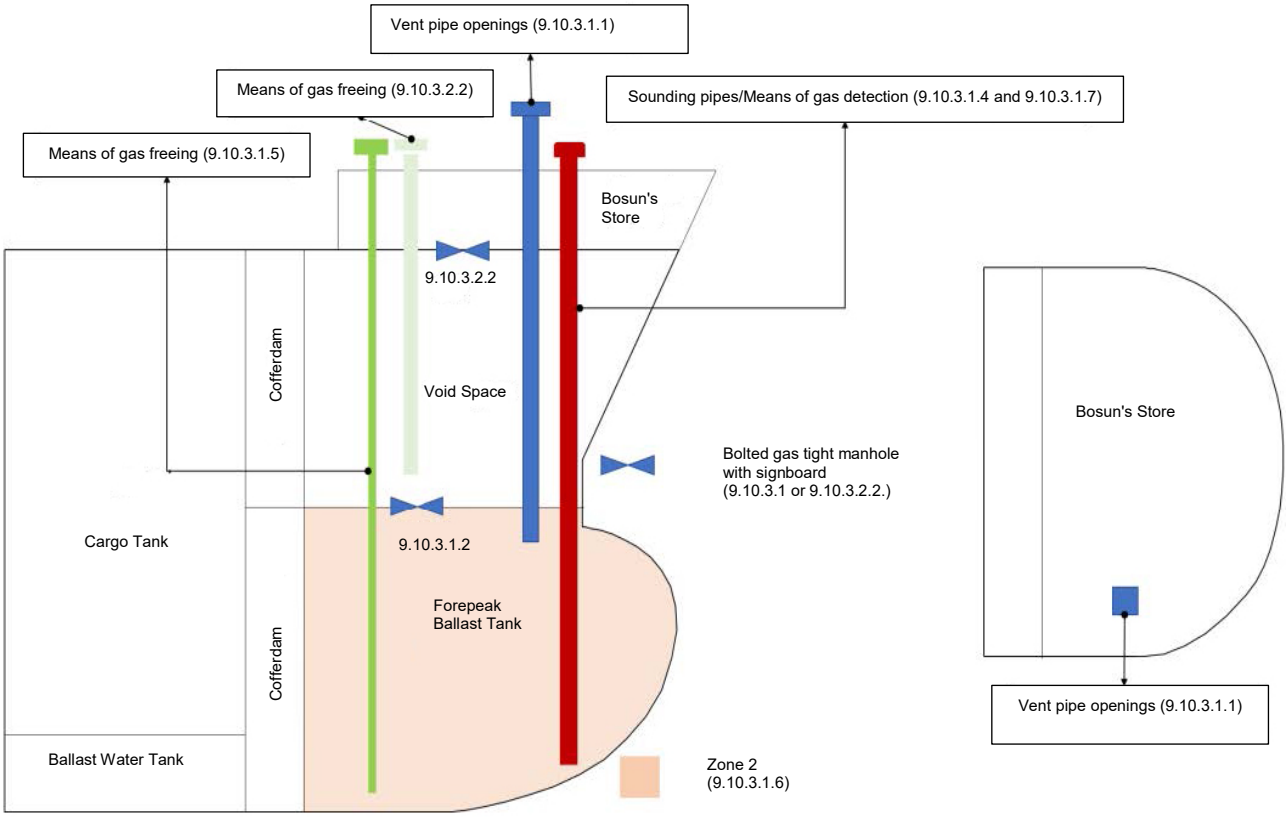



Fig. 9.10.3-1*

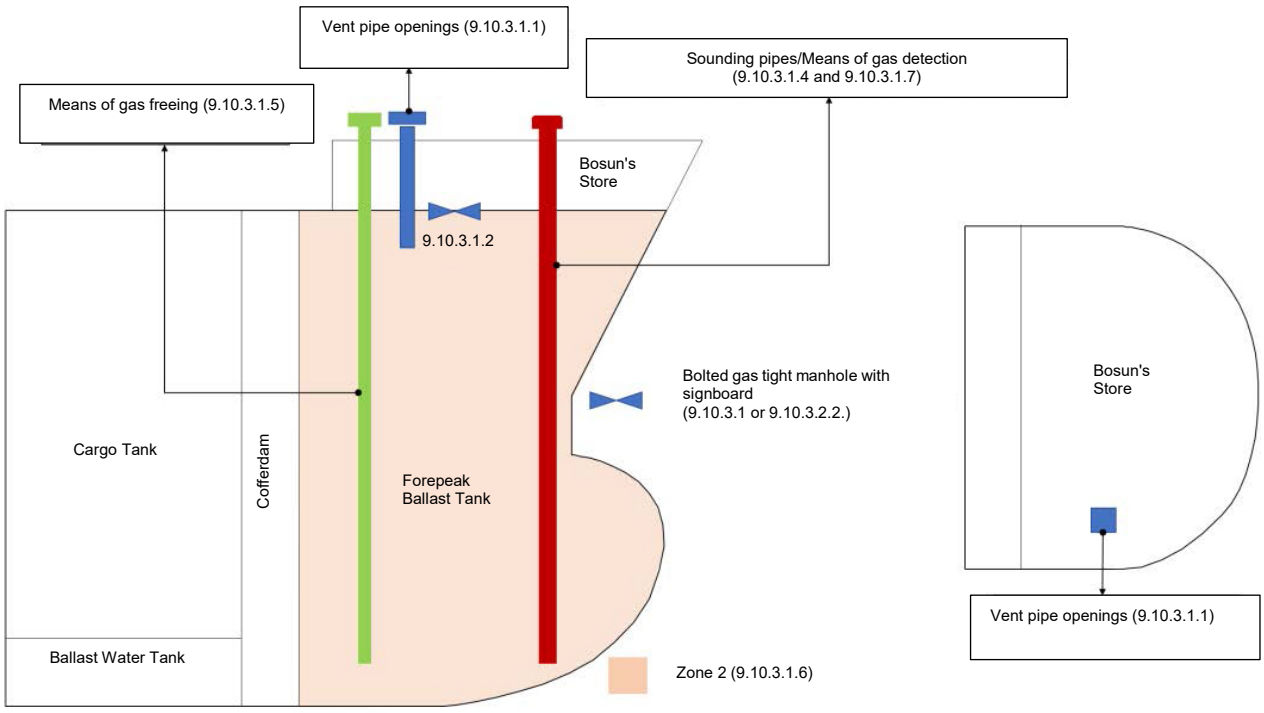



Fig. 9.10.3-2*

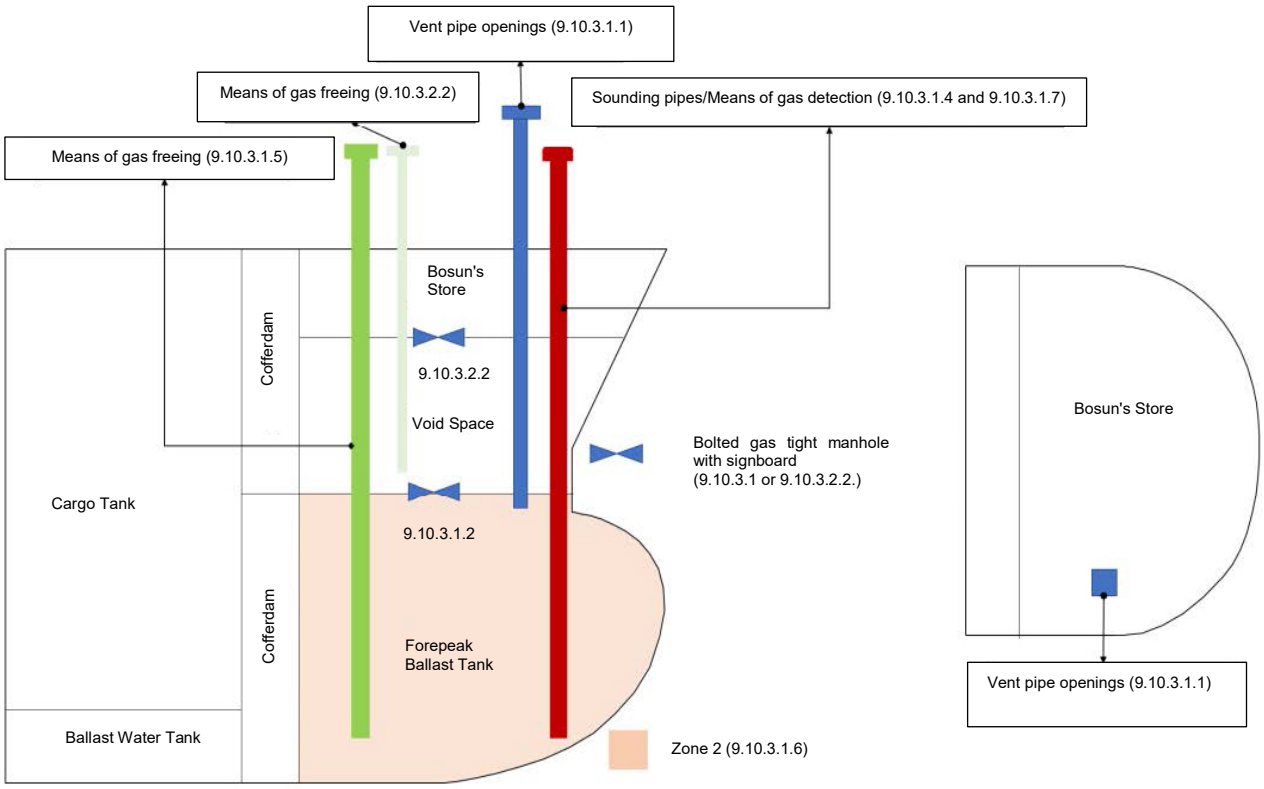

Vent pipe openings (9.10.3.1.1)
Means of gas freeing (9.10.3.2.2)
Sounding pipes/Means of gas detection (9.10.3.1.4 and 9.10.3.1.7)
Means of gas freeing (9.10.3.1.5)
Bosun's Store
Cofferdam
9.10.3.2.2
Void Space
Bolted gas tight manhole with signboard (9.10.3.1 or 9.10.3.2.2.)
Cargo Tank
9.10.3.1.2
Cofferdam
Forepeak Ballast Tank
Ballast Water Tank
Zone 2 (9.10.3.1.6)
Bosun's Store
Vent pipe openings (9.10.3.1.1)

Fig. 9.10.3-3*

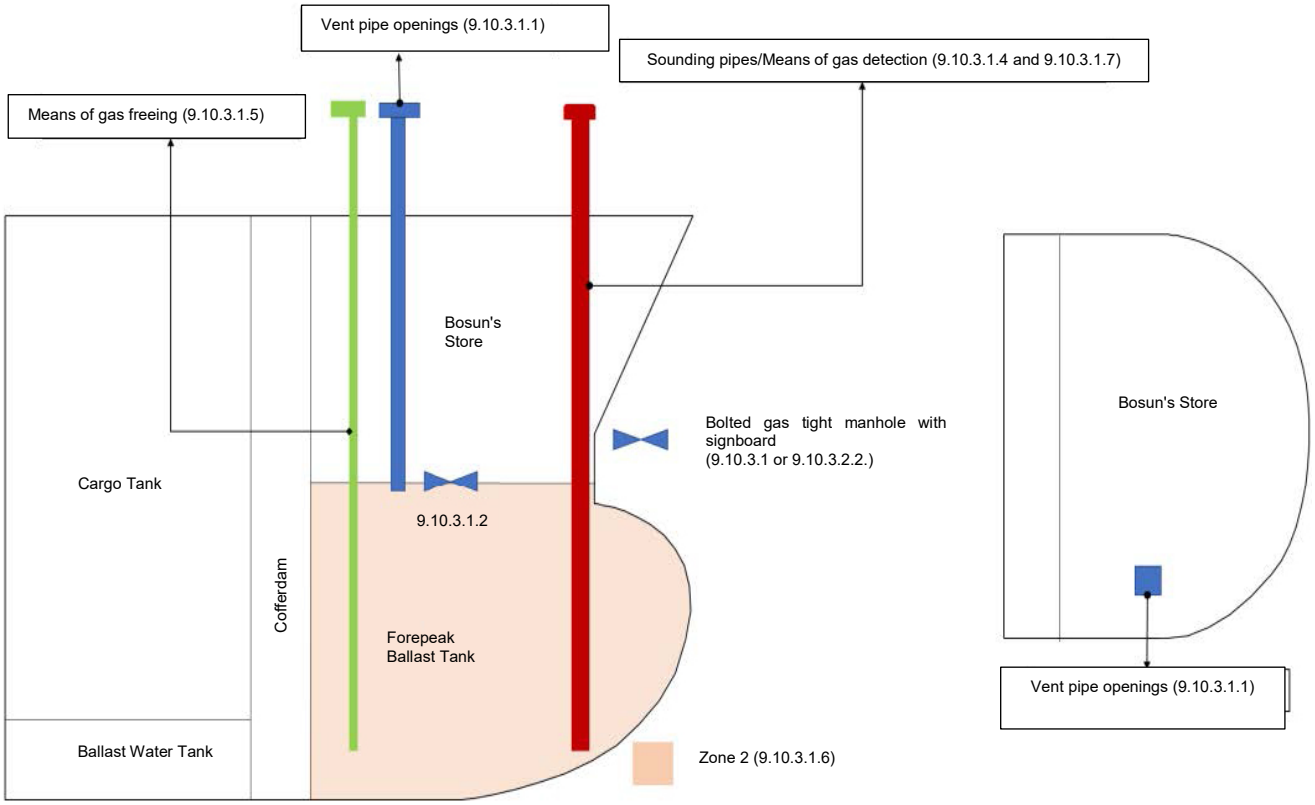

Vent pipe openings (9.10.3.1.1)
Sounding pipes/Means of gas detection (9.10.3.1.4 and 9.10.3.1.7)
Means of gas freeing (9.10.3.1.5)
Bosun's Store
Bolted gas tight manhole with signboard (9.10.3.1 or 9.10.3.2.2.)
Cargo Tank
9.10.3.1.2
Cofferdam
Forepeak Ballast Tank
Ballast Water Tank
Zone 2 (9.10.3.1.6)
Bosun's Store
Vent pipe openings (9.10.3.1.1)

Fig. 9.10.3-4*

*for oil tankers only*

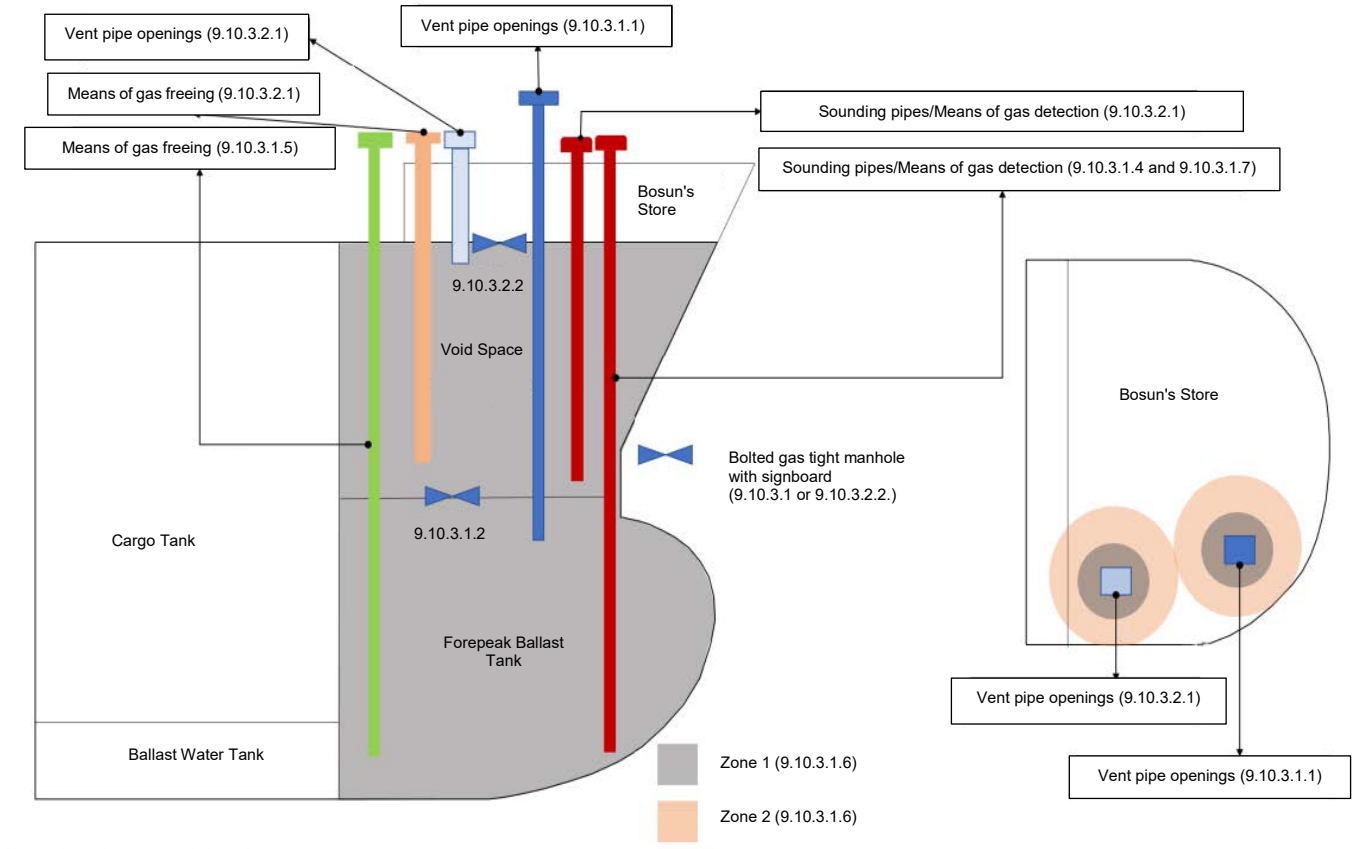



Fig. 9.10.3-5*

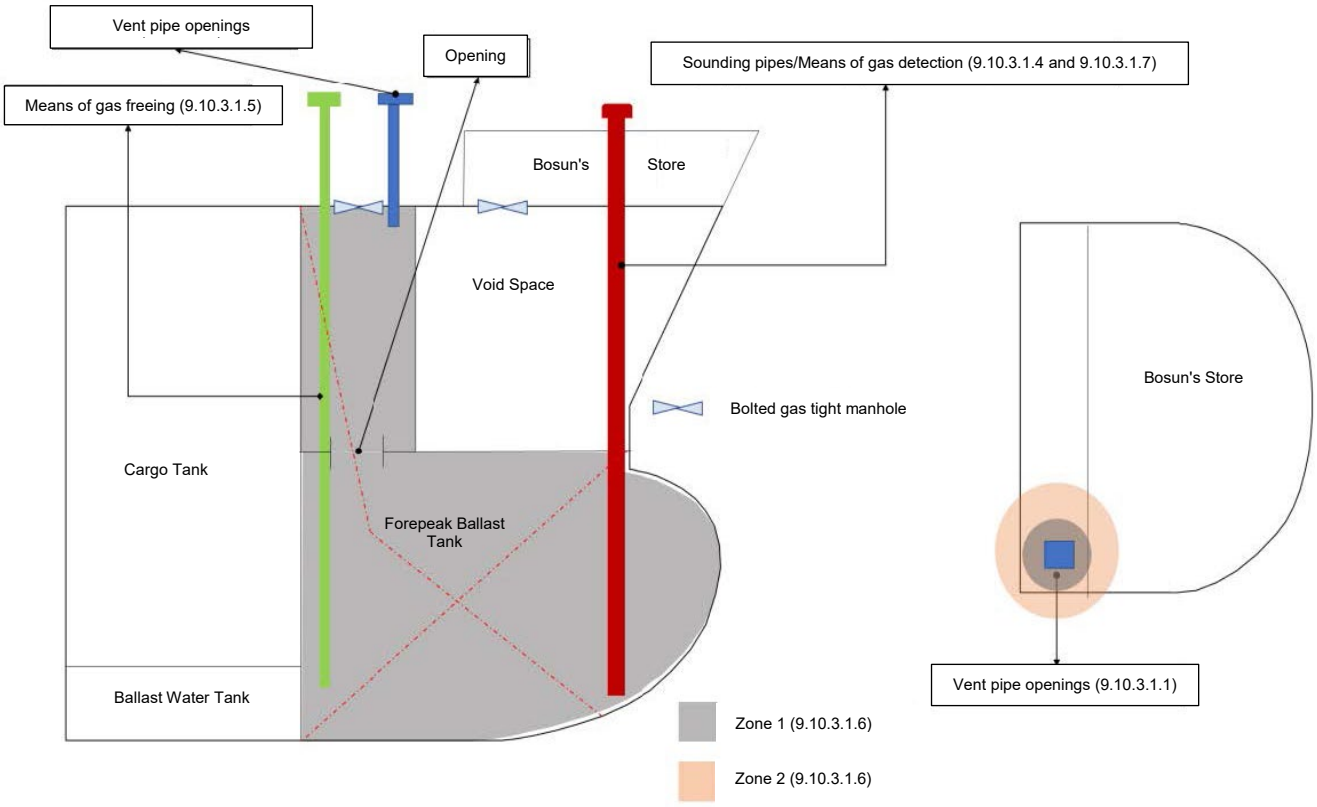



Fig. 9.10.3-6*

*N o t e s : while accessing the forepeak ballast tank the following requirements shall be met:
continuous ventilation is maintained while accessing the forepeak tank (refer to 9.10.3.1.3);
to detect toxic and flammable vapours within the forepeak ballast tank (based on the cargoes carried in the current voyage, and since last de-ballasting of the forepeak ballast tank was carried out), in order to ensure the forepeak ballast tank is fully gas freed (refer to 9.10.3.1.7);
where toxic-vapour-detection equipment is not available for some cargoes, the forepeak ballast tank may be ventilated by dilution method at a minimum rate of 6 air changes per hour for a minimum of 24 h. The tank entry procedure to be done in compliance with IMO resolution A.1050(27).".

