RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part O Work-Ships

ESTABLISHMENT

Rule No.27 30th June 2011
Resolved by Technical Committee on 3rd February 2011
Approved by Board of Directors on 25th February 2011

Rule No.27 30th June 2011
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

Part O has been established as follows.

Part O Work-Ships

Chapter 1 GENERAL

1.1 Application and Equivalency

1.1.1 Application

1 Requirements stipulated in this Part apply to the work-ships (hereinafter referred to as "ships" in this Part) defined in **1.3.2**.
2 Unless otherwise specially specified in this Part, relevant requirements of other Parts are to be applied as appropriate.
3 The hull construction, equipment and scantlings of ships to be classified for restricted service may be appropriately modified according to the conditions of service.
4 The Society may request additional requirements, depending upon designated operations

1.1.2 Consideration for Special Ships

As for ships of a type or purpose different from those specified in this Part, the required hull construction, equipment, arrangements and scantlings are to be specified respectively based upon the fundamental concept of the requirements in this Part and these specified requirements apply as substitutes of the requirements in this Part.

1.1.3 Equivalency

The hull construction, equipment, machinery, etc. and the respective installation arrangements of each as well as the scantlings to which the requirements of this Part are not applicable will be accepted by the Society, provided that the Society is satisfied that such construction, equipment, machinery, installation arrangements and scantlings are equivalent to those required in this Part.

1.2 General

1.2.1 Stability

The requirements in this Part apply to ships having appropriate stability in all conceivable conditions. The Society emphasizes that special attention is to be paid to ship stability by builders during the design and construction stages and by masters while in service.

1.2.2 Docking

Every ship is recommended to be dry docked within six months after launching.

1.2.3 Workmanship

1 Workmanship is to be of the best quality possible. During construction, the builder is to supervise and inspect in detail every job performed in the shed and yard.
2 The connections of the structural parts of the hull are to be fair and sound.
3 The edges of steel plates are to be accurate and fair.
4 The flanging inner radius is not to be less than two times but not greater than 3 times the plate thickness.
5 Where frames or beams pass through watertight decks or bulkheads, the deck or bulkhead is to be of a watertight construction that does not use wooden materials or cement.
6 The details of welded joints and their workmanship are to be as specified in **Part M** in addition to **1.2**, **Part C**.

1.2.4 Class Notations

1 For ships complying with the requirements in this Part, an appropriate notation corresponding to ship purpose will be affixed to the Classification Characters.
2 For ships provided with dynamic positioning systems which satisfy the requirements in **Chapter 10**, **Part P**, an appropriate notation corresponding to the type of dynamic positioning system used by the ships will be affixed to the Classification Characters.

1.2.5 Materials, Hull Equipment, Weldings and End Connections

1 Materials, hull equipment, weldings and end connections are to be according to the following **(1)** or **(2)** depending upon ship length:
(1) For ships which are 90 *m* or longer, materials, hull equipment and end connections are to be according to **1.1.7**, **1.1.11** to **1.1.16** and **1.1.19** to **1.1.24**, **Part C**. In addition, weldings are to be according to **1.2**, **Part C**.
(2) For ships which are less than 90 *m* long, materials, hull equipment, weldings and end connections are to be according to **1.3**, **Part CS**.
2 Equipment is to comply with the requirement of **Part L**, in addition to the requirements in **-1** above.

1.2.6 Load Lines

The load lines of ships are to be in accordance with the requirements of **Part V**.

1.2.7 Ice Strengthening

Ships intended for navigation in ice covered waters are to be reinforced in accordance with the requirements of **Chapter 5**, **Part I**.

1.2.8 Ships which are Engaged in Works with Danger of a Fire or an Explosion

For ships engaged in work where there is a danger of fire or explosion, the requirements in the following **(1)** to **(6)** are to apply in addition to relevant requirements of this Part, depending upon ship purpose.
(1) For electrical installations, the requirements in **12.2** and **12.3**, **Part P** are to be applied as appropriate.
(2) For ventilation systems installed in hazardous areas, the requirements in **13.2.3**, **Part P** are to be applied.
(3) For machinery installations installed in hazardous areas, the requirements in **13.3.4, Part P** are to be applied.
(4) For electrical installations installed in hazardous areas, the requirements in **13.4.4**, **Part P** are to be applied.
(5) For fire protection and means of escape, the requirements in **14.4**, **Part P** are to be applied.
(6) For fire extinguishing systems, the requirements in **15.4**, **Part P** are to be applied.

1.3 Definitions

1.3.1 Application

The definitions of the terms and symbols which appear in this Part are as specified in this **1.3**, in addition to those specified elsewhere.

1.3.2 Work-ship

A "Work-ship" is a ship primary engaged in a designated operation such as dredging, lifting of heavy loads, fire fighting, offshore supply, towing, etc. at sea. Work-ships are defined according to their purpose as follows:

(1) Dredgers

A "dredger" is a ship engaged in dredging sand and rocks from the seabed.

(2) Crane ships

A "crane ship" is a ship engaged in lifting heavy loads and moving such loads vertically and horizontally.

(3) Vessels engaged in towing operations

(a) Tugs

A "tug" is a ship primary engaged in towing ships when such ships leave or come into a port and leave or come alongside the shore, or towing non self-propelled units, floating units, etc.

(b) Ocean tugs

An "ocean tug" is a ship engaged in towing non self-propelled units, floating units, etc. in the ocean.

(4) Pusher tugs

A "pusher tug" is a ship that pushes barges forward with its bow.

(5) Fire fighting vessel

A "fire fighting vessel" is a ship engaged in fire fighting operations.

(6) Offshore supply vessels

An "offshore supply vessel" is a ship primary engaged in the supply of stores such as water and fuel oil, materials and equipment to offshore installations; and, for the purpose of this Part, which is designed with accommodation and bridge erections in the forward part of the unit and an exposed cargo deck in the aft part for the handling of cargo at sea.

(7) Anchor handling vessels

An "anchor handling vessel" is a ship engaged in the installation, moving and taking up of the mooring anchors of mobile offshore drilling units, dredgers, etc.

(8) Vessels engaged in laying objects on the seabed

(a) Cable laying vessels

A "cable laying vessel" is a ship engaged in laying cable on the seabed.

(b) Pipe laying vessels

A "pipe laying vessel" is a ship engaged in laying pipes on the seabed.

(9) Oil recovery vessels

An "oil recovery vessel" is a ship with a system to recover oil spilled on the surface of the water and/or a storage system for recovered oils.

(10) Other ships

"Other ships" are ships other than those specified in **(1)** to **(9)** above.

1.3.3 Type of Ships

Ships are classified into the following two groups depending upon their type:

(1) Ship-type ship

A “ship-type ship” is a ship having a hull which has propelling machinery and is installed with work-related installations, or a ship designed for designated operations in the floating condition or towed condition.

(2) Barge-type ship

A “barge-type ship” is a ship having a hull which has no propelling machinery and is installed with work-related installations, or a ship designed for designated operations in the floating condition or towed condition.