## 9.14 MONITORING THE COMPOSITION OF ATMOSPHERE IN CARGO AREA

**Para 9.14.3** is amended as follows:

"**9.14.3** In cargo pump rooms and in ballast pump rooms fitted with the equipment containing cargo a system for continuous monitoring of the concentration of hydrocarbon gases shall be fitted. Sampling of atmosphere for analysis shall be carried out in succession (including the exhaust vent). The interval between measurements shall be as short as possible. Suitable number of detectors or ~~D~~detector heads of gas analyzers shall be located in the cargo pump room at upper and lower positions, at least covering the following places:

**.1** (perpendicular) upper part of each cargo pump or between two cargo pumps;

**.2** within 30 cm:

from the lowest part of the cargo pump room plating of the inner bottom, if the inner bottom is provided;

from the lowest part of the cargo pump room bottom flooring, if the inner bottom is not provided;

**.3** not more than 1 m below the cargo pump room ceiling/head deck; and

**.4** one detector every 10 m length or width of the cargo pump room.

**.5** in the areas with limited air circulation (at recesses and remote angles).

When the hydrocarbon gas concentration reaches a pre-set level, which shall not be higher than 10 % of the lower flammable limit, a continuous audible and visual alarm signal shall be automatically effected in the pump-room, main machinery control room, cargo control room and navigation bridge to alert personnel to the potential hazard.

In combination carriers, such system, in addition to the cargo pump-rooms, shall be installed in cofferdams and pipe tunnels adjacent to the settling tanks.".

## 11 EXHAUST GAS SYSTEM

### 11.4 SYSTEMS FOR REDUCING $SO_X$ EMISSIONS

**New para 11.4.5** is introduced reading as follows:

"**11.4.5 Monitoring and safety functions for exhaust gas cleaning ($SO_x$) systems.**

The following requirements apply to the arrangements intended for the safeguard of the ship in case of malfunction of the exhaust gas cleaning systems (EGCS):

**.1** exhaust bypass.

The EGCS bypass arrangement shall be provided in order to continue the engine operation. The arrangement shall be operated automatically in accordance with Table 11.4.5. The bypass arrangement may be omitted, provided the EGCS is designed for dry operation and the lack of the bypass arrangement does not interfere with the continuous operation of the engine.

In installations with individually controlled bypass and uptake dampers, an interlock is required to prevent both dampers from being closed at the same time. The interlock can comprise a pressure sensor upstream of the dampers, interfaced to the EGCS safety system, opening the bypass damper in case of high back pressure;

**.2** control and monitoring system.

Automatic control, monitoring (including washwater discharge criteria), alarm, and safety functions shall be provided for the EGCS so that operations remain within preset parameters for all fuel oil combustion unit(s) and $SO_x$ emission abatement system operating conditions.

The control system for the exhaust gas cleaning system may be connected to an integrated control system, in compliance with 7.2 and 7.6.7 of Part XV "Automation", or may be a standalone system. The system shall be designed such that a single fault of a component will not lead to a potentially dangerous situation for human safety and/or the ship. Failure Mode and Effect Analysis (FMEA), or equivalent, demonstrating the safety system design basis shall be submitted when the control system is connected to an integrated control system of a ship.

**.3** safety shutdown system.

A safety shutdown system shall be provided for the exhaust gas cleaning system. The safety system shall be designed as far as is practicable to operate independently of the control and alarm systems specified in 11.4.5.2, such that failures or malfunctions in the control and alarm systems will not prevent the safety system from operating. Therewith:

upon activation of the safety shutdown system, visual and audible alarms shall be indicated at both the local and remote control stations. Visual alarms shall include a means of indicating the parameters causing shutdown;

in addition to the automatic shutdown system, manual emergency shutdown arrangements shall be provided at both the local and remote control stations;

in the event where shutdown by the safety shutdown system is activated, the restart shall not occur automatically, unless after the system is manually reset;

safety shutdown shall be automatically activated for the conditions listed in Table 11.4.5.

Table 11.4.5

**Parameters for indication, alarm and safety functions**

| | Group 1 | | Group 2 |
|---|---|---|---|
| Monitored parameters | Indication at control station(s) | Alarm activation | Automatic EGC Shutdown with alarm and EGC bypass[1] |
| Exhaust gas temperature after EGC unit | X | High | X (High-High) |
| Pressure before the EGC unit and/or Differential pressure across EGC unit[2] | X | High | X (High-High) |
| Water level in wet EGC unit | | High | X (High-High) |
| EGC exhaust fan/blower motors[3] | Running | Stop | |
| EGC exhaust bypass, isolation, mixing valves, where provided | Position[4] | | |
| Operation of EGC washwater pumps or washwater system supply pressure | Running<br><br>X | Stop<br><br>Low | |
| Chemical treatment fluid storage tank temperature | | Low/High[5] | |
| Chemical treatment fluid storage tank level | | Low/High[5] | |
| Chemical treatment fluid leakage detection in system drip tray or drain/residue tank | | X[6] | |
| Group 1 – Common sensor for indication and alarm.<br>Group 2 – Sensor for shut down and bypass.<br><br>[1] Automatic stopping of all EGCS pumps. Automatic bypass of the EGC unit is required when the EGC unit is not suitable for operation in the dry condition.<br>[2] As applicable in accordance with the specific EGC system design.<br>[3] If applied.<br>[4] Refer to 11.4.5.2.<br>[5] Refer to 11.4.2.5.<br>[6] Where necessary, refer to 11.4.2.13. | | | |

".

**Chapter 12.6** is renamed as follows:

"**12.6 VENTILATION OF VEHICLE SPACES, SPECIAL CATEGORY SPACES, OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES**".

**New paras 12.6.9** and **12.6.10** are introduced reading as follows:

"**12.6.9** Inlet and outlet openings for mechanical ventilation of ro-ro spaces and special category spaces shall be permitted below accommodation spaces, service spaces and control stations in superstructures. The openings shall be provided with closing devices controlled from a safe position in case of fire in the ro-ro spaces. The closing device shall be made of steel or other fire-resistant material. Such openings shall not be permitted below arrangement areas of survival crafts, the emergency generator and air intakes for the engine room(s).

**12.6.10** Air intakes serving the ship's propulsion plant and power generators and emergency power generators shall be in a position minimizing the risk of being contaminated by a fire in the ro-ro space, special category space or by a fire of vehicles arranged on the weather deck intended for the carriage of vehicles.".

### 13 FUEL OIL SYSTEM

### 13.1 PUMPS

**New para 13.1.6** is introduced reading as follows:

"**13.1.6** All positive displacement pumps (piston, screw, gear, diaphragm and etc.) shall be provided with safety valves according to 5.2.2.1 and 5.2.2.2 of Part IX "Machinery". If the vessel design requires an isolation valve at the safety valve discharge line, this valve shall be permanently open and be locked open.".

## PART IX. MACHINERY

### 1 GENERAL

### 1.1 APPLICATION

**Para 1.1.1** is amended as follows:

"**1.1.1** The requirements of the present Part of the Rules for the Classification and Construction of Sea-Going Ships[1] apply to the following engines and machinery:

**.1** main internal combustion engines;
**.2** main steam turbines;
**.3** main gas turbines;
**.4** gears and couplings;
**.5** engines driving electric generators or auxiliary and deck machinery, units in assembly;
**.6** pumps included into the systems covered by Part VI "Fire Protection", Part VIII "Systems and Piping" and Part XII "Refrigerating Plants";
**.7** air compressors;
**.8** fans of main boilers, turboblowers (turbochargers) and fans of internal combustion engines;
**.9** fans included into the system covered by Part VIII "Systems and Piping";
**.10** steering gear;
**.11** anchor machinery;
**.12** towing winches;
**.13** anchor handling winches;
**.134** mooring machinery;
**.145** hydraulic drives;
**.156** centrifugal separators for fuel oil and lubricating oil.

---

[1] Hereinafter referred to as the RS Rules/C.".

## 1.2 SCOPE OF SURVEYS

**Table 1.2.4**. **Item 7** is amended as follows:

"

| Nos | Item | Material | Chapter of Part XIII "Materials" |
|---|---|---|---|
| **7** | **Windlasses, capstans, mooring and towing winches, anchor handling winches** | | |

".

## 2 INTERNAL COMBUSTION ENGINES

## 2.3 ENGINE FRAME

**Para 2.3.3** is amended as follows:

"**2.3.3 Protection of internal combustion engines against crankcase explosions.**

**2.3.3.1** Crankcase construction and crankcase doors shall be of sufficient strength to withstand anticipated crankcase pressures that may arise during a crankcase explosion taking into account the installation of explosion relief valves required by 2.3.4. Crankcase doors shall be fastened sufficiently securely for them not to be readily displaced by a crankcase explosion.

**2.3.3.2** Additional relief valves shall be fitted on separate spaces of crankcase such as gear or chain cases for camshaft or similar drives, when the gross volume of such spaces exceeds 0,6 $m^3$ (considering 2.3.4.2 and 2.3.4.3).

**2.3.3.3** Scavenge spaces in open connection to the cylinders shall be fitted with explosion relief valves.

**2.3.3.4** Design, arrangement and location of explosion relief valves shall comply with the requirements of 2.3.4.

**2.3.3.5** Ventilation of crankcase, and any arrangement which could produce a flow of external air ~~within~~ into the crankcase, is in principle not permitted except for ~~dual fuel~~ engines fuelled with gas or low-flashpoint fuel where ~~crankcase ventilation shall be provided in accordance with 9.5.2.~~ this might be necessary to maintain the gas concentration in the crankcase below LEL provided that:

**.1** It is demonstrated that the risk connected with a crankcase explosion is not increased by the ventilation system;

**.2** The operation of the ventilation system is monitored.

**.3** The automatic safety actions to be activated and/or the risk mitigation measures to be implemented in case of detection of a ventilation failure are specified by the engine manufacturer and justified in the safety concept of the engine.

Note: LEL means the Lower Explosive Limit, as defined in IEC 60079-10-1 (February 2021) standard, paragraph 3.6.12. The lowest applicable LEL of all possible gas or low flashpoint fuels, fuel vapours or mixture is to be considered.

**2.3.3.5.1** Crankcase ventilation pipes, where provided, shall be as small as practicable to minimize the inrush of air after a crankcase explosion. The ends of the ventilation pipes shall be fitted with flame-arresting devices and arranged so as to prevent water from getting into engine.

Ventilation pipes shall be laid to the weather deck to locations preventing the suction of vapors into accommodation and service spaces.

For engines with power output up to 750 kW suction of gas from the crankcase by turbochargers or blowers may be admitted, provided reliable oil separators are fitted to prevent the oil from being carried into the engine with suction gas.

**2.3.3.5.2** ~~If a forced extraction of the oil mist atmosphere from the crankcase is provided (for mist detection purposes, for instance), the vacuum in the crankcase shall not exceed 250 Pa.~~ When forced extraction of crankcase atmosphere is provided, the crankcase pressure level is not to influence the reliable function of measurement and safety devices (such as oil mist detection) in the crankcase.

**2.3.3.5.3** To avoid interconnection between crankcases and the possible spread of fire following an explosion, crankcase ventilation pipes and oil drain pipes for each engine shall be independent of any other engine.

**2.3.3.6** For engines fuelled with gas or low flashpoint fuel a detailed evaluation regarding the safety of crankcase is to be carried out justifying that:

**.1** either the gas concentration in the crankcase remains below the LEL without specific measures, or

**.2** the risk of a crankcase explosion is reduced through specific measures (refer to, for example, 2.3.3.5 or 2.3.3.23).

**2.3.3.~~6~~7** Lubricating oil drain pipes from the engine sump to the drain tank shall be continuously submerged at their outlet ends.

Crankcase drain outlets shall be fitted with grates and grids preventing foreign objects from getting into the drain piping. The above requirement is also applied to engines with dry crankcase.

**2.3.3.~~7~~8** A warning notice shall be fitted either on the control stand or, preferably, on a crankcase door on each side of the engine. This warning notice shall specify that, whenever overheating is suspected within the crankcase, the crankcase doors or sight holes shall not be opened before a reasonable time, sufficient to permit adequate cooling after stopping the engine.

**2.3.3.~~8~~9** Oil mist detection arrangements (or engine bearing temperature monitors or equivalent devices) are required:

**.1** for alarm and slow down purposes for low speed ~~diesel engines~~ ICE of 2250 kW and above or having cylinders of more than 300 mm bore (refer also to Table 4.2.10-1, Part XV "Automation");

**.2** for alarm and automatic shutoff purposes for medium and high speed ~~diesel engines~~ ICE of 2250 kW and above or having cylinders of more than 300 mm bore (refer also to Tables 4.2.10-2, 4.4.6-2, Part XV "Automation").

Oil mist detection arrangements shall be of a type approved by the Register and comply with the requirements of 2.3.3.~~9~~10 and 2.3.3.2~~0~~1. The type test procedure for the crankcase oil mist detection arrangements are set forth in Appendix 11 to Section 5, Part IV "Technical Supervision during Manufacture of Products" of the Rules TSDCS.

Engine bearing temperature monitors or equivalent devices (refer to Note 3 below) used as safety devices shall be of a type approved by the Register for such purposes.

Notes: 1. For the purpose of the requirements given in 2.3.3.8.1 and 2.3.3.8.2, the following definitions apply.

Low-speed engines mean ~~diesel engines~~ ICE having a rated speed less than 300 rpm.

Medium-speed engines mean ~~diesel engines~~ ICE having a rated speed of 300 rpm and above, but less than 1400 rpm.

High-speed engines mean ~~diesel engines~~ ICE having a rated speed of 1400 rpm and above.

2. An equivalent device could be interpreted as measures applied to high-speed engines where specific design features to preclude the risk of crankcase explosions are incorporated.

3. Engine bearing temperature monitors or equivalent devices are defined as follows:

For crosshead engines: The wording "engine bearing" of the term “engine bearing temperature monitors or equivalent devices” includes at least journal and connecting rod bearings and the crosshead bearings.

For trunk piston engines: "Engine bearing temperatures monitors" may be accepted as an alternative to the oil mist detector only when the temperature of all bearings, including the piston pin bearings, are monitored.

The expression "equivalent devices" includes measures applied to engines where specific design features to preclude the risk of crankcase explosion are incorporated, subject to satisfactory justifications.

The examples of acceptable "temperature monitors or equivalent devices" are as follows:

a temperature monitoring system of the bearing concerned

a bearing oil outlet temperature monitoring system

a splash oil temperature monitoring system

measures applied to engines where specific design features to preclude the risk of crankcase explosions are incorporated, subject to satisfactory justifications.

**2.3.3.~~9~~10** The oil mist detection system and arrangements shall be installed in accordance with the engine designer's and oil mist detection system arrangements manufacturer's instructions/recommendations. The following particulars shall be included in the instructions:

**.1** schematic layout of engine oil mist detection and alarm system showing location of engine crankcase sample points and piping or cable arrangements together with pipe dimensions to detector;

~~**.2** evidence of study to justify the selected location of sample points and sample extraction rate (if applicable) in consideration of the crankcase arrangements and geometry and the predicted crankcase atmosphere where oil mist can accumulate;~~

**.~~3~~2** the manufacturer's maintenance and test manual;

**.~~4~~3** information relating to type or in-service testing of the engine with engine protection system test arrangements having approved types of oil mist detection equipment.

**2.3.3.1~~0~~1** An engine installed on board ship shall be provided with a manufacturer's maintenance and test manual of oil mist detection arrangements according to 2.3.3.~~9~~10.

**2.3.3.1~~1~~2** Oil mist detection and alarm information shall be capable of being read from a safe location away from the engine.

**2.3.3.1~~2~~3** Each engine shall be provided with its own independent oil mist detection arrangement and a dedicated alarm.

**2.3.3.1~~3~~4** Oil mist detection and alarm systems shall be capable of being tested on the test bed and on board under engine at standstill and engine running at normal operating conditions in accordance with test procedures approved by the Register.

**2.3.3.1~~4~~5** Alarms and shutdowns for the oil mist detection system shall be in accordance with the requirements of Part XV "Automation".

**2.3.3.1~~5~~6** The oil mist detection arrangements shall provide an alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangement.

**2.3.3.1~~6~~7** The oil mist detection system shall provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication.

**2.3.3.1~~7~~8** Where oil mist detection equipment includes the use of programmable electronic systems, the arrangements shall comply with 7.10 "Programmable electronic systems", Part XV "Automation".

**2.3.3.1~~8~~9** Plans showing details and arrangements of oil mist detection and alarm arrangements shall be approved by the Register.

Documentation containing evidence of studies justifying the selected location of sample points and the sample extraction rate (if applicable), supported by a confirmation from the oil mist detection system manufacturer, from the crankcase and the spaces mentioned in 2.3.3.2, shall be provided to the Register for information.

As an alternative to the evidence of studies, an oil mist inlet test may be performed on a running engine. Test conditions such as setup, records or engine loads shall be agreed upon between engine designer, oil mist detector (OMD) manufacturer and Register. The test engine shall be chosen to demonstrate OMD arrangement suitability to cover a specified range of engine types and configurations. To allow a repeatable and comparable test, an oil mist generator as described in Appendix 11 to Section 5, Part IV "Technical Supervision during Manufacture of Products" of the Rules TSDCS shall be used.

**2.3.3.~~19~~20** The equipment together with detectors shall be tested when installed on the test bed and on board ship to demonstrate that the detection and alarm system functionally operates. The testing arrangements shall be approved by the Register.

**2.3.3.2~~0~~1** Where sequential oil mist detection arrangements are provided the sampling frequency and time shall be as short as reasonably practicable.

**2.3.3.2~~1~~2** Where alternative methods are provided for the prevention of the build-up of oil mist that may lead to a potentially explosive condition within the crankcase details, they shall be agreed upon with the Register and provided with the technical substantiation submitted to the Register. In addition to item 22 of Table 1.2.3.1-2, the following information shall be included in the details to be submitted for consideration:

**.1** engine particulars – type, power, speed, stroke, bore and crankcase volume;

**.2** details of arrangements preventing the build up of potentially explosive conditions within the crankcase, e. g., bearing temperature monitoring, oil splash temperature, crankcase pressure monitoring and recirculation arrangements;

**.3** evidence to demonstrate that the arrangements are effective in preventing the build up of potentially explosive conditions together with details of in-service experience;

**.4** operating instructions and the maintenance and test instructions.

**2.3.3.2~~2~~3** Where it is proposed to use the introduction of inert gas into crankcase to minimize a potential crankcase explosion, details of the arrangements shall be submitted to the Register for consideration.".

## 6 DECK MACHINERY

**New Chapter 6.7** is introduced reading as follows:

### "6.7 ANCHOR HANDLING WINCHES

**6.7.1** Requirements of the Chapter apply to the winches intended for deploying, recovering and repositioning anchors and mooring lines used for positioning MODU and other ships engaged in subsea operations.

Requirements for control stations and associated equipment including loose gear used together with anchor handling winches, are given in Chapter 13.3, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships".

**6.7.2** In addition to the applicable requirements given in Chapters 6.1 and 6.5, anchor handling winches shall comply with the requirements specified in this Chapter.

**6.7.3** Anchor handling winches shall be capable of hoisting and lowering in a controlled manner and shall be provided with adjustable speed control between the minimum and maximum speeds.

**6.7.4** Anchor handling winches shall be equipped with the following:

**.1** tension measuring and control means to ensure that the system is not overload in the event that the anchor being handled gets stuck, entangled or is exposed to similar situations;

**.2** continuous load monitors and audible and visual overload alarm. The overload alarm shall be programmable for lower level of load than the nominal one;

**.3** remotely operated spooling devices.

**6.7.5** Minimum set of operational documentation for anchor handling winches is specified in 3.6 and 3.7 of Table 1, Appendix 1, Part II "Technical Documentation" of the Rules TSDCS.

**6.7.6 Emergency release.**

**6.7.6.1** Emergency release system of the load on wire (emergency release system) means machinery and associated equipment used for emergency release of the drum with wire under tension.

**6.7.6.2** Anchor handling winches shall be designed to provide emergency release of the load on the wire in a safe and controlled manner, both under normal as well as dead-ship conditions.

**6.7.6.3** The emergency release system shall be protected against unintentional activation.

**6.7.6.4** The design and operation of the emergency release system shall provide restrictions on the pay-out speed of the wire due to inertia and other restrictions due to onboard arrangements.

**6.7.6.5** Instructions for the operation of the emergency release system shall be clearly displayed at the navigation bridge and locally at the winch.".

## PART XI. ELECTRICAL EQUIPMENT

### 4 DISTRIBUTION OF ELECTRICAL POWER

### 4.3 POWER SUPPLY OF ESSENTIAL SERVICES

**Para 4.3.3** is amended as follows:

"**4.3.3** In cargo ships of restricted areas of navigation **R2**, **R2-RSN**, **R2-RSN(4,5)**, **R3-RSN** and **R3**, and in particular cases in ships of unrestricted service and ships of restricted areas of navigation **R0** and **R1**, the supply feeder of anchor gear may be connected to the distribution board of cargo winches or to another distribution board, on special approval of the Register, provided the boards are supplied directly from the main distribution board and adequate protection is available.".

### 7 INTERNAL COMMUNICATION AND SIGNALLING

### 7.5 FIRE DETECTION AND FIRE ALARM SYSTEM

**New para 7.5.7.5** is introduced reading as follows:

"**7.5.7.5** On ro-ro passenger ships, alarm notifications shall follow a consistent alarm presentation scheme (wording, vocabulary, colour and position). Alarms shall be immediately recognizable on the navigation bridge and shall not be compromised by noise or poor placing. The interface shall provide alarm addressability, allow the crew to identify the alarm history, the most recent alarm and the means to suppress alarms while ensuring the alarms with ongoing trigger conditions are still clearly visible.".

**Para 7.5.10.3** is amended as follows:

"**.3** heat detectors and linear heat detectors fitted in spaces with a normal air temperature shall operate within the temperature limits of 54 to 78 °C when the temperature is increased to those limits at a rate less than 1 °C per min. The Register may consider the possibility of using heat detectors with higher rates of temperature increase taking into account their sensitivity;".

**Para 7.5.10.4** is amended as follows:

"**.4** the activation temperature of heat detectors and linear heat detectors ~~activation~~ in drying rooms and similar spaces, which are characterized by high temperatures, may be set up to 130 °C inclusive, and in saunas up to 140 °C inclusive;".

**New para 7.5.10.8** is introduced reading as follows:

"**7.5.10.8** On ro-ro passenger ships, the smoke detector function in special category and ro-ro spaces may be disconnected during loading and unloading of vehicles. The time of disconnection shall be adapted to the time of loading/unloading and be automatically reset after this predetermined time. The central unit shall indicate whether the detector sections are disconnected or not. Disconnection of the heat detection function or manual call points shall not be permitted.".

## 7.12 INDICATION OF DOOR POSITION IN RO-RO PASSENGER SHIPS AND RO-RO CARGO SHIPS

**Para 7.12.9** is amended as follows:

"**7.12.9** For ro-ro passenger ships engaged in international voyages, the special category spaces and cargo spaces, indicated in 1.5.4.3 and 1.5.9, Part VI "Fire Protection" (in the absence of continuous patrolling or other effective means of monitoring) shall be monitored by means of television surveillance, so that any movement of vehicles in adverse weather conditions, identification of fire location or unauthorized access of passengers thereto, may be detected whilst the ship is moving.".

## 7.14 TELEVISION SURVEILLANCE AND INDICATION SYSTEM

**New para 7.14.17** is introduced reading as follows:

"**7.14.17** For passenger ships, an effective video monitoring system shall be arranged in vehicle, special category and ro-ro spaces for continuous monitoring of these spaces. The system shall be provided with immediate playback capability to allow for quick identification of fire location, as far as practicable. Cameras shall be installed to cover the whole space, high enough to see over cargo and vehicles after loading.

The videos recorded by this monitoring system shall be available for replay at a continuously manned control station or at the safety centre for at least seven days. The correspondence between any one video camera and the section of the fixed water-based fire-extinguishing system protecting the space covered by this camera shall be clearly displayed close to the video monitor. Continuous monitoring of the video image by the crew is not required.".

## 9 EMERGENCY ELECTRICAL INSTALLATIONS

### 9.3 EMERGENCY SOURCES OF ELECTRICAL POWER IN CARGO SHIPS

**Para 9.3.1. The second paragraph** is amended as follows:

"In ships of unrestricted service and restricted areas of navigation **R0** and **RI** of 300 and above gross tonnage, the emergency sources of electrical power shall ensure the supply of services listed above during 18 h.".

## 16 CABLES AND WIRES

### 16.8 CABLING

**Para 16.8.1.9** is amended as follows:

"**16.8.1.9** The high fire risk spaces include:
machinery spaces of category A;
cargo spaces except cargo tanks for liquids with flashpoint above 60 °C and except cargo spaces specified in Note 10 to Table 3.1.2.1, Part VI "Fire Protection";
vehicle, ro-ro and special category spaces;
spaces containing fuel treatment equipment and other highly flammable substances;
galleys and pantries containing cooking appliances;
laundries containing drying equipment;
accommodation spaces of high fire risk;
paint rooms, store rooms and similar spaces for storage of flammable liquids;
enclosed and semi-enclosed spaces requiring installation of safe-type electrical equipment.".

**Para 16.8.10.2** is deleted. **Existing paras 16.8.10.3** and **16.8.10.4** are renumbered **16.8.10.2** and **16.8.10.3** accordingly.

## 17 ELECTRIC PROPULSION PLANTS

### 17.3 CONFIGURATION OF ELECTRIC PROPULSION PLANTS

**Para 17.3.1.6** is amended as follows:

"**.6** electric propulsion motor — ~~one or more~~ at least two units.".

**Para 17.3.2** is amended as follows:

"**17.3.2** For electrical propulsion plants with ~~one electric propulsion motor,~~ synchronous, asynchronous and electronically commutated main propulsion motors ~~shall have two systems of stator windings supplied from the relevant semiconductor frequency converter~~, the possibility of failures in electric machines shall be considered. Sufficient propulsion capacity shall be maintained or restored within due time for the following failure modes of electric machines, as a minimum:
**.1** winding insulation failures; and
**.2** excitation failures.
Single electric propulsion motors (both single and dual winding with a single rotor) for main propulsion shall not be considered to provide the reliability required for a single essential

propulsion component. A separate propulsion unit sufficient to give the ship a navigable speed should be required for such arrangements.

Propulsion arrangements with two independent rotors on a single shaft shall be considered to provide the required reliability, provided it is possible to de-excite or de-flux each of the rotors individually and to supply independently the stators.

Each converter shall be designed for at least 50 % of the rated power of the electric propulsion plant. ~~If the ship is equipped with several electric propulsion motors at the common shaft with the propeller of the main electric propulsion plant or with several main propulsion plants, the use of electric propulsion motors with one system of stator windings is permitted.~~".

## 23 SPECIAL REQUIREMENTS FOR ELECTRICAL EQUIPMENT OF SHIP'S ELECTRIC POWER SYSTEM WITH ELECTRICAL POWER DISTRIBUTION FOR DIRECT CURRENT

### 23.1 GENERAL

**Para 23.1.3** is supplemented with the following text**:**

"**23.1.3** Both direct current generator and rectifier supplied from the alternating current generator may be the sources of d.c. electrical power, as well as accumulator battery connected to the d.c. switchboard busbars with the use of its local monitoring, control, protection and alarm system.".

# PART XIII. MATERIALS

## 2 PROCEDURES OF TESTING

### 2.2 TESTING PROCEDURES FOR METALS

**Para 2.2.10.4** is amended as follows:

"**2.2.10.4** Tests for determining temperature *DWTT*.

The temperature *DWTT* shall be determined in drop-weight testing as the temperature corresponding to 70 % of a fibrous component in the fracture of a full-thickness specimen with a sharp notch being broken down in shock loading at a rate of 5 to 8 m/s. The main specimen dimensions: height = 75+2 mm, length = 300+5 mm, space between support *s* = 252±2 mm.

The tests are carried out for rolled products with thickness equal to 7,5 mm and up to 40 mm according to the procedure agreed with the Register. For rolled products with thickness over 19 mm the specimens with thickness equal to 19 mm cut out from the mid-thickness of rolled products on thickness may be tested. In this case the *DWTT* is higher in comparison with the temperature of full thickness: having rolled products' full-thickness of over 19 mm and above 30 mm at 10 °C, having rolled products' thickness of over 31 and above 40 mm — at 15 °C. The test procedure is in accordance with Appendix IV of the Rules for the Classification and Construction of Subsea Pipelines.

Procedure for attributing fracture sections to a crystalline type in compliance with 2.2.10.2.4.1.

Irrespective of fracture type, the temperature *DWTT* may be assumed as the temperature determined based on the results of absorbed energy measurement in accordance with 2.2.10.4.1.".

**New para 2.2.10.4.1** is introduced reading as follows:

"**2.2.10.4.1** The temperature DWTT determined based on the results of absorbed energy measurement, shall be assumed as a testing temperature when the absorbed energy $E_a$ [J] determined no less than on two specimens, is not less than 70 % from the value of its maximum assessment $E_a^{max}$.

$E_a^{max}$ is assumed as the average value for at least two specimens tested at temperature fully complying with ductile failure (100 % determined in the complete fracture area), recommended temperature is 20 °C ±5 or above, if the latter condition is not met.

Method for determination of absorbed energy $E_a$ shall be agreed with the Register.".

## 2.3 PROCEDURES OF TESTING NON-METALLIC MATERIALS

**Para 2.3.10.1** is amended as follows:

"**2.3.10.1** A sample, which dimensions are determined depending on the required number and dimensions of test specimens is conditioned in semi-immersed condition in the artificial sea water with a temperature (23±2) °C for 30 days. In the process of conditioning the sample distanced from an ultra-violet lamp for 50 cm shall be subjected every day to two-hour ultra-violet irradiation ~~500 W lamp placed at a distance of 50 cm from it~~ having wave length of 200 — 400 nm and density of energy radiation on the sample surface of 70 — 100 W/m$^2$. The recommended power of ultra-violet lamp shall be 210 — 350 W to generate the specified energy density. After conditioning test specimens are prepared from the sample for carrying out the required tests.".

**Para 2.3.10.4** is replaced by the following text:

"**2.3.10.4** Retro-reflective materials.

A sample, which size is determined proceeding from the number and size of specimens required, is subjected to the ultra-violet irradiation given in 2.3.10.1, without being immersed in water. Herewith, the sample of type 1 retro-reflective material shall be subject to continuous exposure during 30 h and during 60 h for type 2.".

## 3 STEEL AND CAST IRON

## 3.5 STEEL FOR STRUCTURES USED AT LOW TEMPERATURES

**Para 3.5.3.3.1.2** is amended as follows:

"**.2** determining the crack resistance parameter *CTOD* for the base metal and HAZ metal in testing the specimens cut from butt-welded joints in accordance with 2.2.10.5 for rolled plates with thickness of 16 mm and more.

Tests of steel with index "Arc" to determine $T_D$ temperature, as a rule, are carried out in the temperature interval including $T_d$ temperature determined as the design temperature of structures in accordance with 1.2.3, Part II "Hull". The value of $T_D$ is determined with 10 °C interval.

Where one procedure for steel manufacture is concerned (smelting, rolling, condition of supply), the results of the above tests obtained with the thickest rolled products may be extended to the rolling products with thicknesses smaller by 40 %, of all lower grades and strength levels where chemical composition, production technology and technology of heat treatment are identical to the tested material. At that, if, according to the calculations, the

spread reaches the thickness of 10 mm and less, the minimum thickness approved by the Register shall be ≥ 10 mm.".

**Para 3.5.3.3.4** is replaced by the following text:

"**3.5.3.3.4** During the initial survey of manufacture by the Register in order to determine the possibility of adding index "Arc" to a steel grade, ductile-brittle design transition temperatures are determined for each type of tests: *NDT* ($T_{D(NDT)}$), $T_{kb}$ ($T_{D(Tkb)}$) and *DWTT* ($T_{D(DWTT)}$). The following tests are mandatory:

*NDT*;

$T_{kb}$ or *DWTT* in rolled products' full-thickness.

Temperature values $T_{D(NDT)}$ and $T_{D(Tkb)}$ are determined in accordance with Table 3.5.3.3.4-1, temperature values $T_{D(DWTT)}$ are determined in accordance with Table 3.5.3.3.4-2. The highest temperature of determined design temperatures is indicated as $T_{D(b-d)}$ and assumed as a ductile-brittle design transition temperature of the presented steel.

For the metal thickness over 40 mm when the obtained values of design temperature $T_{D(Tkb)}$ exceed design temperature $T_{D(NDT)}$ more than by 10 °C, in order to specify the design temperature $T_{D(b-d)}$, *NDT* specimens cut out from the mid-thickness of rolled products may be additionally tested in accordance with 2.2.6. The temperature $T_{D(NDT)}$, obtained during the tests may be considered as a replacement of temperature $T_{D(Tkb)}$.

Table 3.5.3.3.4-1

**Determination of temperatures $T_{d(NDT)}$, $T_{d(Tkb)}$**

| Rolled product thickness, mm | $T_{D(NDT)}$, °C | $T_{D(Tkb)}$, °C |
|---|---|---|
| From 10 up to 15 incl. | – | $T_{kb}$ |
| Over 15 up to 25 incl. | *NDT* | $T_{kb}$ |
| Over 25 up to 30 incl. | *NDT* + 15 | $T_{kb}$ |
| Over 30 up to 40 incl. | *NDT* + 20 | $T_{kb}$ – 15 |
| Over 40 up to 50 incl. | *NDT* + 25 | $T_{kb}$ – 25 |
| Over 50 up to 60 incl. | *NDT* + 30 | $T_{kb}$ – 30 [1] |
| Over 60 | *NDT* + 30 | |

[1] Provided in additional to: $T_{kb} < 0{,}5T_{D(NDT)} + 15$°C.

Note. Additional condition means $T_{kb} \le -5$°C for Arc40, and $T_{kb} \le -15$°C for Arc60.

Table 3.5.3.3.4-2

**Determination of temperatures $T_{d(DWTT)}$**

| Rolled product thickness, mm | $T_{d(DWTT)}$, °C | | |
|---|---|---|---|
| | $R_{p0,2}$, MPa | | |
| | ≤ 500 | 500 < $R_{p0,2}$ ≤ 620 | > 620 |
| From 10 up to 15 incl. | *DWTT* – 10 | *DWTT* | *DWTT* |
| Over 15 up to 25 incl. | *DWTT* – 10 | *DWTT* | *DWTT* |
| Over 25 up to 30 incl. | *DWTT* – 10 | *DWTT – 5* | *DWTT* |
| Over 30 up to 40 incl. | *DWTT* – 10 | *DWTT* – 10 | *DWTT* – 5 |

".

**New para 3.5.3.3.7** is introduced reading as follows:

"**3.5.3.3.7** At СПИ renewal, tests shall be performed to determine one of two ductile-brittle temperatures carried out in rolled products' full-thickness: $T_{kb}$ or *DWTT*. Test result obtained in accordance with 3.5.3.3.4 shall be assumed as temperature $T_{D(b\text{-}d)}$.".

## 3.7 STEEL FORGINGS

**Table 3.7.3.1-2**. **Footnote 3** is amended as follows:

"[3] For ships with ice class marks **IA Super**, **IA**, **IB** and **IC**, as well as **Arc5**, **Arc4**, **Ice3** and **Ice2** materials used in machinery under sea water temperature such as propeller shafts and shaft bolts, the impact tests shall be carried out at – 10 °C. The average impact energy value *KV* for a series of longitudinal specimens shall be at least 20 J. No more than for one of three specimens the result may be by 30 % below the required.

For propeller shaft forgings of ships with ice class **Arc6** and above, the impact tests shall be carried out for all steel types at – 10 °C. The average impact energy value *KV* for a series of longitudinal specimens shall be at least 27 J. No more than for one of three specimens the results may be by 30 % below the required.".

## 3.16 STAINLESS STEEL

**Para 3.16.1.1** is amended as follows:

"**3.16.1.1** These requirements apply to stainless steel subject to the Register survey as required in other Parts of the Rules.

The Chapter includes the requirements for stainless steel rolled plates and bars, forging, casting and pipes of martensitic (M), martensitic + ferritic (MF), ferritic (F), austenitic + martensitic (AM), austenitic (A) and austenitic + ferritic (AF) classes. The assumed classification of stainless steel depending on its chemical composition and structure is given in Table 3.16.1.1.

Steel designations are based on the designations used in international standards.