1.3.4 Hazardous Area

Hazardous areas are all those areas where, due to the possible presence of a flammable atmosphere, the use of machinery or electrical equipment without proper consideration may lead to a fire hazard or an explosion. In addition, hazardous areas may be extended or reduced depending on the actual arrangements in each case, by the use of windshields, special ventilation arrangements, structural arrangements, etc.

Chapter 2 DREDGERS

2.1 General

2.1.1 Application

Dredgers (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

2.2 Stability

2.2.1 General

1 Intact and damage stability are to be according to this **2.2** in addition to **Part U** and **Chapter 4**, **Part C**.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

2.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

2.3 Hull Construction

2.3.1 General

Hull constructions are to be according to this **2.3** in addition to relevant requirements in each

chapter of **Part C**, **Part CS** or **Part Q**.

2.3.2 Surroundings of Ladder Wells

The surroundings of the ladder wells in ships are to be provided with cofferdams or be suitably reinforced.

2.4 Hull Equipment

2.4.1 General

1 Hull equipment is to be according to this **2.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship's purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

2.4.2 Seat for Dredging Machinery

Seats for primary dredging machinery are to have sufficient strength.

2.5 Machinery

2.5.1 General

Main propulsion machinery, power transmission systems, shafting systems, propellers, prime movers other than the main propulsion machinery, boilers and related equipment, incinerators, pressure vessels, auxiliaries, piping systems, and all of their respective control systems (hereinafter all of the above will be referred to as "machinery installations") of the ship are to be according to this **2.5** in addition to **Part D**.

2.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the plants provided with installations and equipment necessary for the tests (hereinafter referred to as "manufacturers, etc." in this Part) in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

2.6 Electrical Installations

2.6.1 General

Electrical equipment and wiring for ships (hereinafter referred to as "electrical installations") of the ship are to be according to this **2.6** in addition to **Part H**.

2.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

2.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

2.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 3 CRANE SHIPS

3.1 General

3.1.1 Application

Crane ships (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

3.2 Stability

3.2.1 General

1 Intact and damage stability are to be according to this **3.2** in addition to **Part U** and **Chapter 4**, **Part C**.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

3.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

3.3 Hull Construction

3.3.1 General

Hull constructions are to be according to this **3.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

3.3.2 Longitudinal Strength

With respect to the longitudinal strength of a barge-type ship provided with cranes, in cases where the cross sectional coefficient is calculated when such cranes are in operation, the value of Z_2 is to be according to **Chapter 12**, **Part Q** or calculated according to the following formula:

$$Z_2 = 8.36CM_s(cm^3)$$

where

All symbols are to be in accordance with the requirements given in **Chapter 12**, **Part Q**.

3.4 Hull Equipment

3.4.1 General

1 Hull equipment is to be according to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship's purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

3.5 Machinery

3.5.1 General

Machinery installations of the ship are to be according to this **3.5** in addition to **Part D**.

3.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

3.6 Electrical Installations

3.6.1 General

Electrical installations of the ship are to be according to this **3.6** in addition to **Part H**.

3.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

3.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

3.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 4 VESSELS ENGAGED IN TOWING OPERATIONS

4.1 General

4.1.1 Application

Vessels engaged in towing operations (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

4.2 Stability

4.2.1 General

1 Intact and damage stability are to be according to this **4.2** in addition to **Part U** and **Chapter 4**, **Part C**.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

4.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

4.3 Hull Construction

4.3.1 General

Hull constructions are to be according to this **4.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

4.3.2 Stern Frames

Scantlings of various parts of propeller posts are to be suitably increased from that given by the formula and figures in **Fig.C2.1** or **Fig.CS2.1**.

4.3.3 Rudder Stocks

The diameter of rudder stocks of ships is not to be less than 1.1 times that required in **Chapter 3**, **Part C** or **Chapter 3**, **Part CS**.

4.3.4 Strength of Contact Parts with Other Ships

The construction of parts, such as the bow parts of ships, in cases where ships come into contact with other ships for navigation or operation purposes, is to be such to ensure sufficient strength.

4.3.5 Supporting Structures of Towing Equipment

1 In principle, towing equipment is to be located on longitudinals, beams or girders, which are parts of the deck construction.

2 In cases where towing equipment cannot be located as specified in **-1** above, towing equipment is to be arranged on reinforced members.

3 The supporting structures of towing equipment are to be such to ensure sufficient strength.

4 The design load on fittings is to take into account all acting loads.

5 The design loads for the supporting structures of towing equipment are to be not less than the breaking strength of the towline system.

4.4 Hull Equipment

4.4.1 General

1 Hull equipment is to be according to this **4.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship’s purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

4.4.2 Towing Equipment

1 The towing hooks, towing bits or towing bollards fitted onto ocean tugs is to be located as low as practicable, and close to, but abaft of, the centre of gravity of the ship in the expected towing condition.

2 Equipment, such as winches, for towing operations is to be provided with suitable safety devices so that towing wires are able to be released or cut in times of emergency.

4.4.3 Fenders

For contact with other vessels and sea-based facilities, ships are to be equipped with sufficient fenders.

4.5 Machinery

4.5.1 General

Machinery installations of the ship are to be according to this **4.5** in addition to **Part D**.

4.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

4.6 Electrical Installations

4.6.1 General

Electrical installations of the ship are to be according to this **4.6** in addition to **Part H**.

4.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

4.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

4.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to this **4.7** in addition to relevant requirements in each chapter of **Part R**.

4.7.2 Additional Equipment for Ships Engaged in Towing Operations

Emergency exits from machinery spaces to decks are to be capable of being used at extreme heel angles. In addition, emergency exits are to be positioned as high as possible above waterlines and positioned as near as practicable to ship centrelines.

Chapter 5 PUSHER TUGS

5.1 General

5.1.1 Application

Pusher tugs (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

5.2 Stability

5.2.1 General

1 Intact and damage stability are to be according to this **5.2** in addition to **Part U** and **Chapter 4**, **Part C**.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

5.2.2 Calculation on Stability

In applying the requirements in **2.1.2, Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

5.3 Hull Construction

5.3.1 General

Hull constructions are to be according to this **5.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

5.3.2 Strength of Contact Parts with Other Ships

The construction of parts, such as the bow parts of ships, in cases where ships come into contact with other ships for navigation or operation purposes, is to be such to ensure sufficient strength.

5.3.3 Construction in Way of Coupling Devices for Connection

In cases where ships are equipped with coupling devices for connection to other vessels, etc., construction in way of such coupling devices is to be such to ensure sufficient strength.

5.4 Hull Equipment

5.4.1 General

Hull equipment is to be according to this **5.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

5.4.2 Fenders

For contact with other vessels and sea-based facilities, the ship is to be equipped with sufficient fenders.

5.5 Machinery

5.5.1 General

Machinery installations of the ship are to be according to this **5.5** in addition to **Part D**.

5.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

5.6 Electrical Installations

5.6.1 General

Electrical installations of the ship are to be according to this **5.6** in addition to **Part H**.

5.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

5.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

5.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 6 FIRE FIGHTING VESSELS

6.1 General

6.1.1 Application

Fire fighting vessels (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

6.2 Stability

6.2.1 General

1 Intact and damage stability are to be according to this **6.2** in addition to **Part U** and **Chapter 4**, **Part C**.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

6.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

6.3 Hull Construction

6.3.1 General

Hull constructions are to be according to this **6.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

6.3.2 Supporting Structures of Monitors for Fire Fighting

The supporting structures of the monitors for fire fighting are to be such to ensure sufficient strength to handle the reaction forces of water jets.

6.4 Hull Equipment

6.4.1 General

Hull equipment is to be according to this **5.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

6.4.2 Fire Fighting Equipment for Fighting Fires on Other Vessels

Ships are to be fitted with fire fighting equipment for fighting fires on other vessels and fitted with suitable equipment to ensure the safety of their own ship during fire fighting operations.

6.5 Machinery

6.5.1 General

Machinery installations of the ship are to be according to this **6.5** in addition to **Part D**.

6.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

6.5.3 Propulsion Machinery

1 Propulsion machinery is to have sufficient power to secure stable maneuverability during fire fighting operations.

2 Propulsion machinery is to be able to maintain ship position in still water as well as the capacity of water monitors during fire fighting operations at not more than 80% of the propulsion force in any direction.

3 Control systems

Control systems are to be provided with the following functions to prevent complete loss of power due to power overloads:

(1) Alarm devices which give alarms in cases where propulsion power exceeds 80% during fire fighting operations.
(2) Means which reduce the speed of propulsion machinery in cases where propulsion power exceeds 100% during fire fighting operations.

6.5.4 Auxiliaries and Piping Systems

Pumps and piping systems intended for serving water monitors or water spray devices which are used for protection are to comply with the following requirements:

(1) Pumps and piping systems are not to be used for services other than water monitors and water spray devices.
(2) In cases where 2 or more pumps are provided, independent sea inlets are to be provided for each pump.
(3) In cases where 2 or more pumps are provided, they are to have equal or near equal capacity.
(4) Adequate piping arrangements to prevent overheating at low pump delivery rates are to be provided to each pump.
(5) Piping systems are to be protected against overpressure.
(6) Pumps and piping systems used for water spray devices are to be independent from systems serving water monitors, except in cases where such pumps are intended for serving water monitors and water spray devices.
(7) Piping systems are to be protected against corrosion and freezing.

6.5.5 Sea Inlets for Fire Fighting Operations

1 The sea inlets for fire fighting operations are not to be used for services other than fire fighting operations or water spray devices.

2 The sea inlets for fire fighting operations and sea chests are to be arranged as low as practical to avoid clogging due to debris or ice and oil intake from the sea surface.

3 The location of sea inlets for fire fighting operations and sea chests are to be such that water suction is not impeded by ship motions or the water flow from propellers or thrusters.

4 Each sea inlet for fire fighting operations is to be provided with a shut off valve.

5 Fire fighting pumps, the shut off valves mentioned above, and overboard discharge valves are to be operable from the same locations.
6 The starting of fire fighting pumps in cases where shut off valves are closed is to be prevented by providing either interlock systems or by audible and visual alarms.

6.6 Electrical Installations

6.6.1 General

Electrical installations of the ship are to be according to this **6.6** in addition to **Part H**.

6.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.
2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.
3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

6.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

6.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to this **6.7** in addition to relevant requirements in each chapter of **Part R**.

6.7.2 Fire Protection

1 In general, exposed decks, hulls and all exterior boundaries of forecastles and deck houses above the lightest operating waterline are to be made out of steel.
2 Special consideration is to be paid to boundaries which are to be constructed of materials other than steel.

6.7.3 Windows

In cases where water-spray systems are not provided to protect ships from the heat radiated from the fire, steel deadlights or shutters are to be provided on all windows and port lights, except for those in navigation bridges.

6.7.4 Water-spray Systems

In cases where water-spray systems are provided to protect ships from the heat radiated from the fire, such systems are to be according to the following **(1)** to **(3)**:
(1) Water-spray systems are to provide suitable protection for all exterior boundaries including the boundaries of hulls, superstructures, and deck houses. In cases where deemed appropriate by the Society, this requirement may be dispensed with.
(2) Water-spray systems are to be protected from corrosion.
(3) Deck scuppers and freeing ports are to be appropriately provided to assure efficient drainage of

water from deck surfaces in cases where water-spray systems are in operation.

Chapter 7 OFFSHORE SUPPLY VESSELS

7.1 General

7.1.1 Application

Offshore supply vessels (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

7.2 Stability

7.2.1 General

1 Intact and damage stability are to be according to this **7.2** in addition to **Part U** and **Chapter 4**, **Part C**. However, for ships specifically approved by the Society, these requirements may be waived.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

7.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

7.3 Hull Construction

7.3.1 General

Hull constructions are to be according to this **7.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

7.3.2 Access Openings

Access to the machinery spaces of category A of ships is to be arranged within the forecastle as far as possible. Any access to such machinery spaces from exposed cargo decks is to be provided with two weathertight closures.

7.3.3 Hull Strength

Side construction is to be such to ensure sufficient strength for impact loads arising from contact with other vessels.

7.3.4 Loading of Cargo

1 In cases where cargo rails are fitted onto cargo decks, the structures under the stanchions of cargo rails are to be appropriately reinforced.

2 In cases where heavy cargo is carried on deck, effective means such as steel cradles, steel or wooden dunnages, etc. are to be provided so that weight is uniformly distributed onto deck structures.

7.3.5 Superstructure and Deckhouses

The superstructure end bulkheads and boundary walls of deckhouses are to be such to ensure sufficient strength for operational loads.

7.3.6 Cargo Tanks

1 Liquid cargo tanks are to be according to the following **(1)** to **(3)**:

(1) In cases where hazardous and noxious liquid cargo are loaded in tanks, the quantities of liquid cargo are to be limited to $800m^3$ or a volume in cubic meters equal to 40% of ship deadweight calculated at a cargo density of $1.0t/m^3$. However, there are no such quantity limitations for drilling fluids (liquid mud, etc.), cargo fuel and non-noxious liquid substances.

(2) In cases where not bounded by bottom shell plating, fuel oil tanks, cargo pump-rooms or pump-rooms, cargo integral tanks are to be separated from other spaces by cofferdams having accessible widths of $600mm$.

(3) Independent tanks are to be segregated from machinery spaces, propeller shaft tunnels, if fitted, dry cargo spaces, accommodation and service spaces and from drinking water and stores for human consumption by cofferdams, void spaces, cargo pump-rooms, oil fuel tanks or other similar spaces.

2 Dry cargo tanks are to be according to the following **(1)** and **(2)**:

(1) In cases where cargo tanks for dry cement or mud are fitted, these cargo tanks are to be separated from engine rooms and accommodation spaces by steel bulkheads and decks.