Designations of national steel marks are given in accordance with the Russian standard.".

**Table 3.16.1.1** is amended as follows:

"Table 3.16.1.1

**Assumed classification of stainless steel depending on chemical composition and structure**

| Steel class | Steel designation | Steel mark | | Temperature range for application, °C |
|---|---|---|---|---|
| | | AISI/UNS | National | |
| M-1 | X20Cr13 | 410 | 20X13 | –20 ÷ +450 |
| | | 420 | 30X13 | |
| | X7CrNiNb16 4 | – | 07X16H4Б | –60 ÷ +350 |
| MF-2 | X15CrNi17 | 431 | 14X17H2 | –20 ÷ +350 |
| F-3 | X8CrTi17 | 430Ti | 08X17T | –0 ÷ +600 |
| AM-4 | X8CrNiTi17 6 | – | 08X17H6T | –60 ÷ +250 |
| A-5 | X10CrNiTi18 10 | 321, 347 | 08X18H10T | –165 ÷ +600 |
| | | | 12X18H10T | |
| | X2CrNi19 11 | 304L, 304LN | – | –165 ÷ +600 |
| | X2CrNi18 10 | 304 | 08X18H10 | –165 ÷ +550 |
| A-6 | X2CrNiMo17 13 2 | 316L, 316LN | 03X17H14M3 | –165 ÷ +600 |
| | X2CrNiMo18 13 3 | 317L, 317LN | – | –165 ÷ +600 |
| | X2CrNiMoTi17 13 3 | – | 10X17H13M3T | –165 ÷ +600 |
| A-7 | X2CrNiMoCu20 18 6 | S31254 | – | –165 ÷ +600 |

| Steel class | Steel designation | Steel mark | | Temperature range for application, °C |
|---|---|---|---|---|
| | | AISI/UNS | National | |
| | X2CrNiMoCu21 23 4 2 | N08904 | – | –165 ÷ +600 |
| AF-8 | X2CrNiMo22 5 3 | S31803 | 03Х22Н6М2 | –40 ÷ +250 |
| | X3CrNiMo25 6 3 | S31260 | – | –40 ÷ +250 |
| | X4CrNiVo25 5 3 | S32550 | – | –40 ÷ +250 |
| | X2CrNiMo25 7 4 | S32750 | – | –40 ÷ +250 |
| | X3CrNiMo25 7 3 | S32760 | – | –40 ÷ +250 |
| | X10CrNiTi22 6 | – | 08Х22Н6Т | –40 ÷ +250 |
| | X10CrNiMo21 6 2 | – | 08Х21Н6М2Т | –40 ÷ +250 |
| A-9 | X4CrNiMnMoNVNb 20 6 11 2 | – | 04Х20Н6Г11М2АФБ | –80 ÷ +500 |

".

**Para 3.16.1.6** is amended as follows:

"**3.16.1.6** Chemical composition and mechanical properties.

Chemical composition and mechanical properties of semi-finished products of stainless steel as well as steel resistance to environmental effects shall meet the requirements of this Part of the Rules and also the requirements of RS-agreed national and international standards or other RS-agreed special documents.

The chemical composition of stainless steel to be determined for each heat depending on the type of manufacture, shall meet the requirements of Tables 3.16.1.6 and 3.16.5.2. Where necessary, samples may be taken directly from a semi-finished product (plate, forging, etc.).

The requirements for mechanical properties of semi-finished products depending on their type are given in Tables 3.16.2.2, 3.16.3.2-1, 3.16.3.2-2, ~~and~~ 3.16.4.2 and 3.16.5.3.".

**Table 3.16.1.6** is renamed as follows:

"**Chemical composition of stainless steel (rolling products, forgings, pipes)**".

**Para 3.16.1.8**. **Heading** is amended as follows:

"**3.16.1.8** Sampling (rolling products, forging, pipes).".

**New para 3.16.5** is introduced reading as follows:

"**3.16.5 Castings.**

**3.16.5.1** These requirements apply to castings made of stainless austenitic chrome-nickel ferrum-base alloys intended for manufacture of elements of cargo containment (tanks), pressure vessels and pipeline fitting on ships or to other castings for ships, shipboard equipment and products of ship machine building.

**3.16.5.2** Chemical composition.

Chemical composition at ladle sample shall comply with the requirements given in Table 3.16.5.2. Where alternative steel mark shall be used, data on chemical composition, heat treatment and mechanical properties shall be presented. It is permitted to check compliance of the chemical composition of steel on each heat.

Table 3.16.5.2

**Chemical composition of castings made of stainless ferrum-base alloys**

| Steel mark | AISI/UNS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Chemical composition, % | | | | | | | | |
| | C, max | Mn, max | Si, max | P, max | S, max | Cr | Ni | Mo | Other |
| 304L | 0,03 | 2,0 | 1,5 | 0,04 | 0,03 | 17,0 — 21,0 | 8,0 — 12,0 | – | |
| 304 | 0,08 | 2,0 | 1,5 | 0,04 | 0,03 | 17,0 — 21,0 | 8,0 — 12,0 | – | |
| 316L | 0,03 | 2,0 | 1,5 | 0,04 | 0,03 | 17,0 — 21,0 | 9,0 — 13,0 | 2,0 — 3,0 | |
| 316 | 0,08 | 2,0 | 1,5 | 0,04 | 0,03 | 17,0 — 21,0 | 9,0 — 13,0 | 2,0 — 3,0 | |
| 321 | 0,08 | 2,0 | 1,0 | 0,045 | 0,03 | 17,0 — 19,0 | 9,0 — 12,0 | | ï ≥ 5×C ≤ 0,07 |
| 347 | 0,08 | 2,0 | 1,5 | 0,04 | 0,03 | 17,0 — 21,0 | 9,0 — 13,0 | – | 10xC ≤ Nb ≤ 0,080 |
| National steels | | | | | | | | | |
| 03X17H 14M3 | 0,03 | 1,0 – 2,0 | 0,4 | 0,03 | 0,02 | 16,8 — 18,3 | 13,5 — 15,0 | 2,2 — 2,8 | |
| 12X18H 10T | 0,12 | 2,0 | 0,8 | 0,035 | 0,02 | 17,0 — 19,0 | 9,0 — 11,0 | – | Ti (5C – 0,8) |
| 08X18H 10T | 0,08 | 2,0 | 0,8 | 0,035 | 0,02 | 17,0 — 19,0 | 9,0 — 11,0 | – | Ti (5C – 0,7) |
| 10X17H 13M3T | 0,1 | 2,0 | 0,8 | 0,035 | 0,02 | 16,0 — 18,0 | 12,0 — 14,0 | 3,0 — 4,0 | Ti (5C – 0,7) |

**3.16.5.3** Mechanical properties.

Mechanical properties of steel for design operating temperature up to –20 °C shall comply with the requirements given in Table 3.16.5.3 except for impact tests unless otherwise is agreed in the RS-approved documentation. If the design operating temperature is below –20 °C, impact tests (*KV*) shall be performed according to 2.2.3 or RS-agreed standards for compliance with the customer's requirements.

**3.16.5.3.1** For castings made of stainless austenitic chrome-nickel ferrum-base alloys, the following shall apply:

**.1** impact tests for casting of steel mark 316 and 316L shall be performed at –196 °C and comply with Table 3.16.5.3. If product elements apply at temperatures above –60 °C, in agreement with the Register, impact tests may be performed at temperature above –196 °C.

**.2** for castings made of steel marks 304, 304L, 321 and 347, impact tests shall be held at –196 °C, if design operating temperature is below –60 °C. If the design operating temperature is above –60 °C, impact tests shall be held in accordance with the customer's requirements.

**3.16.5.3.2** For castings intended for manufacture of cargo and process piping for carriage of liquefied gases and operated at minimum design temperature –165 °C, the requirements for impact are given in Table 2.1-4, Part IX "Materials and Welding" of the LG Rules. For minimum design temperature above –165 °C, it is allowed to be guided by the requirements of 3.16.5.3.1.

Table 3.16.5.3

**Mechanical properties of castings made of stainless ferrum-base alloys**

| Steel class | Steel mark | | Tensile strength $R_m$, min, MPa | Yield stress $R_{p0,2}$, min, MPa | Elongation $A_5$, min, % | Impact *KV* at –196 °C, min, J |
|---|---|---|---|---|---|---|
| | AISI/UNS | National | | | | |
| A-5 | 304L | – | 205 | 485 | 35 | 41 |
| | 304 | | | | | |
| | 321, 347 | 08X18H10T<br>12X18H10T | 205 | 485 | 30 | 41 |
| A-6 | 316L | 03X17H14M3 | 205 | 485 | 30 | 41 |
| | 316 | | | | | |
| | – | 10X17H13M3T | 200 | 510 | 35 | 41 |

**3.16.5.4** Condition of supply. Non-destructive testing.

Castings for products shall be made at firms recognized by the Register. Condition of supply shall meet the requirements of 3.16.1.7. Castings shall be made in accordance with the requirements and normative technical documentation specified in the RS-approved documentation.

Unless otherwise specified, castings shall be checked by liquid penetrant testing. If radiography is applied, it shall be carried out in accordance with the standards agreed by the Register. At least, one casting shall be subjected to liquid penetrant testing for each heat from the batch.

**3.16.5.5** Welding of castings.

Where two or more castings are joined by welding to form a composite component, the welding procedure shall be submitted to the Register for review.

**3.16.5.6** Repair of defects.

The casting surface subject to machining shall be free of such defects as pitting, sand, flaws, injurious surface flaws, cracks, etc. exceeding the allowance for machining in depth.

The processed casting surfaces may contain pitting not affecting functionality and strength of the composite item, sizes and location of which are indicated in the agreed standards and RS-approved documentation. On un-machined casting surfaces it is permitted to omit elimination of pitting and other defects whose type, sizes, number, location and repair method are indicated in the RS-approved documentation, except for cracks. When the defects are to be repaired by welding, it shall be carried out before the final heat On un-machined casting surfaces treatment unless otherwise is instructed in the RS-approved documentation. The possibility to perform weld repair of defects identified after the final heat treatment or machining, as well as necessity and type of further heat treatment of castings are indicated in the technical documentation subject to the Register approval.

Defects that may be repaired by welding are divided into major and minor defects. Defects shall be considered minor when the cavity prepared for welding has a depth not greater than 20 % of the actual wall thickness, but in no case greater than 25 mm, and has no lineal dimension greater than four times the wall thickness nor greater than 150 mm, whatever is less. Repairs of minor defects where welding is required shall be treated as weld repairs and repaired in accordance with the procedure approved at the firm. Minor defects in critical locations shall be treated as and repaired in the same manner as major defects.

Major defects may be weld repaired upon preliminary agreement with the Register prior to work performance. In this case, the documentation containing the details of the extent and location of the repair, welding procedure, heat treatment plan and subsequent non-destructive testing, shall be approved.

Shallow grooves or depressions resulting from the removal of defects may be accepted, provided that they will cause no appreciable reduction in the strength of the casting. The

resulting grooves or depressions shall be subsequently ground smooth, and complete elimination of the defective material shall be verified by liquid penetrant.

Defects may be removed by grinding or chipping and grinding, provided that the component dimensions remain acceptable. The resulting grooves shall have a bottom radius of approximately three times the groove depth and shall be blended into the surrounding surface so as to avoid any sharp contours. Complete elimination of the defective material shall be verified by liquid penetrant testing.

The casting manufacturer shall keep records of repairs and subsequent inspections that are traceable to each casting repaired. Temporary welds made for operations such as lifting, handling, staging, etc., shall be removed, ground and inspected using suitable approved, non-destructive examination methods. Depending upon the application of casting, intergranular corrosion testing of weld repaired stainless steel castings may be required subject to the relevant requirements in the RS-approved normative documentation for casting.

**3.16.5.7** Testing procedures.

Tensile and impact tests shall be performed in accordance with 2.2 considering the RS-approved documentation.

The methods for determination of chemical composition of metals and permissible deviations are specified in relevant standards.

Castings intended for operation with corrosive chemical substances shall be subjected to an intergranular corrosion tests taking into account the requirements of 3.16.1.9.3.

Intergranular corrosion resistance is tested according to the procedure in accordance with ISO 3651-1:1998 and 3651-2:1998. Samples of steel are kept in boiling water solution of copper sulphate and sulphuric acid in the presence of metallic copper (chips or wire).

In case of instructions in the RS-agreed normative documentation for casting, crevice or pitting corrosion testing shall be performed in sea water or resistance to microbiological corrosion and biofouling depending upon the application and heat cycling associated with the heat treatment or repairs. Such tests shall be carried out in accordance with the international or national standards.

**3.16.5.8** Scope of testing. Sampling.

Castings are accepted individually or in batches. A batch shall consist of castings made from the same heat of steel. As agreed between the manufacture and the customer, the batch may consist of steel castings from the same batch made from one or several heats of shift smelting after heat treatment.

At individual manufacture, at least one sample shall be provided for each casting. Unless otherwise is specified in the RS-approved documentation, such samples shall be cast integrally or attached to the casting.

Where the casting is of complex design or where the finished mass exceeds 10 t, at least two cast on test blocks shall be located as far as practicable from each other. Where large castings are made from two or more casts, which are not mixed in a ladle prior to pouring, two or more test blocks shall be provided corresponding to the number of casts involved. These shall be taken directly from the casting, or attached to the casting or cast separately. The samples shall be identified.

At serial manufacture of castings with the mass less than 1000 kg of the same size made from one cast and heat treated in the same furnace charge, the cast for tests may be cut from one or several batch castings or, alternatively, separately cast test blocks may be used.

When casting the steel in furnaces with capacity of not more than 500 kg, test blocks for determination of chemical composition may be sampled in the middle of mould casting. Where one casting is cast, sampling shall be performed after mould casting. Metal taken from the cast for mechanical tests may be used to determine the chemical composition. Samples shall be marked by cast number.

Mechanical properties of the casting metal are determined on test blocks taken from the samples or, if test blocks are unavailable, directly from castings. Test blocks cast separately from the castings are recommended to be cast in the middle of pouring of each cast. Location of test blocks for tensile test and impact toughness test in samples are given on the casting drawings. Type of sample is established by the firm (manufacturer). Samples may be divided from castings after the final heat treatment. Conditions for manufacture of samples and castings shall be equal. To determine mechanical properties, samples or specimens cut from samples shall be heat treated together with castings from the batch. It is allowed to cast samples in sand molds (dry or wet) irrespectively of the method of casting manufacture. For thick-wall castings it is allowed to cut samples at a distance not more than 30 mm from the external surface of casting.

Results of sample tests having defects related to the condition of their casting (pitting, impurity inclusions, hot cracks, porosity, etc.), machining conditions or test conditions, shall not be accepted. Defected samples are replaced by new ones.

Mechanical properties of steel castings shall be tested at tensile tests on one sample and at impact tests on two sample.

**3.16.5.9** Procedures of repeated tests.

In case of unsatisfactory test results for at least one of parameters of mechanical properties, it shall be subject to repeated test performed on the double number of specimens taken from the samples or castings of the same batch and heat or castings and samples shall be subject to repeated heat treatment and all the mechanical properties shall be tested.

Samples for possible repeated tests shall be taken as close as possible to the samples used for initial tests. If cut-out of additional samples from the previously used sample is not possible, it is possible to manufacture such samples from other specimen or cast.

**3.16.5.10** Marking and documents.

The requirements of 3.8.9 taking into account the requirements of 2.2.5.4.3, Part III "Technical Supervision during Manufacture of Materials" of the Rules TSDCS shall be met.".

## 5 ALUMINIUM ALLOYS

### 5.1 WROUGHT ALUMINIUM ALLOYS

**Para 5.1.1.1** is amended as follows:

"**.1** rolled products (plates, strips and sheets): 5083, 5086, 5383, 5059, 5754, 5456;
temper conditions: O/H111/H112/H116/H321;
national alloys: 1530, 1550, 1561, 1561Н, 1565ч, 1575, 1581;
temper conditions: O/~~Н111/~~Н112, Н116, Н32/Н321;".

**Table 5.1.3-1** is amended as follows:

"Table 5.1.3-1

**Mechanical properties for rolled products**

| Grade | Temper condition | Thickness $t$, mm | Yield stress $R_{p0,2}$, N/mm$^2$, min. | Tensile strength $R_m$, N/mm$^2$, min. | Elongation, % min. | |
|---|---|---|---|---|---|---|
| | | | | | $A_{50}$ mm | $A_{5d}$ |
| 5083 | O | $3 \le t \le 50$ | 125 | 275 — 350 | 16 | 14 |
| | H111 | | 125 | 275 — 350 | 16 | 14 |
| | H112 | | 125 | 275 | 12 | 10 |

| Grade | Temper condition | Thickness $t$, mm | Yield stress $R_{p0,2}$, N/mm$^2$, min. | Tensile strength $R_m$, N/mm$^2$, min. | Elongation, % min. | |
|---|---|---|---|---|---|---|
| | | | | | $A_{50}$ mm | $A_{5d}$ |
| | H116 | | 215 | 305 | 10 | 10 |
| | H321 | | 215 — 295 | 305 — 385 | 12 | 10 |
| 5383 | O | $3 \le t \le 50$ | 145 | 290 | – | 17 |
| | H111 | | 145 | 290 | – | 17 |
| | H116 | | 220 | 305 | 10 | 10 |
| | H321 | | 220 | 305 | 10 | 10 |
| 5059 | O | $3 \le t \le 50$ | 160 | 330 | 24 | 24 |
| | H111 | $3 \le t \le 50$ | 160 | 330 | 24 | 24 |
| | H116 | $3 \le t \le 50$ | 270 | 370 | 10 | 10 |
| | | $20 \le t \le 50$ | 260 | 360 | – | 10 |
| | H321 | $3 \le t \le 20$ | 270 | 370 | 10 | 10 |
| | | $20 \le t \le 50$ | 260 | 360 | – | 10 |
| 5086 | O | $3 \le t \le 50$ | 95 | 240 — 305 | 16 | 14 |
| | H111 | | 95 | 240 — 305 | 16 | 14 |
| | H112 | $3 \le t \le 12,5$ | 125 | 250 | 8 | – |
| | | $12,5 \le t \le 50$ | 105 | 240 | – | 9 |
| | H116 | $3 \le t \le 50$ | 195 | 275 | 10[1)] | 9 |
| 5754 | O | $3 \le t \le 50$ | 80 | 190 — 240 | 18 | 17 |
| | H111 | | 80 | 190 — 240 | 18 | 17 |
| 5456 | O | $3 \le t \le 6,3$ | 130 — 205 | 290 — 365 | 16 | |
| | | $6,3 \le t \le 50$ | 125 — 205 | 285 — 360 | 16 | 14 |
| | H116 | $3 \le t \le 30$ | 230 | 315 | 10 | 10 |
| | | $30 \le t \le 40$ | 215 | 305 | – | 10 |
| | | $40 \le t \le 50$ | 200 | 285 | – | 10 |
| | H321 | $3 \le t \le 12,5$ | 230 — 315 | 315 — 405 | 12 | – |
| | | $12,5 \le t \le 40$ | 215 — 305 | 305 — 385 | – | 10 |
| | | $40 \le t \le 50$ | 200 — 295 | 285 — 370 | – | 10 |
| National alloys | | | | | | |
| 1530 | O/H112 | $3 \le t \le 12,5$ | 80 | 185 | 15 | – |
| | | $12,5 \le t \le 50$ | 60 | 165 | – | 11 |
| 1550 | O/H112 | $3 \le t \le 12,5$ | 125 | 275 | 15 | – |

| Grade | Temper condition | Thickness *t*, mm | Yield stress $R_{p0,2}$, N/mm$^2$, min. | Tensile strength $R_m$, N/mm$^2$, min. | Elongation, % min. | |
|---|---|---|---|---|---|---|
| | | | | | $A_{50}$ mm | $A_{5d}$ |
| | | 12,5 ≤< *t* ≤ 50 | 110 | 255 | – | 12 |
| 1561 | O/H112 | 3 ≤ *t* ≤ 12,5 | 175 | 335 | 12 | – |
| | | 12,5 ≤< *t* ≤ 50 | 175 | 335 | – | 10 |
| 1561H | H32/H321 | 3 ≤ *t* ≤ 12,5 | 245 | 355 | 10 | – |
| | | 12,5 ≤ *t* ≤ 50 | 225 | 335 | – | 12 |
| 1565ч | O/H112 | 2≤ *t*≤ 45 | 145 | 330 | 18 | 18 |
| | | 5 | 170 | 330 | | 15 |
| | | 5,5 ≤< *t* ≤ 10,5 | 175185 | 335 | 15 | 15 |
| | | 11,0 ≤ *t* ≤ 40,0 | 175 | 335 | - | 15 |
| | | 40 ≤< *t* ≤ 60 | 175 | 330 | - | 15 |
| | | 60 ≤< *t* ≤ 80 | 170 | 310 | - | 12 |
| | H112 | 2 ≤ *t* ≤ 5 | 205 | 345 | 14 | - |
| | | 5 < *t* ≤ 10,5 | 205 | 350 | 15 | - |
| | | 11,0 ≤ *t* ≤ 40,0 | 175 | 335 | – | 15 |
| | | 40 < *t* ≤ 60 | 175 | 330 | – | 15 |
| | | 60 < *t* ≤ 80 | 170 | 310 | – | 12 |
| | H116 | 2 ≤ *t* ≤ 10,5 | 260 | 360 | 10 | – |
| | | 10,5 ≤< *t* ≤ 30 | 270 | 370 | – | 10 |
| | H321 | 2 ≤ *t* ≤ 10,5 | 260 | 360 | 10 | – |
| | | 10,5 ≤< *t* ≤ 30 | 270 | 370 | – | 10 |
| 1575 | O/H112 | 3 ≤ *t* ≤ 12,5 | 295 | 400 | 11 | – |
| 1581 | O/H112 | 1,5 ≤ *t* ≤ 6,0 | 205 | 345 | – | 15 |
| | | 6 < *t* ≤ 10,5 | 200 | 350 | | 15 |
| | | 10,5 < *t* ≤ 50,0 | 190 | 350 | | 14 |

[1] 8 % — for thicknesses up to and including 6,3 mm.