(2) Cargo transfer piping systems are, in principle, not to be led through machinery spaces. However, in cases where such design is impractical, piping systems may pass through machinery spaces, provided that all pipe connections located within the machinery spaces are welded and any detachable connections are arranged outside of such spaces.

7.3.7 Bulkheads

1 Machinery spaces and other working and living spaces in the hull are to be separated by watertight bulkheads.

2 An afterpeak bulkhead is to be fitted and made watertight up to the freeboard deck. The afterpeak bulkhead may, however, be stepped below the freeboard deck.

7.4 Hull Equipment

7.4.1 General

1 Hull equipment is to be according to this **7.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship's purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

7.4.2 Fenders

Longitudinal fenders are normally to be fitted on side shells in the deck areas where upper

decks or forecastles decks are at full breadth.

7.4.3 Protection of Decks

Wooden sheathings, etc. are to be provided on cargo decks to appropriately protect steel deck plates from mechanical damage and/or scuffing.

7.4.4 Cargo Loading Equipment

In cases where cargo rails are fitted onto cargo decks, cargo rail stanchions are to be attached.

7.5 Machinery

7.5.1 General

Machinery installations of the ship are to be according to this **7.5** in addition to **Part D**.

7.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

7.6 Electrical Installations

7.6.1 General

Electrical installations of the ship are to be according to this **7.6** in addition to **Part H**.

7.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

7.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

7.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 8 ANCHOR HANDLING VESSELS

8.1 General

8.1.1 Application

Anchor handling vessels (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

8.2 Stability

8.2.1 General

1 Intact and damage stability are to be according to this **8.2** in addition to **Part U** and **Chapter 4**, **Part C**. However, for ships specifically approved by the Society, these requirements may be waived.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

8.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

8.3 Hull Construction

8.3.1 General

Hull constructions are to be according to this **8.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

8.3.2 Supporting Structures of Anchor Handling Equipments

The supporting structures of anchor handling equipments and in way of parts where anchors are loaded are to be such to ensure sufficient strength.

8.3.3 Suitable Construction for Anchor Handling Operation

1 Ships are to have completely clear after decks in order to effectively handle anchors.

2 In cases where anchor handling operations are conducted using after deck stern rollers, the aft terminals in way of the stern areas for anchor handling are to be round in shape.

8.4 Hull Equipment

8.4.1 General

1 Hull equipment is to be according to this **8.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship's purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

8.4.2 Protection of Deck Areas

Deck areas for the collection and handling of anchors and associated equipment are to be protected by wooden sheathing, etc. However, in cases where deemed appropriate by the Society, such protection may be omitted.

8.4.3 Safety Devices

Equipment, such as winches, for anchor handling operations is to be provided with suitable safety devices so that towing wires are able to be released or cut in times of emergency.

8.5 Machinery

8.5.1 General

Machinery installations of the ship are to be according to this **8.5** in addition to **Part D**.

8.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

8.6 Electrical Installations

8.6.1 General

Electrical installations of the ship are to be according to this **8.6** in addition to **Part H**.

8.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship,

fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

8.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

8.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 9 VESSELS ENGAGED IN LAYING OBJECTS ON THE SEABED

9.1 General

9.1.1 Application

Vessels engaged in laying objects on the seabed (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

9.2 Stability

9.2.1 General

1 Intact and damage stability are to be according to this **9.2** in addition to **Part U** and **Chapter 4**, **Part C**. However, for ships specifically approved by the Society, these requirements may be waived.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

9.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

9.3 Hull Construction

9.3.1 General

Hull constructions are to be according to this **9.3** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

9.3.2 Hull Strength

1 The supporting structures of equipment used for laying objects on the seabed are to be such to ensure sufficient strength.

2 The supporting structures of parts used for loading cable and pipes are to be such to ensure sufficient strength.

3 In cases where ships are equipped with mooring equipment or anchor handling equipment for positioning, the supporting structures of such equipment are to be such to ensure sufficient strength.

9.4 Hull Equipment

9.4.1 General

1 Hull equipment is to be according to this **9.4** in addition to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

2 In cases where equipment and devices for the ship's purpose are fitted, suitable measures are to be taken so that ship safety is not impaired.

3 Cargo gear is to be at the discretion of the Society.

9.4.2 Safety Devices

Equipment for laying objects on the seabed is to be provided with suitable safety devices so that towing wires are able to be released or cut in times of emergency.

9.5 Machinery

9.5.1 General

Machinery installations of the ship are to be according to this **9.5** in addition to **Part D**.

9.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

9.6 Electrical Installations

9.6.1 General

Electrical installations of the ship are to be according to this **9.6** in addition to **Part H**.

9.6.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

9.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

9.7.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

Chapter 10 OIL RECOVERY VESSELS

10.1 General

10.1.1 Application

Oil recovery vessels (hereinafter referred to as “ships” in this Chapter) are to apply the requirements in this Chapter in addition to the relevant requirements of other Parts.

10.1.2 Hazardous Areas

Hazardous areas for ship are as listed in the following **(1)** to **(13)**. However, in areas other than those listed below, the requirements in **13.1.3-3**, **Part P** correspondingly apply.

(1) Recovered oil tanks (including oily-water separating tanks, hereinafter the same)
(2) Enclosed spaces and semi-enclosed spaces adjacent to recovered oil tanks or having bulkheads above and in line with recovered oil tank bulkheads
(3) Recovered oil pump rooms and enclosed spaces in which oil recovering apparatus is located

(4) Enclosed spaces and semi-enclosed spaces in which recovered oil pipes are fitted
(5) Enclosed spaces in which portable oil recovering apparatus or recovered oil hoses are stored
(6) Areas on exposed deck within 3 *m* of any oil recovering apparatus installed on open deck excluding that is stored on exposed deck after oil recovering work
(7) Areas on exposed deck within 3 *m* of any recovered oil tank outlet
(8) Areas on exposed deck within 3 *m* of any entrance or ventilation opening of hazardous areas
(9) Areas on exposed deck over all recovered oil tanks and to the full breadth of the ship plus 3 *m* fore and aft on exposed deck, up to a height of 2.4 *m* above the exposed deck (the outer surface of the recovered oil tank in case where the surface is above the exposed deck)
(10) Enclosed spaces and semi-enclosed spaces having direct openings, such as doors or windows, into any hazardous area specified in **(1)** to **(9)**
(11) All areas on exposed deck up to a height of 3 *m* above the load line(1)
(12) Enclosed spaces having direct openings, such as doors or windows, into any hazardous area specified in **(11)**(1)
(13) Notwithstanding **(10)** and **(12)**, enclosed spaces having direct openings into any hazardous area specified in **(6)** to **(9)** and **(11)** may be considered not hazardous provided that the space is separated by a gas-tight steel bulkhead or equivalent thereto and maintained with overpressure in relation to the atmosphere by a supply-type mechanical ventilation system with an air change rate not less than 30 *times per hour*. Inlets of the ventilation system are to be located in non-hazardous areas as high and far away from any inlet of a ventilation system for hazardous areas as practicable. And the arrangement of ducts in the space is to be such that the entire space is efficiently ventilated. In case of failure of the driving motor for a fan, a visual and audible alarm is to be given.

Note:

1. Areas specified in **(11)** and **(12)** may be considered not hazardous where the ship is engaged in the work at areas far away from the oil spillage area.

10.2 Stability

10.2.1 General

1 Intact and damage stability are to be according to this **10.2** in addition to **Part U** and **Chapter 4**, **Part C**. However, for ships specifically approved by the Society, these requirements may be waived.

2 Intact stability is to be in accordance with requirements given in **Part U**. In addition, special consideration is to be paid to stability during designated operations.

10.2.2 Calculation on Stability

In applying the requirements in **2.1.2**, **Part U**, the heeling lever resulting from designated operations is to be considered the one most unfavorable for stability.

10.3 Hull Construction

10.3.1 General

Hull constructions are to be according to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

10.4 Hull Equipment

10.4.1 General

Hull equipment is to be according to relevant requirements in each chapter of **Part C**, **Part CS** or **Part Q**.

10.5 Machinery

10.5.1 General

Machinery installations of the ship are to be according to this **10.5** in addition to **Part D**.

10.5.2 Tests

1 Before installation on board, equipment and components constituting the machinery installations are to be tested at the manufacturers in accordance with the relevant requirements in **Part D**.

2 Notwithstanding the requirements in **-1**, for machinery installations, other than boilers, pressure vessels belonging to Group I or II and piping systems which contain inflammable or toxic liquids, used solely for the operation which is the purpose of the ship, the tests may be deemed appropriate by the Society.

3 The systems or the equipment essential for the safety of the ship or for the propulsion of the ship (only applicable to the ship which has the main propulsion machinery) are, after installed on board, to be subjected to performance tests.

10.6 Machinery Installations in Hazardous Area

10.6.1 General

Machinery installations in hazardous areas for ship are to comply with the requirements in the following **(1)** to **(3)**.

(1) Machinery installations in hazardous areas
The requirements in **13.3.3**, **Part P** are to apply correspondingly.

(2) Oil recovery apparatus
Oil recovery apparatus is to be constructed so as to ensure the safety to the operator and so as not to ignite the explosive gas.

(3) Gas detection
At least one piece of gas detection equipment is to be provided in order to detect gases in enclosed non-hazardous spaces and in other spaces deemed necessary by the Society in case those spaces contain source of ignition. One piece of portable gas detection equipment is to be provided where the fixed gas detection equipment is only provided on board.

10.7 Electrical Installations

10.7.1 General

Electrical installations of the ship are to be according to this **10.7** in addition to **Part H**.

10.7.2 Tests

1 Among electrical equipment used solely for the operation which is the purpose of the ship, fuses, circuit breakers, explosion-protected electrical equipment and cables are to be subjected to be

in accordance with the requirement in **1.2.1-4**, **Part H**. However, electrical installations which do not comply with this requirement may be accepted provided that the submission of documents such as specifications, sectional assembly drawings, test reports, certificates issued by public bodies for the examination by the Society.

2 Electrical equipment used solely for the operation which is the purpose of the ship and not listed in **-1** may be in accordance with the standards deemed appropriate by the Society.

3 For electrical installations used solely for the operation which is the purpose of the ship, an insulation resistance test specified in **2.18.1**, **Part H** and performance tests of safety devices for generators and transformers are to be carried out after installed on board.

10.8 Electrical Installations in Hazardous Areas

10.8.1 General

Electrical installations in hazardous areas for a ship are to comply with the requirements in the following **(1)** to **(7)**.

(1) Intrinsically safe type electrical equipment and associated cables may be installed in any hazardous area specified in **10.1.2**.

(2) In hazardous areas specified in **10.1.2(2)** to **(5)**, lighting fittings of flame-proof type and associated cables may be installed.

(3) In hazardous areas specified in **10.1.2(6)**, flameproof type electrical equipment and associated cables may be installed.

(4) In hazardous areas specified in **10.1.2(7)** to **(9)**, flame-proof type electrical equipment, increased safety type electrical equipment and associated cables may be installed.

(5) For electrical installations installed in hazardous areas specified in **10.1.2(10)**, these areas are to be considered as equivalent to the adjacent hazardous area having direct openings, and the electrical installations are to be in compliance with the relevant requirements in **(1)** to **(4)**.

(6) In hazardous areas specified in **10.1.2(11)** and **(12)**, flame-proof type electrical equipment and associated cables may be installed. However, where the ship is engaged in the work at areas far away from the oil spillage area, all types of electrical installations may be installed in case that the electrical installation is provided with a multipole linked switch in non-hazardous area and a precaution against the use of the installation during the oil recovery work is taken.

(7) Electrical equipment installed on non-hazardous exposed deck is to be provided with a multipole linked switch at a continuously attended location outside the hazardous areas to easily shut off the electrical power supply in case of the increase of the risk of ignition or fire due to the increase of gas concentrations, etc. during the oil recovery work.

10.9 Fire Protection, Means of Escape and Fire Extinguishing Systems

10.9.1 General

Fire protection, means of escape and fire extinguishing systems are to be according to relevant requirements in each chapter of **Part R**.

10.9.2 Ventilation Systems installed in Hazardous Areas

Ventilation systems of ships are to comply with the requirements in the following **(1)** and **(2)**.

(1) Ventilatilation for hazardous areas

(a) Recovered oil pump rooms and enclosed spaces in which oil recovering apparatus is located are to be provided with an exhaust-type mechanical ventilation system with an air change rate not less than 20 *times per hour*. Inlets of the ventilation system are to be

located as high as practicable in non-hazardous areas. However, the ventilation system for small recovered oil pump rooms which contain no source of ignition may be dispensed with subject to the approval of the Society.

(b) Driving motors for fans of the ventilation systems for hazardous areas are to be installed outside ventilation ducts. Fans and casings are to be designed so as not to emit sparks due to contact of moving parts or formation of static electricity.

(2) Ventilation for non-hazardous areas (excluding areas considered not hazardous in the application of **10.1.2(13)**)

(a) The ventilation method for non-hazardous areas is not to be an exhaust mechanical type.

(b) Inlets and outlets of the ventilation system are to be located in non-hazardous areas as high and far away as practicable from any inlet of a ventilation system for hazardous areas.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 30 December 2011.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the application is submitted to the Society before the effective date upon request by the owner.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part O Work-Ships

ESTABLISHMENT

Notice No.41 30th June 2011

Resolved by Technical Committee on 3rd February 2011

Notice No.41 30th June 2011
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

Part O has been established as follows.

Part O Work-ships

O1 GENERAL

O1.1 Application and Equivalency

O1.1.1 Application

With respect to the reduction of scantlings of the structural members of ships to be classed for restricted service, the provisions in **1.1.1-2**, **Part CS of the Rules** are to apply except for those specially prescribed in this Part.