N o t e s : 1. The values in the Table are applicable for longitudinal and transverse specimens as well. Elongation on specimens of a rectangular cross-section with a gauge length 50 mm shall apply for thicknesses up to and including 12,5 mm and of a circular cross-section with a gauge length 5*d* for thicknesses above 12,5 mm (refer to 2.2.2).

2. The mechanical properties for the O and H111 tempers are the same. However, they are separated to discourage dual certification as these tempers represent different processing.

".

## 6 PLASTICS AND MATERIALS OF ORGANIC ORIGIN

### 6.13 SYNTHETIC MATERIALS USED FOR BEARINGS OF MARINE SHAFTS AND RUDDER STOCKS

**Para 6.13.2** is amended as follows:

"**6.13.2** Synthetic materials for their application for bearings of marine shafts and rudder stocks shall be approved by the Register (shall have Type Approval Certificate (CTO) and/or the Register Certificate for a batch).

The Register approval shall cover the product (shells/bushes) of one material type and of each size. The type means the same chemical composition with or without reinforcement. Materials of shells/bushes of different chemical compositions, resins, fibers, cores, etc. are deemed as different types. At least three representative diameter products of one kind shall be tested in accordance with 6.13.3. One representative diameter product therefrom may be selected for tests in accordance with 6.13.3.2 — 6.13.3.4.

Synthetic materials of shells/bushes are divided into two levels depending on the ability to withstand surface pressure during operation:

up to 5,5 N/mm$^2$;

5,5 N/mm$^2$ to 10 N/mm$^2$.

Test program shall include following items:

description of material;

description of the selected test samples;

content of tests (test item, test standard, test conditions, acceptance criteria).".

**The text of para 6.13.3** is amended as follows:

"**6.13.3** The material ~~under approval~~ of bearings of marine shafts and rudder stocks shall be tested ~~under supervision of the Register or in a laboratory recognized by the Register~~ for determination of properties specified in Tables 6.13.3-1, 6.13.3-2 and 6.13.3-3.".

**Table 6.13.3-1** is amended as follows:

"Table 6.13.3-1

**Test for all surface pressures**

| Property (parameter) | Unit | Testing method | Qty and choice of specimens, pc | Value | Acceptance criteria |
|---|---|---|---|---|---|
| ~~Compressive~~ Mechanical properties | | | | | |
| Elastomeric materials | | | | | |
| ~~Compressive relative deformation for 120 N/mm$^2$~~ | ~~%~~ | ~~Testing method is determined by the manufacturer. (Recommended standards: GOST 4651, ISO 604)~~ | ~~Isotropic: min. 5 Anisotropic: min. 10~~ | ~~Max. strain 4 %~~ | ~~All results are below the requirements~~ |
| Tensile strength | N/mm$^2$ | ISO 37:2017; ASTM D412-16(2021), Method A; ASTM D638-22 GOST R 54553:2019, Method A; GOST 11262-2017 | 3 | Min. 10 N/mm$^2$ for rubber, and min. 30 N/mm$^2$ for other elastomeric materials | All results are above the requirements |

| Property (parameter) | Unit | Testing method | Qty and choice of specimens, pc | Value | Acceptance criteria |
|---|---|---|---|---|---|
| Elongation | % | | 3 | Min. 150 % for rubber, and min. 60 % for other elastomeric materials | All results are above the requirements |
| Non-elastomeric materials | | | | | |
| Compressive strength | $N/mm^2$ | GOST 4651, ISO 604, ASTM D695-2015 | Isotropic: min. 5 | Min. 85 $N/mm^2$ | All results are above the requirements |
| Compressive strength (transverse) | $N/mm^2$ | | ~~Isotropic: min. 5~~ Anisotropic: min. ~~10~~5 | Min. 100 $N/mm^2$ | All results are above the requirements |
| Compressive strength (longitudinal). Required only for flats and strips | $N/mm^2$ | | ~~Isotropic: min. 5~~ Anisotropic: min. ~~10~~5 | Min. 85 $N/mm^2$ | All results are above the requirements |
| Modulus of elasticity in compression | $N/mm^2$ | | Isotropic: min. 5 | Min. 850 $N/mm^2$ | All results are above the requirements |
| Modulus of elasticity in compression (transverse) | $N/mm^2$ | | ~~–~~ Anisotropic: min. 5 | Min. 1000 $N/mm^2$ | All results are above the requirements |
| Modulus of elasticity in compression (longitudinal). Required only for flats and strips | $N/mm^2$ | | Anisotropic: min. 5 | Min. 850 $N/mm^2$ | All results are above the requirements |
| Swelling from water (for water-lubricated bearings) | | | | | |
| Volumetric swelling from water at temperature 20 °C; ~~and 80~~60 °C or advised maximum working temperature by manufacture, whichever is higher | % | GOST 12020, ISO 175, ISO 1817:2022 4 weeks in substitute ocean water (ASTM D1141) | Minimum 3 specimens at each temperature. Specimens: pipe section or flat element with 50 x 50 x *t* mm dimensions, minimum *t* = 4 mm or minimum thickness of produced bush. Tests shall be carried out immediately after recovery (in wet condition) | max. up to 3 % | All results are below the requirements |

| Property (parameter) | Unit | Testing method | Qty and choice of specimens, pc | Value | Acceptance criteria |
|---|---|---|---|---|---|
| Water resistance (for water-lubricated bearings) | | | | | |
| Elastomeric materials | | | | | |
| Water resistance after 4 weeks in substitute ocean water (ASTM D1141) at 20 °C | % | ~~Max. permissible compressive strain of 120 N/mm$^2$~~ ISO 37:2017; ASTM D412-16(2021), Method A; ASTM D638-22 GOST R 54553:2019, Method A; GOST 11262-2017 | ~~Isotropic: min. 5 Anisotropic: min. 10~~ 3 | ~~Max. strain 4 %~~ Min. 80 % retention of tensile strength and elongation | All results are ~~below~~ above the requirements |
| Non-elastomeric materials | | | | | |
| Water resistance after 4 weeks in substitute ocean water (ASTM D1141) at 20 °C | % | GOST 4651, ISO 604, ASTM D695-2015 Compression test | Isotropic: min. 5 Anisotropic: min. 10 (5 in two direction) | Maintenance: min. 80 % of compression strength and modulus of elasticity in compression | All results are above the requirements |
| Oil exposure (for oil-lubricated bearings) | | | | | |
| Volumetric swelling from oil after 4 weeks at 20 °C | % | GOST 12020, ISO 175, ISO 1817:2022 In oil No. 3 ~~according to ISO 1817:2016~~ | minimum 3 specimens of 50 x 50 x *t* mm, minimum *t* = 4 mm or minimum thickness of produced bush. Tests shall be carried out immediately after immersion (in wet condition) | max. up to 3 % | All results are below the requirements |
| Heat resistance | | | | | |
| Elastomeric materials | | | | | |
| ~~Compression test after specimen heating up to 50 °C~~ Tensile test after specimen heating up to 60 °C or up to advised maximum working temperature by manufacture, whichever is higher | % | ~~GOST 4651, ISO 604 At compression force of 120 N/mm$^2$~~ ISO 37:2017; ASTM D412-16(2021), Method A; ASTM D638-22 GOST R 54553:2019, Method A; GOST 11262-2017 | ~~Isotropic: min. 5 Anisotropic: min. 10~~ 3 | ~~Max. strain 4 %~~ Min. 80 % retention of tensile strength and elongation | All results are ~~below~~ above the requirements |
| Non-elastomeric materials | | | | | |
| Compression test after specimen heating up to ~~50~~60 °C or up to advised maximum working temperature by | % | GOST 4651, ISO 604, ASTM D695-2015 | Isotropic: min. 5 Anisotropic: min. 10 (5 in two direction) | Maintenance: min. 80 % of compression strength and modulus of elasticity in compression | All results are above the requirements |

| Property (parameter) | Unit | Testing method | Qty and choice of specimens, pc | Value | Acceptance criteria |
|---|---|---|---|---|---|
| manufacture, whichever is higher | | | | | |
| Thermal expansion | | | | | |
| Transverse (perpendicular to the sheet) and longitudinal (parallel to the sheet) | mm/mm° C | GOST 32618.2<br>ISO 11359-2<br>ASTM D696 | – | Value specified by the manufacturer | – |

".

**Table 6.13.3-3** is amended as follows:

"Table 6.13.3-3

**Tests for surface overpressures above 5,5 N/mm$^2$ and up to 10 N/mm$^2$ and above**

| Property (parameter) | Unit | Testing method | Qty and choice of specimens, pc | Acceptance criteria | Value |
|---|---|---|---|---|---|
| Volumetric swelling from water | % | GOST 12020,<br>ISO 175,<br>ISO1817:2022<br>wet/ dry/ wet cycle;<br>3 days wet + 3 days dry, within 4 weeks in substitute ocean water (ASTM D1141) at temperature 20 °C. Shall be started and terminated by 3-day wet cycle | Minimum 3 specimens of 50 x 50 x *t* mm dimensions, minimum *t* = 4 mm or minimum thickness of produced bush. Tests shall be carried out immediately after immersion (in wet condition) | max. up to 3 % | All results are below the requirements |
| Wear | Refer to 6.13.3.2 and 6.13.3.3 | Refer to 6.13.3.2 and 6.13.3.3 | Refer to 6.13.3.2 and 6.13.3.3 | Wear tests shall show minimum expected service life | – |
| Dynamic factor | – | Friction coefficient shall be determined on friction machine (recommended type: UTM-1): at temperature + 20 °C: during wear testing at two different surface pressures (max. and 2 times greater than the max. one) in dry and wet conditions.<br>+80 °C: on friction machines at two different surface pressures (max. and 2 times greater than the max. one) | +20 °C According to wear test procedure;<br>+80 °C: minimum 3 specimens for each pressure | max. 0,25 | All results are below the requirements |
| Static factor | – | | | | |

".

**Para 6.13.3.3.1** is amended as follows:

"**6.13.3.3.1** Wear tests for synthetic materials of propeller shaft bearings with continuous movement shall be performed at the following parameters and conditions:
mating materials — shaft ~~is made~~ of stainless steel or shaft liner of copper alloy;
shaft diameter depends on the bearing size but shall be ≥ 35 mm;
shaft movement — smooth sliding;
peripheral speed 6 m/s for oil and water lubrication and 3 m/s for lubricating grease;
lubrication by sea water (room temperature) and mineral oil (80 °C), lubricating grease (80 °C), if applicable;
surface roughness $R_a$ ~~=~~≤ 0,5 μm for stainless steel, $R_a$ ≤ 0,8 μm for copper alloys (in accordance with GOST 2789:1973, ISO 4287:2014);
~~pressure at joint minimum~~ surface pressure: maximum nominal surface pressure of bearing in N/mm$^2$ +/- 10% but not less than 0,6 N/mm$^2$;
tests continue until wear coefficient becomes constant (not less than 192 h, not more than 840 h);
~~to obtain~~ for mixed lubrication the tests shall break up every 8 h;
dimensions of testing specimen shall be in accordance with Fig. 6.13.3.3.1.".

**Para 6.13.3.3.2** is amended as follows:

"**6.13.3.3.2** Set parameters:
Wear shall be continuously and regularly measured on bushes and shaft. In case of regular changes, the wear shall be measured every 48 h until the constant wear rate is obtained (minimum at four measurement points). Measurements shall be presented both in tables and in diagrams;
wear relating to time (mm/h) and pressure (N/mm$^2$);
friction coefficient relating to time;
period between tests (h);
temperature of testing specimen during testing cycle (°C).".

**New Chapter 6.15** is introduced reading as follows:

"**6.15 POLYMER MATERIAL USED IN THE MANUFACTURE OF BUOYANCY MODULES**

**6.15.1** These requirements apply to polymer material (high density polyethylene, polypropylene, etc.) used in manufacture of polymer buoyancy modules (PBM) used in structures of long-term positioned floating facilities (for example, floating terminals) in accordance with Section 18, Part VI "Technical Supervision during Manufacture of Products" of the Rules TSDCS.

**6.15.2** Polymer material used in PBM manufacture shall comply with the requirements of Table 6.15.2.

Table 6.15.2

| No. | Feature (parameter) | Testing method | Standard |
|---|---|---|---|
| 1. | Tensile test of PBM material sample:<br><br>yield stress;<br>ultimate strength;<br>elongation | <br><br><br>ISO 527/<br>ISO 37:2017 | <br><br><br>Standards are determined by the manufacturer |

| No. | Feature (parameter) | Testing method | Standard |
|---|---|---|---|
| 2. | Resistance to low temperature exposure[1]:<br><br>brittleness temperature at impact; or<br><br>minimum temperature at tensile tests (refer to 1 above) | <br><br>ISO 974:2000/ GOST 16782:2015<br><br>ISO 527/ ISO 37:2017 | <br><br>Minimum temperature is established depending on the operating conditions |
| 3. | Resistance to high temperature exposure:<br><br>Heat distortion temperature (HDT) | <br><br>ISO 75-1/ GOST 34371:2017 | not lower than 70 °C above zero at operation without protection against sun heating; or<br>not lower than the temperature established by the manufacturer at operation with protection against sun heating |
| 4. | Resistance to aging[1]:<br>after exposure to sea water;<br><br>after exposure to ultraviolet radiation | ISO 12944-2 and ISO 12944-6 during 168 h at +35 (±2)°C, ultraviolet radiation according to ISO 4892-2 during 168 h at +23 (±2)°C. | <br><br>Reduction in features not more than by 30 % at tensile tests |
| [1] Resistance to aging of materials developed before entry into force of these requirements may be tested in accordance with 2.3.10.1. | | | |

".

## 11 ADDITIVE MANUFACTURING PRODUCTS

### 11.1 GENERAL

**Para 11.1.1** is amended as follows:

"**11.1.1** The requirements of this Section apply to ~~semi-finished products, finished products and alternative products obtained by additive synthesis methods and~~ additive products used for manufacturing of hull structural members, parts of machinery, arrangements/gearing and other ship's components, being items of the Register technical supervision in accordance with the RS Nomenclature.".

**Para 11.1.4** is amended as follows:

"**11.1.4** Application of ~~additive synthesis~~ manufacture methods and materials of the nature other than that described in this Section may be allowed by the Register after examination under RS technical supervision. The examinations are carried out ~~is performed~~ to determine product performance and their scope shall be specified by the customer's requirements. ~~The product~~ In this case metal products may be allowed in accordance with 2.4.1.3 of Part III "Technical ~~s~~Supervision during ~~m~~Manufacture of ~~m~~Materials" of the Rules TSDCS.".

## 11.2 DEFINITIONS AND EXPLANATIONS

**Para 11.2.1** is amended as follows:

"**11.2.1** The following definitions and explanations have been adopted in this Section ~~of the Rules~~.

Additive manufacturing (AM)~~, additive synthesis~~ means a process of manufacture of ~~semi-manufactured products, items and other~~ additive products based on creation of a physical object from an electronic geometric model by adding material, generally layer upon layer, alternatively to subtractive production (machining) and conventional forming production (casting, stamping).

An additive product means an ~~semi-manufactured product,~~ item and ~~other product~~ part resulting from addition production.

~~A precursor means an ingoing forming material in a state preceding the additive product synthesis.~~

~~A prototype means a semi-manufactured product or a product obtained using the methods described in other sections of the RS Rules. Inter alia, prototypes include: hot-rolled products, stampings, castings, forgings, etc. A semi-manufactured product manufactured in compliance with national and international standards may also be a prototype.~~

AM machine means machine of three-dimensional printing (3D printer).".

## 11.3 METAL ADDITIVE PRODUCTS

**Para 11.3.1.1** is amended as follows:

"**11.3.1.1** The present requirements cover metal ~~semi-manufactured articles, end~~ products and parts of ship's arrangements and ship machine-building components from metals produced using additive manufacturing methods.

Metal powder, welding wire or strip may be used as ~~precursors~~ raw material. Most commonly, heat input required for the synthesis is supplied by laser beam, electronic beam, plasma, electric arc or other ways.".

**Para 11.3.2.2** is amended as follows:

"**11.3.2.2** RS recognition of additive products manufacturers shall be carried out in compliance with 2.1, Part III "Technical Supervision during Manufacture of Materials" of the Rules TSDCS. Scope of application of the issued Recognition Certificate for Manufacturer covers the surveyed metals and additive synthesis methods. Furthermore, apart from the requirements of other sections of the Rules, the Certificate shall contain the following:

types (steel, titanium or other alloys, compositions, etc.);

~~kinds (carbon steel, corrosion-resistant steel, etc.);~~

~~classes and grades (categories) (AF-7, BT6, etc.);~~

~~synthesis~~ AM process (laser melting (Directed Energy Deposition (DED), Direct Metal Deposition (DMD)), selective laser melting (SLM), etc.);

types of ~~precursors~~ raw material applied (powder, wire, strip, etc.);

maximum overall dimensions of the product;

applied condition of supply;

method of surface hardening (heat treatment, machining).".