O1.2 General

O1.2.4 Class Notations

With respect to ships complying with relevant requirements given in this Part, notations corresponding to the purpose of those ships defined in **1.3.2**, **Part O of the Rules** are affixed to the Classification Characters as follows:

(1) Dredgers: *Dredger* (abbreviated to *D*)
(2) Crane ships
  (a) Ship-type ships: *Crane Vessel* (abbreviated to *CV*)
  (b) Barge-type ships: *Floating Crane* (abbreviated to *FC*)
(3) Vessels engaged in towing operations
  (a) Tugs: *Tug*
  (b) Ocean Tugs: *Towing Vessel* (abbreviated to *TV*)
(4) Pusher tugs: *Pusher*
(5) Fire fighting vessels

With respect to fire fighting vessels, the following notations corresponding to the installed fire fighting equipment defined in **O6.4.2-1** are affixed.

  (a) FFV1 vessels: *Fire Fighting Vessel-Type 1* (abbreviated to *FFV1*)
  (b) FFV2 vessels: *Fire Fighting Vessel-Type 2* (abbreviated to *FFV2*)
  (c) FFV3 vessels: *Fire Fighting Vessel-Type 3* (abbreviated to *FFV3*)

In cases where the fire fighting equipment specified in **Table O1.2.4** is installed, additional descriptions can be affixed. (For example, *Fire Fighting Vessel-Type 1 equipped with WSS, MFG*)

In addition, if foam monitor systems for fire fighting complying with the requirements given in **O6.4.2-9** are installed, the following additional descriptions are affixed. (For

example, *Fire Fighting Vessel-Type 3 equipped with WSS, FMS3*)

(a) *FMS1*: Have capacities of more than 1,000*l*/ *minute*
(b) *FMS2*: Have capacities of more than 3,000*l*/ *minute*
(c) *FMS3*: Have capacities of more than 6,000*l*/*minute*
(d) *FMS4*: Have capacities of more than 12,000 *l*/*minute*
(e) *FMS5*: Two fixed low expansion foam monitors that have capacities more than 5,000 *l*/*minute*

Table O1.2.4 Fire fighting equipment

Fire fighting equipment	Additional descriptions
Water-spray system	*WSS*
Mobile high expansion foam generator	*MFG*
Foam monitor system	*FMS*

(6) Offshore supply vessels: *Offshore Supply Vessel* (abbreviated to *OSV*)
(7) Anchor handling vessels: *Anchor Handling Vessel* (abbreviated to *AHV*)
(8) Vessels engaged in laying objects on the seabed
  (a) Cable laying vessels: *Cable Layer* (abbreviated to *CL*)
  (b) Pipe laying vessels: *Pipe Layer* (abbreviated to *PL*)
(9) Oil Recovery Vessels: *Oil Recovery Vessel* (abbreviated to *ORV*)
(10) Notations, except for those mentioned above, corresponding to work purposes of work-ships
In addition, in cases where the purpose of work-ships which are designed to perform more than a single purpose within the **(1)** to **(10)** mentioned above, notations corresponding to each purpose are affixed. (For example, Tugs-cum-Fire fighting vessels: *Tug/Fire Fighting Vessel-Type 1*)

O1.3 Definitions

O1.3.2 Work-ships

Pusher tugs defined in **1.3.2(4)**, **Part O of the Rules** are categorized into the following **(1)** or **(2)** according to the way they are connected to barges

(1) Easy separation type pusher tugs:
Connected by a pin and can be separated quickly and easily during an emergency.
(2) Unity type pusher barge:
Pusher tugs which are tightly connected to barges so that a single structure is formed. More specifically,
  (a) Connection by a bolt and so on
  (b) Has an uneven form structure so that they complement each other in the connecting part, and can be secured by wire ropes and so on after connection is made.

O2 DREDGERS

O2.2 Stability

O2.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09 *m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O3 CRANE SHIPS

O3.2 Stability

O3.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09 *m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O4 VESSELS ENGAGED IN TOWING OPERATION

O4.2 Stability

O4.2.1 General

Ships engaged in towing operations are to comply with the following requirements, in addition to the requirements of **2.2.1, Part U of the Rules**.

(1) The initial transverse metacentric height (G_0M) is not to be less than 0.15 *m*.

(2) The stability curves are to comply with the following **(a)** or **(b)**:

(a) The residual area between a righting lever curve and a heeling lever curve developed from the bollard pull force is not to be less than 0.09 *m-rad*. The area is to be determined between the first interception of the two curves and the second interception or the angle of down flooding whichever is less. (The area as specified by "*A*" in **Fig. O4.2.1**)

(b) The area under a righting lever curve ("*A*" + "*B*" in **Fig. O4.2.1**) is not to be less than 1.4 *times* the area under a heeling lever curve developed from the bollard pull force ("*B*" + "*C*" in **Fig. O4.2.1**). The areas are to be determined between 0 *degree* and the 2nd interception or the angle of down flooding whichever is less.

In the application of the above requirements, the heeling lever (l_h) curve developed from the bollard pull force is to be derived by using the following formula. For ships intended for towing astern, such lever is to be that for towing ahead or that for towing astern, whichever is larger.

$$l_h = \frac{\kappa \cdot T \cdot h \cdot \cos\theta}{9.81 \cdot \Delta} \quad (m)$$

where

κ : Coefficient relating to type of propulsion, is to be taken equal to 0.7 for ships with azimuth thruster(s) and 0.5 for other ships.

T : Maximum bollard pull (*kN*). In principle, maximum bollard pull is to be derived from the actual test at the maximum continuous output of the engine(s). However, a nominal bollard pull specified by constructor of the considered ship may be accepted, provided that such value is not less than value given by **Table O4.2.1** as a standard, unless records of bollard pull tests in similar ships or sufficient information provided by the constructor.

h : Vertical distance (*m*) between the towing hook and the centre of the propeller.

Δ : Displacement (*ton*)

(3) Maximum bollard pull used in the application of **(2)** above is to be clearly stated in the ship's stability information and drawings relating to ship's towing arrangements. Such maximum bollard pull is also to be indicated at an appropriate position on each of the ship's towing arrangements.

(4) In principle, ships are to be provided with an appropriate device being capable of releasing the towing cable in an instant. Notwithstanding the above, ships only engaged in coasting service or equivalent, such device may be dispensed with, provided that appropriate safety procedures for emergency are to be stated in the ship's stability information.

Fig. O4.2.1 Heeling Lever Curve Developed from the Bollard Pull Force

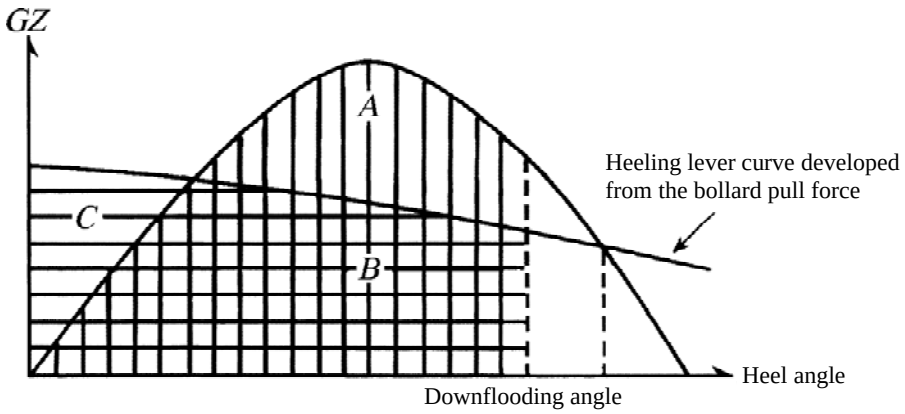


Table O4.2.1 Maximum Bollard Pull (*kN*)

	Towing ahead	Towing astern	
		For azimuth thruster(s)	For others
For propeller(s) not fitted with nozzles	0.16 *H*	0.14 *H*	0.08 *H*
For propeller(s) fitted with nozzles	0.19 *H*	0.17 *H*	0.10 *H*

H : Maximum continuous output of engine(s) (*kW*)

Note:

For ships other than conventional ships having propulsion(s) in the aft end, a special consideration is to be given for each ship.

O4.4 Hull Equipment

O4.4.2 Towing Equipment

The breaking strength of towlines is to be the maximum design towline force times at least 2.5.

O5 PUSHER TUGS

O5.1 General

Integrated pusher tugs are to comply with relevant requirements given in **Part O of the Rules** as pusher tugs integrated with barges in addition to complying with relevant requirements given in **Part O of the Rules** as pusher tugs.

O5.2 Stability

O5.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O6 FIRE FIGHTING VESSELS

O6.2 Stability

O6.2.1 General

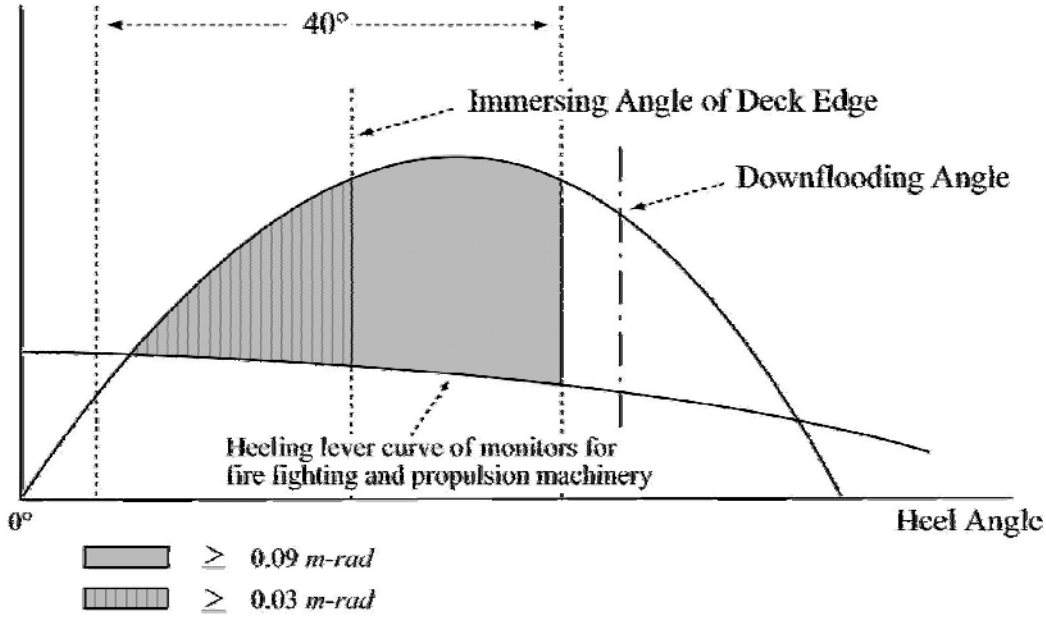
Fire fighting vessels are to comply with following requirements in addition to the requirements given in **2.2.1**, **Part U of the Rules**.

(1) Stability curves are to comply with the following **(a)** and **(b)**:

(a) The residual area between a righting lever curve and a heeling lever curve of monitors for fire fighting and propulsion machinery such as thrusters for ship positioning is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the angle up to an angle of heel of 40 *degrees* beyond the angle of the first intercept or the downflooding angle, whichever is less.

(b) The residual area between a righting lever curve and a heeling lever curve of monitors for fire fighting and propulsion machinery such as thrusters for ship positioning is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the downflooding angle or the immersing angle of the deck edge, whichever is less. In such cases, the immersing angle of the deck edge is to be according to **U2.3.1-1(2)**.

Fig. O6.2.1 Heeling Lever Curve of Monitors for Fire Fighting and Propulsion Machinery



O6.4 Hull Equipment

O6.4.2 Fire Fighting Equipment for Fighting Fires on Other Vessels

1 Fire fighting vessels are to comply with **O6.4.2** as either type specified in **Table O6.4.2**.

2 The fuel oil tanks of fire fighting vessels are to be capable of carrying sufficient fuel oil for fire fighting operations with all fixed water monitors in use at maximum and continuous propulsion operation during the operation time specified in **Table O6.4.2**.

3 Water monitors for fire fighting are to be according to following **(1)** to **(5)**:

(1) The range and height of trajectory of monitor jets are to be not less than those specified in **Table O6.4.2** with all fixed water monitors in use simultaneously.

(2) Water monitors are to be capable of adequate adjustment in the vertical and horizontal directions.

(3) Means are to be provided for preventing monitor jets from impinging on ship structure and equipment.

(4) Water monitors are to be capable of being operated and maneuvered both locally and at a remote-control station. The water monitor remote-control station is to have adequate overall operational visibility and protection.

(5) Control systems are to be suitably protected from external damage.

4 The pump capacity of water monitors is to be not less than that specified in **Table O6.4.2**.

5 Hoses and nozzles for fire fighting are to be according to following **(1)** to **(3)**:

(1) Each nozzle is to be capable of producing a jet and spray.

(2) Hoses are to be not less than 38*mm* or more than 65*mm* in diameter, and are to be at least 15*m* in length.

(3) A water jet flow of at least 12*m* is to be provided.

6 Fire-fighter's outfits are to be according to following **(1)** to **(3)**:

(1) Fire-fighter's outfits are to be according to **23.2.1**, **Part R of the Rules**.

(2) At least one set of fully charged spare air bottles is to be provided for each apparatus.
(3) Means for fully recharging free from contamination the air cylinders used for breathing apparatus in a time not exceeding 30 *minutes* are to be suitably located.

7 Searchlights are to be capable of providing effective horizontal and vertical ranges of coverage.

8 In cases where additional mobile high expansion foam monitors are provided according to **O1.2.4(5)**, each mobile high expansion foam monitor is to have a minimum capacity of 100m^3/*minute*. In addition, total foam forming liquid carried is to be capable of a least 30 *minutes* of foam production.