**Para 11.3.2.4** is amended as follows:

"**11.3.2.4** During the manufacturer survey, normative documentation regulating the procedures of production process~~, such as applied radiated power, rebuild welding rate, etc.~~ ensuring set features of additive product (manufacturer's standard, technical conditions, specifications, etc.) shall be submitted. In compliance with the requirements of 11.3.2.3, the manufacturer is responsible for further observation of all specified processing methods during the additive product manufacture. The relevant records shall be controlled by the manufacturer and submitted to the RS representative during the survey.

Deviations from the established synthesis procedures may be permitted provided that the quality of manufactured products meets the requirements to product materials. The specified deviations shall be agreed with the Register.".

**Para 11.3.2.5** is amended as follows:

"**11.3.2.5** ~~Synthesis~~ Manufacture of additive products shall be performed using metal powder, ~~combination of welding wire with gas or inert gas,~~ combination of welding wire or strip ~~and flux~~. Chemical composition of ~~precursors~~ ingoing raw material shall be controlled by the manufacturer of the additive product by verifying the compliance of international and national standards, technical conditions, technical requirements, specifications or other normative documents.

When ~~precursors are~~ ingoing raw material is manufactured at one firm, and the additive product ~~synthesis~~ is ~~carried out~~ manufactured at another firm, an ~~precursor~~ ingoing raw material Manufacturer's Certificate specifying the batch number and, at least, chemical composition shall be submitted to the surveyor.".

**Para 11.3.2.6** is replaced by the following text:

"**11.3.2.6** Each raw material batch shall be subjected to incoming inspection prior to use by the following parameters:

check of accompanying documentation (Manufacturer's Certificate);

check of packing.

Scope and list of types of incoming inspection shall be indicated by the additive products manufacturer in AM normative documents agreed with the Register. Where the Register identifies significant defects of metal structure of the product, verification of geometric and other parameters of the raw material may be requested.

**11.3.2.6.1** For powders additionally, the Manufacturer's Certificate shall contain as a minimum the following information:

granulometric composition;

flow rate;

bulk density;

chemical composition.

In case of repeated application, the manufacturer shall carry out compulsory powder sieving, provide relevant conditions for their storage as well as perform control over their technological properties and geometric parameters.

**11.3.2.6.2** For wire additionally, the Manufacturer's Certificate shall contain as a minimum the following information:

diameter;

chemical composition.

**11.3.2.6.3** For strip additionally, the Manufacturer's Certificate shall contain as a minimum the following information:

geometric parameters of the cross-section;
chemical composition.".

**Para 11.3.2.7** is amended as follows:

"**11.3.2.7** Incoming inspection of ~~welding wire, strip and flux~~ raw material applied for manufacture of additive products shall be carried out in compliance with the national and international standards agreed by RS.".

**Paras 11.3.2.8 — 11.3.2.11** are replaced by the following text:

"**11.3.2.8** While selecting additive product metal and procedures of its testing, the required performance properties shall be taken into account based on the product functionality and the requirements of applicable sections of this Part for prototypes and/or documents for supply for chemical composition of the prototypes.

**11.3.2.9** Test procedures of additive product material shall comply with the requirements of Section 2 and/or national and international standards agreed by RS.

**11.3.2.10** Selection of the condition of supply shall be determined by the required quality of additive product that ensure obtaining of mechanical properties, in its turn determined by documents for supply.

**11.3.2.11** Additional treatment (mechanical, heat etc.) of additive material is performed taking into account the requirements of AM normative documents (technical specifications, instructions etc.) for the product independent of the materials of the source powder composition and processing parameters.".

**Paras 11.3.2.12** and **11.3.2.13** are deleted.

**Para 11.3.3** is replaced by the following text:

"**11.3.3 Manufacturing of test specimens. Sampling.**

**11.3.3.1** Manufacturing samples for testing of additive materials may be done by the following methods:

cutting from reference samples synthesized on an AM machine in one processing cycle with additive manufacturing;

cutting from the additional part to the additive product body;

cutting from final additive products.

Where it is impossible to obtain the samples by the above methods, they may be synthesized on an AM machine in one processing cycle with additive manufacturing. Where process equipment limitations do not allow to manufacture specimens in one processing cycle with additive manufacturing, it is permitted to manufacture them in a separate cycle using the same procedure, the same equipment, the same raw material batch that those used for the additive product batch upon the agreement with the Register.

Manufacturing method of test specimens depends on the type of additive product and AM procedure, it is determined by the manufacturer and agreed upon with the Register.

**11.3.3.2** The dimensions of a sample in thickness shall be selected depending on the wall size of additive products. The dimensions of a sample or an extra part in thickness and diameter may differ from the maximum dimensions of the additive product not more than by 25 % or with at least 1 mm of machining allowance.

**11.3.3.3** When cutting test specimens from additive product, sampling scheme shall be submitted. Selection of sampling site shall be based on the need to control the worst possible

properties and structure of the material and/or the most essential spots in terms of product service conditions.

**11.3.3.4** For investigation of anisotropic structure and properties of additive products, specimens shall be manufactured or cut from in several selected structural orientations. To assess mechanical properties of synthesized material it is recommended to manufacture at least three test specimens for each orientation.

**11.3.3.5** Number of manufactured specimens and reference samples shall be in excess to ensure the possibility of repeat testing.

**11.3.3.6** Sampling and manufacturing specimens shall be carried out after all kinds of heat treatment of products.

**11.3.3.7** As a rule, to conduct prescribed tests, extra to the batch product subject to cutting to produce test specimens shall be synthesized. Such product shall be manufactured using the same procedure, the same batch of raw material and the same heat treatment that the batch products.

**11.3.3.8** Dimensions of reference samples shall be such as to ensure the required and possible repeat testing. If necessary, an extra batch of specimens is manufactured from the same raw material.

**11.3.3.9** Specimens for mechanical testing and microstructure control taking into account possible anisotropy of properties shall be cut in two directions relative to the direction of synthesis, that is, the longitudinal axes of the specimens shall be parallel and perpendicular to the direction of additive product growth respectively.".

**Table 11.3.4.1** is replaced by the following text:

"Table 11.3.4.1

**Types of additive product tests**

| Parameters | Types of materials | | | | |
|---|---|---|---|---|---|
| | Low-alloyed steels | Alloy, high-alloyed steels | Titanium alloys | Aluminium alloys | Copper, cobalt and nickel alloys |
| Chemical composition[1] | + | + | + | + | + |
| Density | + | + | + | + | + |
| Porosity | + | + | + | + | + |
| Tensile tests[2] at 20 °C:<br>tensile strength $R_m$;<br>yield stress $R_{0,2}$;<br>elongation;<br>relative reduction | <br>+<br>+<br>+<br>+ | <br>+<br>+<br>+<br>+ | <br>+<br>+<br>+<br>+ | <br>+<br>+<br>+<br>– | <br>+<br>+<br>+<br>– |
| Fatigue endurance $\sigma_R$[2] | + | + | + | + | + |
| Fracture energy at impact bending at the ambient temperature[3] | + | + | + | – | – |
| Phase structure content check[2] | + | + | + | + | + |
| Intergranular corrosion resistance[2] | – | + | – | + | – |
| Pitting and gap corrosion resistance[2] | – | + | – | + | – |
| Non-destructive testing | + | + | + | + | + |

Note.
Types of samples and testing procedures shall comply with the requirements of Section 2.
[1] Determination of chemical composition is required if there is no information in the supporting documentation on raw material or if indicated in the agreed normative document of the product.
[2] If indicated in the agreed normative document on the product.
[3] Testing at sub-zero temperature if indicated in the agreed normative document.

".

**Table 11.3.4.3** is amended as follows:

"Table 11.3.4.3

| Test type | Number of specimens |
|---|---|
| ~~Determination of chemical composition~~ | ~~One~~ |
| Tensile test | Three test specimens per each of two directions |
| Determination of impact energy | Three test specimens per each of two directions |
| Intergranular corrosion resistance | 4 (two check specimens) |
| Pitting corrosion and gap corrosion resistance | Three test specimens per each test type |
| Microstructure check | One specimen per two faces of cross section preparing |

".

**Para 11.3.5.3** is amended as follows:

"**11.3.5.3** Non-destructive testing of ~~semi-finished~~ propellers obtained by AM method, shall be performed based on the requirements of 3.12.7 or 4.2.7 depending on the selected material of precursor.".

**Para 11.3.6.1** is amended as follows:

"**11.3.6.1** The ~~surface quality of objects of~~ additive product~~s~~ ~~application~~ shall have the surface quality complying with the requirements of design documentation and/or national and international standards.

The surface quality and structure of surface layer of the additive product shall be considered during design of electronic geometric model of further mechanical treatment and operation. Manufacturer quality control system shall ensure the required scope surface check of product and surface layer of samples preceding the product supply to the consumer. Where material surface defects are detected during the latter stages of manufacture, repair may be carried out in compliance with 11.3.6.2.3. Product repair shall be agreed with the consumer.".

**Para 11.3.6.2.3.3** is amended as follows:

"**11.3.6.2.3.3** The requirements of 3.12.9 or 4.2.8 apply to defect elimination on ~~semi-finished~~ propellers obtained by AM method, depending on the selected material of precursor.".

**New para 11.3.7.3** is introduced reading as follows:

"**11.3.7.3** Manufacture's Certificate.

The Manufacturer's Certificate for an additive product shall be submitted to the Register representative simultaneously with the presentation of the additive product in the finished condition or in good time. The Certificate shall be verified by the quality service of a works and witnessed by the person authorized for this by the works and contain, at least, the following data:

manufacture's name and order number;

project number, if known;

name, number, dimensions and mass of additive product with indication of drawing or draft number (if applicable);

mark (grade) of material, type of alloy, chemical composition;

identification number;
heat treatment type and schedule (if required);
results of mechanical tests;
results of non-destructive testing (satisfactory or unsatisfactory), when applicable.".

**New para 11.3.7.4** is introduced reading as follows:

"**11.3.7.4** Acceptance of additive products.

Additive products are supplied to the items of the Register technical supervision if the manufacture holds a valid СПИ. The RS Certificate for an additive product shall contain one of the nomenclature codes (refer to Appendix 1, Part I "General Regulations for Technical Supervision" of the Rules TSDCS) complying with the code group of additive products as well as nomenclature code of item of the relevant product (parts of machinery, arrangements, systems, etc. that may be obtained by AM method) of a reference shall be given to the requirements of the RS rules for such a product.".

## PART XIV. WELDING

### 2 TECHNOLOGICAL REQUIREMENTS FOR WELDING

**Chapter 2.9** is replaced by the following text:

### "2.9 FLAME BRAZING OF PIPING

**2.9.1** During manufacture and installation of ship piping, the application of flame brazing shall be limited and shall be allowed only in cases where welding is not possible for technically justified reasons, or if there is an appropriate instruction for pipe brazing in the equipment manufacturer's documentation indicating brazing alloy brand.

Flame brazing (hereinafter referred to as "brazing") shall be applied for copper piping not used for sea water transportation, with the thickness up to 3 mm for connecting brass parts made of ЛМц58-2 and ЛЦ16К4 grades, as well as for interconnecting copper pipes during installation of refrigerant piping (by overlap joints using couplings or overlap joints with expansion of one pipe end) if welding is impossible. Filler metal brand of ЛОК59-1-0,3 shall be used as filler consumable for brazing unless another brazing alloy brand is specified in the equipment manufacturer's documentation.

Brazing is allowed for attaching pressure washers to bimetallic piping (steel + copper) with outer diameters of 6 — 10 mm and a wall thickness of 1,5 — 2 mm (fillet joints), for connecting double-wall pipes to each other using copper spacers and connecting double-wall pipes with copper branches.

**2.9.2** The types of brazed joints and seams shall be selected according to standards agreed upon by RS. Brazed joints shall be listed in the piping welding table and/or indicated in the corresponding drawings.

The piping, whose brazed joints are subject to be designed during installation, except for the coupling connected piping, shall be positioned vertically or close to it at brazing points so that brazing can be performed in the downhand position. The coupling connected piping shall be brazed horizontally.

**2.9.3** All consumables for piping brazing such as brazing alloys, fluxes and shielding gasses (acetylene, argon) supplied to the firm shall be accompanied with quality certificates verifying their quality in accordance with the requirements of relative standards. Approval of brazing consumables with the issue of Certificate of Approval for Welding Consumables (COCM) is not required.

**2.9.4** Pipe edges subject to brazing shall be mechanically treated with a roughness *Ra* not exceeding 5 — 10 $\mu$m. No burrs are permitted after mechanical treatment.

**2.9.5** Pipes and parts connected by brazing shall be cleaned and degreased on the inner and outer surfaces to be connected.

**2.9.6** The assembled joints subject to brazing shall be accepted by the manufacturer's technical control service. At the same time, the surface roughness and cleanliness of the prepared edges, the correctness of mutual alignment of parts and the edges of structural elements of brazed joints shall be checked.

**2.9.7** Brazing of copper piping shall be performed taking into account the following process conditions:

the pipes and assemblies subject to brazing shall be positioned so as to allow continuous brazing of seams (if possible, in the downhand position) and to avoid displacement of a part during brazing;

the brazing process shall begin by preheating the assembled joint to a temperature of 700 — 800 °C (to the cherry-red colour of the pipe) by a neutral oxygen-acetylene flame with an oxygen-to-acetylene ratio of 1:1,05 (this ratio is practically achieved when the white flame tips disappear behind the bright core). While heating up parts with different thermal conductivity or with different wall thicknesses, the flame shall be directed mainly to a thicker or more thermally conductive part. The torch movement shall be oscillatory to ensure uniform heating;

if the brazing alloy is not fluxed, then flux (vitrified borax) shall be applied on the heated junctions of parts before its introduction. During subsequent heating, the molten flux shall be distributed over the surface. After the flux is spread over the surface the brazing alloy shall be introduced;

brazing during installation of overlap joints of copper pipelines transporting refrigerant, with flanging of the coupling according to Fig. 2.9.7, shall be performed on both sides;

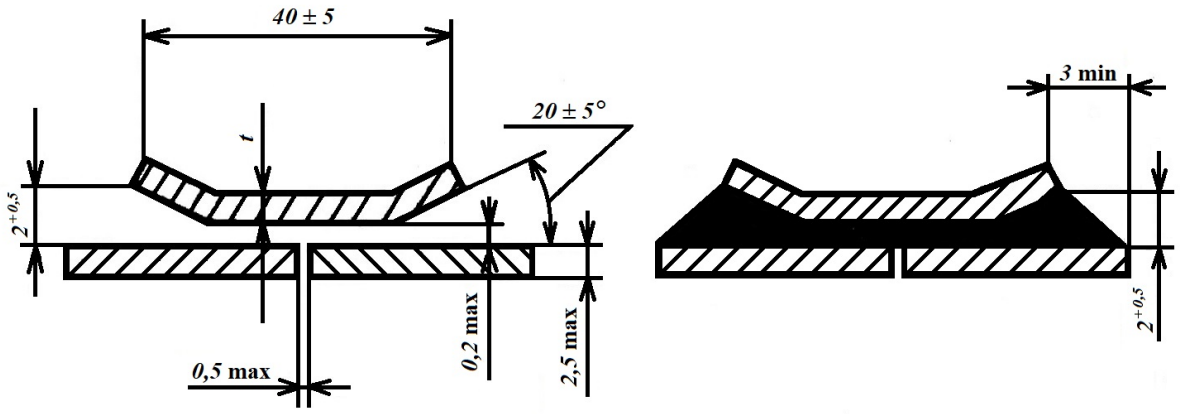



Fig. 2.9.7
Brazing during installation of overlap joints of copper pipelines transporting refrigerant with flanging of the coupling (ГП-Н4 joint)

brazing of refrigerant piping joints shall be carried out in the presence of argon shielding of the inner cavity of the pipe; argon supply shall be stopped after the seam is complete and the brazed joint is cooled down to a temperature of 100 — 150 °C;

joint brazing of refrigerant piping shall be carried out only at a positive temperature; when brazing is necessary to perform at a negative temperature, then dehumidifiers and heaters,

utilized during carbon dioxide welding, shall be additionally used for argon shielding; brazing of ship pipelines, as an exception, is allowed to be carried out at a negative air temperature of at least –20 °C with preheating of parts;

when brazing the overlap field joints of refrigerant piping, with the pipe axis positioned horizontally, brazing shall begin from the bottom up on both sides of the pipe (from the overhead position);

brazing of branches, branch fittings and welded-on pieces shall be carried out with the horizontal arrangement of the pipe, and brazing of flanges (rings), intermediate fittings and nipples shall be done with the pipe vertical arrangement;

recommended data for flame brazing is provided in Table 2.9.7:

Table 2.9.7

**Flame brazing data**

| Diameter of the butting part, mm | Welding torch tip number | Acetylene consumption, l/min | Oxygen consumption, l/min |
|---|---|---|---|
| < 50 | 2 — 3 | 5,0 — 8,3 | 5,5 — 9,2 |
| 50 — 100 | 3 — 4 | 8,3 — 12,5 | 9,2 — 13,7 |
| 100 — 155 | 4 — 5 | 12,5 | 13,7 |

during brazing, the flux is additionally introduced into the joint by dipping the end of the heated rod into flux;

brazing rod with a diameter of 2 — 6 mm shall be used for brazing;

during brazing, the joint and brazing alloy shall be in a protective flame envelope;

upon completion of brazing, the product shall not be moved until the complete hardening of brazing alloy to avoid cracks in the brazed joint;

the completed brazed area shall be cooled down in the air; it is not allowed to cool down the brazed joints of copper-to-brass and brass-to-brass in water to prevent significant degrading of mechanical properties of the brazed joints;

after cooling down, the seam shall be cleaned of deposits and slag;

brazed joints of refrigerant pipelines performed in the workshop shall, if possible, be cleaned of slag and scale from the side of the seam root.

**2.9.8** When brazing copper pipes together and to attached brass parts, the brazing filler metal shall completely fill the gaps in the brazed joint.

**2.9.9** Workers performing brazing of ship piping shall have a professional certificate or diploma of the brazing operator or electric gas welder, as well as be additionally certified for brazing the joints of copper pipes and fittings to be connected. The certification is confirmed by issuance of the Brazing Approval Certificate (indicated in the column "welding process" is number 912 — flame brazing).

Scope of approval for pipe diameters and thicknesses shall comply with Tables 4.5.7-2 (for copper and its alloys) and 4.5.7-3 of Part III "Technical Supervision During Manufacture of Materials" of the Rules TSDCS and is limited to the maximum thickness of 3 mm.

The scope of tests for a brazed sample shall be determined according to 2.9.12 including additional testing of one transverse macrosection.

**2.9.10** When approving the technological process of pipes brazing, each type of brazed joint used in production shall have a brazing sample with subsequent issue of Brazing Procedure Specification (BPS) in a manner similar to filling in of Welding Procedure Specification (WPS). Herewith, the issue of a Type Approval Certificate for brazing is not required. Types of brazed joint samples are listed in Appendix 1 to Section 4 of Part III "Technical Supervision During Manufacture of Materials" of the Rules TSDCS.

Scope of approval for pipe diameters and thicknesses is similar to the one listed in 2.9.9.

The scope of tests for brazed sample shall be determined according to 2.9.12 including additional testing of one transverse macrosection.

In case of positive test results, the BPS shall be approved by the Register.

**2.9.11** The external defects of brazed joints include cracks, surface pores, slag and flux inclusions. The defects of brazed seam size are the insufficient leg length of a fillet seam, insufficient throat thickness and deposit height.