9 In cases where additional foam monitor systems for fire fighting are provided according to **O1.2.4(5)**, foam monitor systems are to be according to following **(1)** to **(3)**:

(1) Two fixed low expansion foam monitors are to be installed.
(2) The foam expansion ratio is not to be more than 15 to 1. In addition, the total foam forming liquid carried is to be capable of a least 30 *minutes* of foam production.
(3) A foam throw height of at least 50*m* above sea level with foam monitors in simultaneous use at maximum foam generation is to be provided.

Table O6.4.2 Minimum Requirements for Fire Fighting Vessels

	FFV1	FFV2			FFV3	
Total pump capacity （m^3/h）	2,400	7,200			9,600	
Number of pumps(1), (2)	1	2			2	
Number of water monitors	2	2	3	4	3	4
Discharge rate per monitor （m^3/h） (3)	1,200	3,600	2,400	1,800	3,200	2,400
Monitor range （*m*）	120	150			150	
Height of water jets of monitors （*m*） (4)	45	70			70	
Number of hose connections on each side of vessel	4	8			8	
Number of fire-fighter's outfits	4	8			8	
Fuel oil capacity （*hours*）	24	96			96	
Number of search lights	2	2			2	

Notes:

(1) Pumps used for extinguishing fires onboard a vessel may be used for fighting fires on other vessels.
(2) It is recommended that fire pump suction velocity generally not exceed 2*m/sec* and discharge piping to water monitors generally not exceed 4*m/sec* operational velocity in order to assure adequate system capacity.
(3) Provided that total discharge capacity of water monitors installed on FFV2 or FFV3 fire fighting vessels is equal to total pump capacity, the discharge rate per monitor may be less than that specified in the above Table. However, in all cases, the discharge rate per monitor of each monitor is to be more than 1,800m^3/h.
(4) The range of water jets is to be more than 70*m* from the nearest part of the fire fighting vessel. The height of water jets from sea level is to be at least that specified in the above table.

O6.5 Machinery

O6.5.5 Sea Inlets for Fire Fighting Operations

The "shut off valves" specified in **6.5.5-4** to **-6, Part O of the Rules** may be also used as sea valves.

O6.7 Fire Protection, Means of Escape and Fire Extinguishing Systems

O6.7.4 Water-spray Systems

Water-spray systems are to have a capacity of 10*l*/*minute*/m^2 for protected areas of uninsulated steel and 5*l*/*minute*/m^2 for protected areas which are insulated internally to *A*-60 standards.

O7 OFFSHORE SUPPLY VESSELS

O7.2 Stability

O7.2.1 General

1 With regard to intact stability, 2.4, Part B of *IMO Res. MSC.*267(85) "*International Code on Intact Stability 2008 (2008 IS Code)*" is to apply in addition to **Part U of the Rules**.

2 "Those ships specifically approved by the Society" refers to the offshore supply vessels complying with the requirements of *IMO Resolution MSC.*235(82).

3 For offshore supply vessels, the following requirements are to apply in cases where the requirements in **1.3.9, Annex U1.2.1 Guidance for Stability Information for Master** apply.

(1) The following conditions are to be included in the standard loading conditions in addition to those specified in **1.3.9-1, Annex U1.2.1 Guidance for Stability Information for Master.**

(a) The following **i)** to **iii)** full load departure conditions and full load arrival conditions:

i) The condition is to be as a ship with cargo distributed below deck and with cargo specified by position and weight on deck, corresponding to the worst service condition.

ii) If the ship has tanks for liquid cargo, the effective deadweight in the loading conditions therein described is to be distributed according to the following two assumptions: with cargo tanks full and with cargo tanks empty.

iii) In cases where pipes are carried on deck, a quantity of trapped water equal to a certain percentage of the net volume of the pipe deck cargo is to be assumed in and around the pipes. The net volume is to be taken as the internal volume of the pipes, plus the volume between the pipes. This percentage is to be:

1) 30 if the freeboard amidships is equal to or less than $0.015L_f$; and
2) 10 if the freeboard amidships is equal to or greater than $0.03L_f$.
3) For intermediate values of the freeboard amidships, the percentage may be obtained by linear interpolation.

However, if the effects of sheer aft, actual trim and area of operation are taken into account, these requirements may be waived.

(b) Ship in the worst anticipated operating condition

(2) A realistic stowage weight, the height of the cargo and its centre of gravity are to be stated in addition to the items specified in **1.3.9-2, Annex U1.2.1 Guidance for Stability Information for Master**.

O7.3 Hull Construction

O7.3.5 Superstructure and Deckhouses

The water head used for the calculation of the scantlings of structure end bulkheads and deckhouse boundary walls is not to be less than that obtained from **Table O7.3.5**.

Table O7.3.5

Exposed front bulkhead and wall of the first tier	8.0(m)
Side walls, aft bulkheads and aft walls	3.3(m)

O7.4 Hull Equipment

O7.4.2 Fenders

In cases where ships are fitted with fenders, such ships are to be according to the following **(1)** and **(2)**:

(1) Fender materials are to be not less than the steel required for Grade A materials.

(2) Carling plates are to be arranged between the side frames bearing the fender loads.

O7.4.3 Protection of Decks

The thickness of wooden sheathing is to be at least 50*mm*.

O7.4.4 Cargo Loading Equipment

The section moduli of cargo rails and stanchions are to be not less than that required by the following equation:

Stanchion: $7.8CbHSh$ cm^3

Cargo rail: $7.8CbHSh^2$ cm^3

C : 1.3 for stanchions, and 0.11 for cargo rails

b : breath of cargo deck, between cargo rails (m)

H : mean height of cargo (m)

S : spacing of cargo rail stanchion (m)

h : height of cargo rail (m)

O8 ANCHOR HANDLING VESSELS

O8.2 Stability

O8.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O8.4 Hull Equipment

O8.4.2 Protection of Decks

Cases “deemed appropriately by the Society” refer to those where the plate thickness is increased by 2.5*mm*.

O9 VESSELS ENGAGED IN LAYING OBJECTS ON THE SEABED

O9.2 Stability

O9.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O10 OIL RECOVERY VESSELS

O10.2 Stability

O10.2.1 General

Ships are to comply with the following requirements corresponding to their designated operations in addition to the requirements given in **2.2.1**, **Part U of the Rules**. However, in cases where other stability requirements deemed appropriate by the Society are in effect, this requirement may be dispensed with.

Stability curves are to comply with the following:

The residual area between a righting lever curve and a heeling lever curve due to designated operations is not to be less than 0.09*m-rad*. The area is to be determined between the first intercept of the two curves and the second intercept or the angle of down flooding, whichever is less.

O10.9 Fire Protection, Means of Escape and Fire Extinguishing Systems

O10.9.2 Ventilation Systems Installed in Hazardous Areas

In the requirements of **10.9.2(1)(b)**, **Part O of the Rules**, fans and casings are to comply with the requirements of **R4.5.4-1**.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 30 December 2011.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance may apply to ships for which the application is submitted to the Society before the effective date upon request by the owner.