When assessing the quality of brazed joints of ship piping, the following basic requirements shall apply:

the absence of external defects on the surface of brazed joints that exceed the permissible size limits; all unacceptable defects detected during visual testing shall be eliminated prior to testing by subsequent methods;

compliance of geometric dimensions of brazed seams with the standards agreed upon by the Register;

the seams of brazed piping joints shall have no unacceptable defects such as cracks, clusters of pores and slag inclusions, as well as large pores, inclusions of slag and tungsten;

only single pores and inclusions up to 0,5 mm in size (but not more than 2 items for pipes with an outer diameter of up to 34 mm inclusive and not more than 3 items for pipes with an outer diameter exceeding 34 mm) shall be allowed;

the maximum low spot between beads (scales) shall be 0,3 mm, the maximum undercut shall be 0,3 mm at a length not exceeding 10 % of the seam perimeter;

in the case of hydraulic testing, all brazed joints shall ensure tightness (density) and strength under hydraulic loads (under the test and operating pressure); the pressure parameters and temperature during hydraulic loads shall be agreed by the Register; all brazed joints operated under pressure are subject to hydraulic testing. The quality of brazed joints is considered unsatisfactory if during the test a leak of the working fluid is visually detected, and observed after the test is a residual deformation (wall bulging) of the pipe diameter exceeding limit deviations.

**2.9.12** Non-destructive testing of brazed piping joints during manufacture and installation includes visual testing along the entire length (including a near-seam area of at least 20 mm from the fusion boundary), as well as testing of tightness and strength by internal pressure and the working media pressure (for brazed joints operating under pressure). The value of the test pressure shall be set according to the technical requirements of the drawings.

**2.9.13** Defective areas of brazed joints shall be re-melted with a gas burner. The defective area prepared for repair shall be accepted by the technical control service. It is allowed to fix defective seam areas in one place not more than twice. When replacing brazed joints with welded ones, it is necessary to completely eliminate the possibility of brazing alloy ingress into the weld metal, for which it is necessary to remove the places of previous brazing. The repaired sections of brazed joints shall be repeatedly tested according to 2.9.12.".

# PART XVII. DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION SPECIFYING STRUCTURAL AND OPERATIONAL PARTICULARS OF SHIPS

## 3 REQUIREMENTS FOR THE EQUIPMENT OF SHIPS IN COMPLIANCE WITH THE DISTINGUISHING MARKS ECO AND ECO-S IN THE CLASS NOTATION

### 3.1 GENERAL

**Para 3.1.2.** After the definition "Bilge alarm" **new definition "Bilge primary tank"** is introduced reading as follows:

"Bilge primary tank means a tank intended for pre-treatment of oily bilge water, which separates oil from oil bilge water by gravity".

### 3.6 TECHNICAL REQUIREMENTS FOR ASSIGNING THE DISTINGUISHING MARK ECO-S IN THE CLASS NOTATION

**Para 3.6.3.4.4** is replaced by the following text:

"Each ship shall be fitted with the oily bilge water holding tank in compliance with 3.5.3.4.2 and, additionally, the bilge primary tank in compliance with the application of the concept of Integrated Bilge Water Treatment System (IBTS) (refer to IMO MEPC.1/Circ.642). The bilge primary tank shall be provided with arrangements for discharge of the separated high oil content water to oil residue (sludge) tanks, and the low oil content water — to the oily bilge water holding tank.".

**Para 3.6.3.4.7** is amended as follows:

"Where settled water may be discharged from a holding tank using filtering equipment specified in 3.6.3.4.2, which shall be confirmed by a firm (manufacturer) of the filtering equipment and bilge alarms, in addition to the requirements of 3.6.3.4.6, the holding tank shall be provided with transfer pipelines to oily bilge water holding tank or ~~slop~~ bilge primary tank required by 3.6.3.4.4.".

## 7 REQUIREMENTS FOR SHIP EQUIPMENT TO ENSURE LONG-TERM OPERATION AT LOW TEMPERATURE

### 7.8 LIFE-SAVING APPLIANCES

**Para 7.8.1.3** is deleted. **Existing para 7.8.1.4 and references thereto** are renumbered **7.8.1.3**.

**Para 7.8.2.1.2** is deleted. **Existing paras 7.8.2.1.3 — 7.8.2.1.14 and references thereto** are renumbered **7.8.2.1.2 — 7.8.2.1.13** accordingly.

**Para 7.8.6.3** is deleted. **Existing para 7.8.6.4 and references thereto** are renumbered **7.8.6.3**.

**Para 7.8.6.5** is deleted. **Existing para 7.8.6.6 and references thereto** are renumbered **7.8.6.4**.

**Para 7.8.6.7** is deleted.

## 9 REQUIREMENTS FOR SHIPS EQUIPPED FOR USING GASES OR LOW-FLASHPOINT FUELS

### 9.1 GENERAL

**Para 9.1.3** is supplemented by the **definition "Unacceptable loss of power"**:

"Unacceptable loss of power means an operational condition when it is not possible to sustain or restore normal operation of the main engines in the event of one of the essential auxiliaries becoming inoperative, as defined in 1.2.1 of Part VII "Machinery Installations".".

### 9.2 GENERAL REQUIREMENTS FOR SHIP STRUCTURE

**Para 9.2.2.3.3** is amended as follows:

"**.3** for independent tanks the protective distance shall be measured to the tank shell (the primary barrier of the ~~tank~~ fuel containment system). For membrane tanks, such distance shall be measured to the bulkheads surrounding the tank insulation;".

**Para 9.2.7.1** is amended as follows:

"**9.2.7.1** An airlock is a space enclosed by gastight bulkheads with two ~~substantially~~ gastight doors spaced at least 1,5 m and not more than 2,5 m apart. Unless subject to the requirements of the International Convention on Load Lines or Load Line Rules for Sea-Going Ships (if applicable), the ~~door~~ coaming of the door leading to hazardous spaces and areas shall not be less than 300 mm in height. The doors shall be self-closing without any holding back arrangements.".

**New paras 9.2.8 — 9.2.8.2.5** are introduced reading as follows:

"**9.2.8 Requirements for welding and non-destructive testing.**

**9.2.8.1** Welding and non-destructive testing of welded joints of gas fuel tanks and gas fuel piping shall meet the requirements of Section 3 of Part IX "Materials and Welding" of the LG Rules, applicable to the welded joints of cargo tanks and cargo piping, respectively, subject the requirements of 9.2.8.2.

**9.2.8.2** The following requirements for the scope of production non-destructive testing of welded joints for gas fuel piping shall be applied in lieu of the requirements of 3.6.7 of Part IX "Materials and Welding" of the LG Rules:

**.1** visual testing along the full length;

**.2** radiographic or ultrasonic testing (if applicable) along the full length in the following cases:

piping design temperature is less than –10 °C, or

piping design pressure is greater than 1 MPa, or

for gas supply piping in ESD protected machinery spaces; or

for piping with inside diameter of more than 75 mm or with wall thickness greater than 10 mm;

**.3** when butt-welded joints of piping are made by automatic or fully mechanized welding procedures approved by the Register, and satisfactory quality of welded joints is documented, a reduction in the scope of radiographic or ultrasonic testing can be agreed, but

in no case to less than 10 % for each joint. When unacceptable defects are revealed, the scope of the testing shall be increased to 100 % and include the testing of the previously accepted welded joints. The approval can only be granted if results of non-destructive testing are regularly submitted thus confirming the ability to consistently produce satisfactory welds;

**.4** the scope of radiographic or ultrasonic testing (if applicable) may be reduced to 10 % for butt-welded joints in the outer pipe of the double-walled fuel piping;

**.5** for other butt-welded joints of pipes not covered by 9.2.8.2.1, 9.2.8.2.2 and 9.2.8.2.4, spot non-destructive testing shall be carried out according to the requirements of 3.3.4 of Part XIV "Welding" of these Rules, depending on the piping class and material. Herewith, at least 10 % of butt-welded joints of pipes shall be subjected to radiographic or ultrasonic testing (if applicable).".

## 9.3 DESIGN OF GAS FUEL TANKS

**Para 9.3.2.2** is amended as follows:

"**9.3.2.2** ~~All LNG tanks shall be fitted with safety valves in compliance with the requirements specified in 3.19.1 of Part VI "Systems and Piping" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.~~Each LNG tank shall be equipped with pressure relief valves so that, regardless of the state of any one pressure relief valve, the capacity of the residual valves meets the requirements for the combined relieving capacity specified in 3.21.1 of Part VI "Systems and Piping" of the LG Rules. The tank shall be loaded on condition that all the valves are operational.".

## 9.4 STORED FUEL PRESSURE AND TEMPERATURE CONTROL SYSTEM

**Para 9.4.1. The first paragraph** is amended as follows:

"**9.4.1** With the exception of liquefied gas fuel tanks designed to withstand the full gauge vapour pressure of the fuel under conditions of the upper ambient design temperature, liquefied gas fuel tanks' pressure and temperature shall be maintained at all times within their design range by one or more of the following methods:".

## 9.5 FUEL SYSTEM

**Para 9.5.1.5** is replaced by the following text:

"**9.5.1.5** The wall thickness of pipes operating under the internal pressure shall not be less then value calculated by the formula:

$$S = (S_0 + b + c)/(1 - |a|/100), \qquad (9.5.1.5)$$

Where: $S_0 = dp/(2\sigma\varphi + p)$;
$S_0$ — theoretical wall thickness, mm;
$d$ — pipe outside diameter, mm;
$p$ — design pressure determined in accordance with 9.5.1.6, MPa;
$\varphi$ — weld efficiency factor taken in accordance with 9.5.1.7;
$b$ — allowance for a reduction of pipe wall thickness because of bending taken in accordance with 2.3.4 of Part VIII "Systems and Piping", mm;
$\sigma$ — allowable (normal) stress determined in accordance with 9.5.1.8, MPa;
$c$ — corrosion allowance (mm) taken in accordance with Table. 2.3.1-1 (for steel pipes) and Table 2.3.1-2 (for pipes of nonferrous metals) of Part VIII "Systems and Piping", which shall be increased, if pipe increased corrosion or erosion is expected. The allowance shall be consistent with the expected life of the piping;

$a$ — negative manufacturing tolerance for pipe wall thickness, % (where pipes without negative allowance are used, $a$ = 0).

The minimum wall thickness of pipes shall be taken in accordance with Table 2.3.8 of Part VIII "Systems and Piping" or in compliance with the Register approved standards.".

**New paras 9.5.1.6 — 9.5.1.8** are introduced reading as follows:

"**9.5.1.6** The greater of the following design values shall be taken as design pressure $p$ in Formula (9.5.1.5):

for piping systems or piping components which may be separated from their relief valves and which contain only vapour at all times, vapour pressure at 45 °C assuming an initial condition of saturated vapour in the system at the system operating pressure and temperature; or

the maximum allowable relief valve setting (MARVS) of the fuel tanks and fuel processing systems; or

the pressure setting of the associated pump or compressor discharge relief valve; or

the maximum total discharge or loading head of the fuel piping system; or

the relief valve setting on a pipeline system.

In any case, the minimum design pressure $p$ shall be 1 MPa except for open-ended lines where it shall not be less than 0,5 MPa.

**9.5.1.7** The strength factor $\varphi$ shall be taken equal to 1,0 for seamless pipes and for longitudinally or spirally welded pipes, delivered by approved manufacturers of welded pipes, that are considered equivalent to seamless pipes when non-destructive testing on welds is carried out in accordance with standards agreed upon with the Register.

For other welded pipes the strength factor φ shall be assigned considering the requirements of 2.1.6.1-1 of Part X "Boilers, Heat Exchanges and Pressure Vessels".

**9.5.1.8** Allowable stress. Stress analysis.

**9.5.1.8.1** For pipes made of steel including corrosion-resistant (stainless) steel, the allowable normal stress σ in formula (9.5.1.5) shall be taken as the lower of the following values:

$$\sigma = \min\left(\frac{R_m}{2{,}7}, \frac{R_e}{1{,}8}\right),$$

where $R_m$ — specified tensile strength at room temperature, MPa;

$R_e$ — specified minimum yield stress at room temperature, MPa. When no well-defined yield phenomenon exists, the 0,2 % proof stress $R_{p0,2}$ shall be determined according to the applicable specification.

For pipes made of materials other than steel, the allowable stress shall be taken according to the standards agreed upon with the Register.

**9.5.1.8.2** Where necessary for mechanical strength to prevent damage of pipes resulted from excessive sag due to superimposed loads from supports, ship deflection or other causes, the wall thickness shall be increased over that required by 9.5.1.5. If this is impracticable or would cause excessive local stresses, these loads shall be reduced or eliminated completely by other design methods.

Such superimposed loads may be caused by supporting structures, ship hull deflections, liquid pressure surge during transfer operations, the weight of suspended valves, reaction to the loading arm connections, or otherwise.

**9.5.1.8.3** For fuel piping systems with a design pressure exceeding 1,0 MPa, a complete stress analysis in the piping shall be provided, taking into account the following:

stresses due to the weight of pipes;

acceleration loads when significant;

internal pressure and loads induced by hog and sag of the ship hull.

**9.5.1.8.4** When the design temperature of the inner medium is –110 °C or lower, a

complete stress analysis in the piping, taking into account all the stresses due to the weight of pipes, including acceleration loads if significant, internal pressure, thermal contraction and loads induced by hog and sag of the ship for each branch of the piping system shall be submitted to the Register.".

**Existing para 9.5.1.6** is renumbered **9.5.1.9**.

**Para 9.5.2.7** is replaced by the following text:

"**9.5.2.7** Bunkering manifold.

**9.5.2.7.1** The bunkering manifold shall be designed to withstand the external loads during bunkering operations. The connections at the bunkering station shall be of a dry-disconnect type and shall be equipped in one of the followings ways:

**.1** a dry-disconnect / connect coupling in accordance with ISO 21593:2019;

**.2** a manual connect coupler or hydraulic connect coupler, used to connect the bunker system to the receiving vessel bunkering manifold presentation flange in accordance with ISO 20519:2021;

**.3** a bolted flange to flange assembly according to ISO 20519:2021.

**9.5.2.7.2** When using connections specified in 9.5.2.7.1.1 and 9.5.2.7.1.3, they shall be combined with operating procedures that ensure a dry-disconnect is achieved.

Such connections shall be subject to special consideration within the bunkering arrangement risk assessment under ISO 20519:2021 conducted at the design stage and considering dynamic loads at the bunkering manifold in accordance with the Register recognized standards, requirements for the safe operation of the ship and other hazards that may arise during bunkering operation.

The fuel handling manual required by 9.12.5 shall include documentation that the bunkering arrangement risk assessment was conducted, and that special consideration was granted under this requirement.

**9.5.2.7.3** An emergency release coupler (ERC) / Emergency Release System (ERS) or equivalent means shall be provided, unless installed on the bunkering supply side of the bunkering line. These means shall comply with ISO 20519:2021 and shall enable a quick physical disconnection ("dry break-away") of the bunker system in an emergency event.".

**Para 9.5.3.1** is amended as follows:

"**9.5.3.1** For single fuel installations the fuel supply system shall be arranged with ~~full~~ redundancy and segregation ~~all the way from the fuel tanks to the consumers~~ so that a leakage in one system ~~does not lead to~~, or failure of one of the fuel supply essential auxiliaries, does not lead to an unacceptable loss of power. In the event of a leakage or machinery failure, a partial reduction in propulsion capability compared to its normal operation may be accepted when submitting a technical justification for consideration by the Register in each specific case.".

**Para 9.5.4.7** is amended as follows:

"**9.5.4.7** ~~In cases where the master gas fuel valve is automatically shutdown, the complete gas supply branch downstream of the double block and bleed valve shall be automatically ventilated assuming possible reverse flow from the engine to the pipe.~~

In cases where the master gas fuel valve is automatically shut down when the safety system as required in 9.10.6.2 is activated, the complete gas supply pipe between this master gas fuel valve and the double block and bleed valves and between the block and bleed valves and the consumer shall be automatically vented.".

**Para 9.5.4.8** is amended as follows:

"**9.5.4.8** There shall be one manually operated shutdown valve in the gas supply line to each ~~engine~~ consumer upstream of the double block and bleed valves to assure safe isolation during maintenance of ~~engines~~ gas consumers.".

**Para 9.5.5.1.1** is amended as follows:

"**.1** the gas piping shall be a double wall piping system with the gas fuel contained in the inner pipe. The space between the concentric pipes shall be pressurized with inert gas at a pressure greater than the gas fuel pressure. Suitable alarms shall be provided to indicate a loss of inert gas pressure between the pipes. ~~When the inner pipe contains high pressure gas, the system shall be so arranged that the pipe between the master gas valve and the engine is automatically purged with inert gas when the master gas valve is closed~~; or".

**Para 9.5.7.1** is amended as follows:

"**9.5.7.1** The design pressure of the outer pipe or duct of fuel systems shall not be less than the maximum working pressure of the inner pipe. Alternatively, ~~for fuel piping systems with a working pressure greater than 1 MPa, the design pressure of the outer pipe or duct shall not be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements~~ the design pressure of outer pipes or ducts may be calculated in accordance with 9.5.7.2.".

**Para 9.5.7.2** is amended as follows:

"**9.5.7.2** ~~For high-pressure fuel piping, the design pressure of the ducting~~ Alternatively to 9.5.7.1, the design pressure of outer pipes or ducts shall be taken as the higher of the following:".

**Para 9.5.7.4** is amended as follows:

"**9.5.7.4** ~~For low-pressure fuel piping the duct shall be dimensioned for a design pressure not less than the maximum working pressure of the fuel pipe.~~ The duct shall be pressure tested to show that it can withstand the expected maximum pressure at fuel pipe rupture.".

## 9.7 FIRE PROTECTION

**Para 9.7.7.1** is amended as follows:

"**9.7.7.1** Two portable dry chemical powder fire extinguishers, each of at least 5 kg capacity shall be provided, one of which shall be located in the vicinity of the bunkering station, and the second shall be in the fuel preparation room.".

## 9.10 MONITORING, CONTROL AND AUTOMATION SYSTEMS

**Para 9.10.2.5** is amended as follows:

"**9.10.2.5** Level indicators for liquefied gas fuel tanks.

**9.10.2.5.1** ~~The LNG tanks shall be provided with level indicators~~ Each liquefied gas fuel tank shall be provided with liquid level gauge as well as arrangements giving visual and audible lower liquid level signals and ensuring automatic shutdown of motors of fixed and

submersible fuel pumps with subsequent visual and audible alarm. These signals shall be given at the navigation bridge, continuously manned central control station or onboard safety centre. The gauges shall be designed to operate throughout the design pressure range of the liquefied gas fuel tank and at temperatures within the fuel operating temperature range.

The automatic shutdown of submersible fuel pumps may be accomplished by sensing low pump discharge pressure, low motor current, or low-liquid level.

**9.10.2.5.2** Where only one liquid level gauge is fitted it shall be arranged so that it can be maintained in an operational condition without the need to empty or gas-free the tank.

**9.10.2.5.3** Liquid level gauges for a liquefied gas fuel tank may be of the following types:

**.1** indirect devices which determine the amount of fuel by means such as weighing or in-line flow metering; or

**.2** closed devices which do not penetrate the liquefied gas fuel tank, such as devices using radioisotopes or ultrasonic devices; or

**.3** closed devices which penetrate the liquefied gas fuel tank but which form part of a closed system and keep the gas fuel from being released. Such devices shall be considered as tank connections. If the closed gauging device is not mounted directly onto the tank, it shall be provided with a shutoff valve located as close as possible to the tank.".

## 9.11 ELECTRICAL EQUIPMENT

**Para 9.11.2.2** is amended as follows:

"**9.11.2.2** Zone 0: the internal areas of gas fuel storage tanks, gas fuel pipelines, pipelines from safety valves of gas fuel storage tanks and any air pipelines from equipment containing gas, and interbarrier spaces as defined in 9.1.3.".

**Para 9.11.2.3. The second paragraph** is amended as follows:

"tank connection spaces~~,~~ and fuel storage hold spaces ~~and interbarrier spaces~~;".

## 13 ADDITIONAL REQUIREMENTS FOR SHIPS OF SPECIAL TYPES

## 13.3 ANCHOR HANDLING VESSELS

**Para 13.3.1.2**. **New definitions** are introduced as follows:

"L o o s e g e a r means an article of ships equipment by means of which a load (anchor or anchor line) can be attached to an anchor handling winch but which does not form an integral part of the winch or load".

"W i r e means a wire rope or a chain line (steel rope, fiber rope or chain) used for the handling of anchors by means of an anchor handling winch and which may include connecting loose gear.".

"C h a i n s t o p p e r is a device used for securing and holding a section of wire, thereby relieving the load on the winch drum.".

**Para 13.3.2** is replaced by the following text:

"**13.3.2 Documentation.**

**13.3.2.1** Technical documentation specified in 3.2.17.11 of Part I "Classification" shall be submitted to the Register for review to confirm compliance with the requirements for anchor handling vessels and to assign the additional notations **anchor-handling** and **towing** in the class notation.

**13.3.2.2** Anchor handling vessels intended for towing of floating installations or objects are subject to static bollard pull tests upon the completion of construction or later, but before the ship commissioning. The results of bollard pull tests shall be submitted to the Register.

**13.3.2.3** Based on results of the bollard pull testing, the following entry shall be introduced in the Classification Certificate in the Section "Other Characteristics": "Permanent static towing pull at the maximum free running condition of the propulsion plant…kW is…t".

**Paras 13.3.4 — 13.3.4.2** are replaced by the following text:

"**13.3.4 Equipment, Arrangements and Outfit.**

**13.3.4.1** An anchor handling vessel shall be equipped with:

**.1** anchor handling winch,

**.2** chain stoppers;

**.3** towing pins;

**.4** stern rollers.

**13.3.4.2** Design loads of chain stoppers, towing pins and stern rollers shall be taken in accordance with 5.4.2.2 of Part III "Equipment, arrangements and outfit". In such case, the stress in these components shall not exceed 0,8 yield strength of their material.

**13.3.4.3** Chain stoppers.

**13.3.4.3.1** Chain stoppers shall be equipped with an audible alarm complying with the requirements of 7.3.4 and 7.3.6 of Part IX "Electrical Equipment" and which is activated when the stopper is either being engaged or disengaged.

**13.3.4.3.2** The chain stopper design shall include an emergency release device that is functional in all conditions, including dead-ship situations, considering the following:

**.1** when activating the emergency release device of the chain stopper, the structural elements of the stopper shall be placed in a position preventing a wire to get stuck or entangled;

**.2** emergency release device shall be remotely activated;

**.3** emergency release device shall be protected against unintentional activation;

**.4** instructions for the operation of the emergency release device shall be clearly displayed at the navigation bridge and locally at the winch. The instructions shall include the requirement for complete chain stopper system inspection after the emergency release device actuation for signs of damage or deterioration. Any identified damage or deterioration shall be rectified before the anchor stopper is put back into service.

**13.3.4.4** Loose gear.

**13.3.4.4.1** Loose gear utilized with anchor handling winches shall meet the requirements of 10.3 and/or 10.4 (as applicable) of the RS Rules/CHG.

**13.3.4.4.2** Loose gear shall be marked and have certificates in accordance with Section 12 of the RS Rules/CHG.

**13.3.4.4.3** If there is insufficient space for marking all data required by 13.3.4.4.2 on the loose gear, the omitted information shall be included in the document issued as a result of technical supervision of the loose gear. In all cases, the safe working load (SWL) shall be marked on the loose gear.".

**Paras 13.3.7 and 13.3.7.1** are replaced by the following text:

"**13.3.7 Machinery.**

**13.3.7.1** Anchor handling winches shall meet the requirements of 6.1 and 6.7 of Part IX "Machinery".".

**Paras 13.3.8 — 13.3.8.6** are replaced by the following text:

"**13.3.8 Control stations.**

**13.3.8.1** Anchor handling winches, including activation of the emergency release system shall be controlled from the control station which has a clear view of the deck area within which the winch is operated.

Operators shall be able to visually monitor anchor handling winches and associated equipment. If the view is obstructed, video monitoring devices may be used for this purpose.

**13.3.8.2** The main control station shall be placed on the navigation bridge.

**13.3.8.3** The anchor handling winch may be controlled from more than one control station provided that these stations meet the requirements of 13.3.8.1 and 13.3.8.4 — 13.3.8.6 and prevent from exercising winch control from more than one station at a time.

**13.3.8.4** Each control station shall be provided with:

**.1** means for two-way communication with the main control station (in case of several control stations in addition to the main one);

**.2** means to prevent inadvertent actuation of a winch or associated equipment including emergency release system of a winch/chain stopper emergency release device;

**.3** structures ensuring personnel protection;

**.4** sufficient illumination of at least 320 lux;

**.5** marking of operating controls with signs indicating their purpose and the operating direction.

**13.3.8.5** Controls shall ensure single action control by one operator; therewith the selected operating mode shall be clearly distinguished from other modes provided.

The winch operating controls should be of the "hold-to run" type, which will cause the hoisting or lowering motion to automatically stop when the control lever is released by the operator.

**13.3.8.6** In compliance with 6.7.4.1 of Part IX "Machinery", the information of towing line tension shall be displayed at the winch control panels or in the close vicinity thereof, as well as the data of the maximum permissible towing line tension, relevant vertical and horizontal angles to determine the towing line position according to the calculations made for each loading condition.".

**Paras 13.3.9 and 13.3.10** are deleted.

## 15 REQUIREMENTS FOR SHIPS NOT ALWAYS AFLOAT BUT SAFELY AGROUND (NAABSA SHIPS)

### 15.2 REQUIREMENTS FOR HULL STRUCTURE

**Para 15.2.6.1** is amended as follows:

"**15.2.6.1** Design local pressures $p_i$, in kPa, on the structural members immediately perceiving the seabed are determined by the ~~formula~~ formulae:

for ships with distinguishing mark **NAABSA1** lying aground with hull baring on plane sand-and-mud sea bed

$$p_i = 10d_N(1 + 0{,}8/(A_i)^{1/2}), \qquad (15.2.6.1\text{-}1)$$

for other ships

$$p_i = 10 d_N (1 + 4/(A_i)^{1/2}), \qquad (15.2.6.1\text{-}2)$$

where $d_N$ — refer to 15.2.2;
$A_i$ — calculated area of the member strain zone, in m$^2$.".

## 23 REQUIREMENTS FOR SHIPS EQUIPPED TO USE METHANOL/ETHANOL AS FUEL

### 23.6 REQUIREMENTS FOR FIRE PROTECTION

**New paras 23.6.6.2 and 23.6.6.3** are introduced reading as follows:

"**23.6.6.2** Where a carbon dioxide smothering system is used as a fixed smothering system to protect a machinery space or a fuel preparation room in methyl/ethyl alcohol fuelled ships, the quantity of carbon dioxide ($CO_2$) carried shall be sufficient to give a minimum volume of free gas equal to 50% of the gross volume of the largest space protected, including the machinery space casing.

**23.6.6.3** As an alternative to the requirements of 23.6.6.2, upon agreement with the Register, the suitability of the fire extinguishing means in machinery space equipped with the fire extinguishing system required by 3.1.2.1 of Part VI "Fire Protection" and a fixed local application fire extinguishing system required by 3.12 of Part VI "Fire Protection" can be confirmed by performing risk assessment based on the amount of methanol and the expected duration of a potential methanol fire in the space considered (but not limited to that).".

**Existing para 23.6.6.2 and references thereto** are renumbered **23.6.6.4**.

# PART XX. ADDITIONAL REQUIREMENTS FOR YACHTS

## 5 TECHNICAL REQUIREMENTS

### 5.3 STABILITY, SUBDIVISION, FREEBOARD

**New para 5.3.3.6** is introduced reading as follows:

"**5.3.3.6** Requirements of 5.3.3 may not to apply for ships that fully comply with the requirements of Section 3 of the Guidelines on Application of Provisions of the International Convention on Load Lines (LL-66/88) or Section 3 of the Load Line Rules for Sea-Going Ships depending on which of them is applicable to the ship considered.".

### 5.4 FIRE PROTECTION

**Para 5.4.1.1** is amended as follows:

"**5.4.1.1** The hull, superstructures, structural bulkheads, decks and deckhouses of yachts of ~~more than~~ 2000 gross tonnage and over shall be constructed of steel or other equivalent material and ~~comply with~~ meet the requirements of Part VI "Fire Protection". Structural fire protection for yachts of 500 gross tonnage and more, with hulls constructed of steel or other equivalent materials, shall meet the requirements of Part VI "Fire protection".".

**Para 5.4.3** is replaced by the following text:

"**5.4.3 Structural fire protection for yachts of 300 gross tonnage and over but less than 500.**

Structural fire protection for yachts of 300 gross tonnage and over but less than 500 with hulls constructed of steel or other equivalent material, not carrying more than 12 passengers shall meet the requirements of 5.4.3.1 — 5.4.3.5, 5.4.3.9 — 5.4.3.14.

Structural fire protection for yachts of 300 gross tonnage and over but less than 500 with hulls constructed of fiber-reinforced plastic materials (FRP), not carrying more than 12 passengers shall meet the requirements of 5.4.3.2.1 — 5.4.3.2.4, 5.4.3.3 — 5.4.3.14 with minimum fire integrity of divisions in accordance with 5.4.3.6.

Structural fire protection for yachts of 300 gross tonnage and over but less than 500 with hulls constructed of non-combustible materials including steel or other equivalent materials, and/or fire-restricting materials based on FRP, carrying from 13 to 36 passengers inclusive shall meet the requirements 5.4.3.3 — 5.4.3.14, 5.4.4.1.2 with minimum fire integrity of divisions in accordance with 5.4.3.6.

**5.4.3.1** The minimum fire integrity of the bulkheads and decks separating the adjacent spaces shall meet the requirements of Tables 8.4.1-1 and 8.4.1-2 of Part VI "Fire protection" and the requirements for materials shall meet requirements of 8.5 of Part VI "Fire protection" except for that stated in 5.4.3.2.

**5.4.3.2** The usage of combustible veneers in accommodation and service spaces on outer surfaces of non-combustible bulkheads, linings and ceilings the thickness of which exceeds the thickness specified in 2.1.1.10 of Part VI "Fire protection" as well as combustible linings and ceilings may be permitted provided that the following alternative measures of fire protection are met:

**.1** combustible materials used for veneers, linings and ceilings shall have low flame spread characteristics in compliance with the requirements of Part 5 of the FTP Code;

**.2** in general insulating materials, enclosed behind lining and ceilings within accommodation and service spaces, shall be non-combustible. Where combustible insulating material is used, e.g. vibration, heat and sound insulation, it shall be covered with a layer of non-flammable fire insulation with the thickness of at least 25 mm and density of not less than 100 kg/$m^3$;

**.3** air spaces enclosed behind lingings or ceilings shall be divided by close-fitting non-combustible draught stops spaced not more than 14 m apart. In the vertical direction, such air spaces shall be closed at each deck;

**.4** all ship spaces in which the above-mentioned combustible veneers, linings and ceilings are used, shall be protected by automatic fire detectors of a fixed fire detection and fire alarm system or by an automatic sprinkler, fire detection and fire alarm system.

**5.4.3.3** Paints, varnishes and other finishes used on exposed surfaces inside accommodation and service spaces, control stations and stairways enclosures shall be of the low flame-spread approved type and shall not generate excessive quantity of smoke and toxic vapours, this being determined in accordance with Parts 2 and 5 of the FTP Code.

This requirement applies to the finish materials of bulkheads, decks, floor plates, linings and ceilings, but is not applicable to cables insulation, plastic piping and furniture.

**5.4.3.4** Insulation materials used in machinery spaces shall be non-combustible, and its surface shall be oily vapours-impermeable, which may be provided by coating insulation with galvanized steel sheets, reinforced aluminium foil, aluminium foil laminated fiberglass cloth or by other means.

**5.4.3.5** Divisions made of aluminum alloy shall be insulated so that the temperature of the structural core of the specimen does not rise more than 200 °C above the ambient temperature at any time during the applicable fire exposure at the standard fire test.

**5.4.3.6** The minimum fire integrity of bulkheads and decks separating adjacent spaces shall meet the requirements of Table 5.4.4.4.8. For yachts with hulls constructed of FRP and with restricted navigation area R3, the fire protection time may be reduced to 30 min.

**5.4.3.7** The fire integrity of divisions (decks and bulkheads) made of FRP, bounding machinery spaces of category A, galleys and saunas shall be ensured by using non-combustible insulation.

**5.4.3.8** When installing the insulation for hull divisions as required in 5.4.4.4.8, the following shall be provided:

For FRP divisions, the insulation shall be such that at any time during the applicable fire exposure at the standard fire test the temperature on both fire side and non-fire side remains below the heat deflection temperature (HDT) determined in accordance with the requirements of ISO 75-1:2020 "Plastics — Determination of temperature of deflection under load — Part 1: General test method".

Divisions of machinery spaces of category A shall be made of FRP with the use of a resin with HDT not less than 80 °C. In hazardous spaces it is recommended to use FRP with final (outer) layer of thickness not less than 1,5 mm with the use of self-extinguishing resin, which composition includes inhibitors, e.g. antimony oxide, alumina hydrate, etc.

In all above-mentioned cases, the insulation shall be applied on the side that is exposed to the greatest fire risk, e.g. inside the engine room, a division between two such spaces shall, however, be insulated on both sides.

For the above purposes the following insulation of the FRP divisions is considered adequate:

rockwool insulation with the thickness of 120 mm and density not less than 100 kg/m$^3$ to ensure 60 minutes of structural fire protection time;

rockwool insulation with the thickness of 60 mm and density not less than 100 kg/m$^3$ to ensure 30 minutes of structural fire protection time;

herewith it shall be confirmed that HDT of the resin used in FRP is higher than the maximum temperature observed during testing of the similar specimen, insulated as above to provide fire integrity required by Table 5.4.4.4.8;

protection of outer surface of the insulation shall be in accordance with 5.4.3.4.

**5.4.3.9** Penetrations.

If "A" class divisions are penetrated for the passage of electric cables, pipings, trunks, ventilation ducts and etc., or for girders, beams or other divisions, arrangements shall be provided to prevent reduction of fire integrity of divisions.

Passages of piping, cables or ventilation ducts through fire-resisting divisions and/or fire-restricting divisions shall be of the Register approved type, i.e. they shall be tested according to the requirements of Part 3 of the FTP Code, except for piping penetrations in "A" and "B" class divisions, the design of which meets the requirements of 2.1.3.3 and 2.1.3.4 of Part VI "Fire protection" for which the tests under the FTP Code are not required. Requirements of 12.1.12 and 12.1.13 of Part VIII "Systems and piping" shall be applied for ventilation duct penetrations.

In places of the above passages, the arrangements shall be provided to prevent the transmission of heat from intersections to uninsulated parts of divisions and penetrations by extending insulation for at least 450 mm.

**5.4.3.10** Doors, hatches and other openings in fire-resisting and fire-restricting divisions.

Openings in fire-resisting and fire-restricting divisions shall be provided with a permanently attached means of closing and are to be at least as effective for resisting fires as the divisions in which they are fitted.

Doors shall be self-closing in way of machinery spaces of category A and galleys, except where they are normally kept closed.

**5.4.3.11** Interior stairways.

**5.4.3.11.1** Interior stairways serving machinery spaces, accommodation spaces, service spaces or control stations shall be constructed of steel or other equivalent material.

**5.4.3.11.2** Internal stairways that serve only two decks[1] of accommodation shall be protected at least at one level by at least "B-0" class divisions.

**5.4.3.11.3** Where one or both of the decks contain accommodation for berthed passengers, the doors shall be self-closing.

**5.4.3.11.4** Where stairways serve only two decks, they shall be protected by divisions with doors or hatches, at least on one level, to limit free entry of smoke to other ship decks and air intake to the fire source. The doors in such enclosures shall be self-closing.

If a stairway serving only two decks of accommodation is arranged only within public spaces, stairway enclosures may not be installed, provided that the public spaces are protected by smoke detectors of the fire detection and fire alarm system.

**5.4.3.12** Stairway trunks.

**5.4.3.12.1** On yachts with hulls constructed of FRP, the stairway trunks that serve three or more decks of accommodation shall be enclosed at all levels by fire-restricting divisions. On yachts with hulls constructed of steel or other equivalent material shall comply with the requirements of Table 8.4.1-1 and 8.4.1.3 and 8.4.1.4 of Part VI "Fire protection".

**5.4.3.12.2** On yachts with hulls constructed of FRP, the time rating for structural fire protection of divisions stated in 5.4.3.12.1 shall meet the applicable time period of fire integrity specified in Table 5.4.4.4.8 or 15 min, whichever is greater.

**5.4.3.12.3** Doors fitted in the fire restricting divisions of stairway trunks (landings) shall be self-closing and shall comply with the requirements of Part 3 of the FTP Code.

**5.4.3.12.4** Where none of the decks served by the stairway trunk contain accommodation for berthed persons, the self-closing doors may be arranged with catches to keep them open under normal conditions.

**5.4.3.12.5** Direct access to stairway trunks shall be limited to the following spaces:

public spaces;

corridors;

lifts;

public toilets;

open ro-ro spaces to which passengers can have access;

and external areas.

**5.4.3.13** Stairways and vertical ladders arranged in a machinery space shall be securely fixed and manufactured of steel or another material equal to steel in fire integrity, including steps.

**5.4.3.14** Floor plates in passageways of machinery spaces of category A and floor plate supporting structures shall be constructed of steel or other equivalent material unless floor plate supporting structures form part of the primary hull structure of a ship constructed of FPR which can be made of non-combustible material (aluminum alloys).".

[1] An open deck above enclosed accommodation that is capable of accommodating 12 passengers and the crew shall be considered a deck of accommodation for the purposes of this Part.

**Para 5.4.4** is amended as follows:

"**5.4.4 Structural fire protection for yachts of ~~300~~500 gross tonnage and over but less than 2000 with hulls constructed of non-combustible and fire-restricting materials.**".

**Para 5.4.4.1.2** is amended as follows:

"**5.4.4.1.2** All separating divisions, ceilings or linings if they are not fire-resisting, shall be of non-combustible or fire-restricting materials. Draught stops shall be of non-combustible ~~or fire-restricting~~ materials. Herewith:

**5.4.4.1.2.1** Divisions of accommodation and service spaces may have veneers, mouldings, decorations made of combustible materials, which shall:

**.1** have a calorific value not exceeding 45 MJ/$m^2$ of the area for the thickness used; and

**.2** have a total volume not exceeding the volume equivalent to a 2,5 mm thick combustible veneer on the combined area of the walls and ceiling.

These requirements shall not be applied to furniture fixed to linings and bulkheads.

**5.4.4.1.2.2** The requirements of 5.4.4.1.2.1 may not be applied if the spaces are equipped with an automatic sprinkler system or an equivalent fixed water-mist fire extinguishing system.

**5.4.4.1.2.3** Combustible veneers are permitted on non-combustible surfaces and fire resisting divisions in spaces other than specified in 5.4.4.1.2.1 provided that they satisfy the requirements for a low flame-spread surface.".

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