

DNV STATUTORY INTERPRETATIONS

JULY 2010

DET NORSKE VERITAS

FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

Main changes

- Text duplicated from Rules Pt.1 Ch.1 Sec.1 A is replaced with references to that section.
- The chapters have been structured in the same ways as the international statutory instruments (conventions/codes) they interpret, to avoid confusion. However, for this edition, only some SOLAS chapters and underlying codes have DNV interpretations.
- The documentation requirements (DocReq) are presented introductorily in each chapter when relevant.
- Only the standalone DNV interpretations on international statutory instruments are retained. Hence the current IACS UIs are deleted.
- Generally amended with editorial improvements, corrections and clarifications of the statutory certification process.
- Update of ISM part due to revision of ISM Code
- Introduced 6 months entry into force regime.

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INTRODUCTION

1 General

1.1 Objective

1.1.1 This publication presents the Society's interpretations of international statutory instruments. Such interpretations may be on matters which are left to the satisfaction of the flag administration or are vaguely worded. Interpretations described in this publication, are given in those circumstances where IACS Unified Interpretations (UIs) or no other interpretations exist.

1.1.2 This publication covers only selected relevant topics and shall under no circumstances be taken as the Society's complete interpretations to international statutory instruments.

1.2 The Society

1.2.1 See Rules Pt.1 Ch.1 Sec.1 A.

1.3 Statutory Certification

1.3.1 The Society undertakes statutory certification on behalf of flag administrations when and to the extent the Society has been authorised to do so by the individual flag administration. Statutory certification includes inter alia approval, survey and the issuance of statutory certificates. See further Rules Pt.1 Ch.1 Sec.1 D.

1.3.2 When statutory certification is undertaken, the document requirements for approval and the survey requirements are based on IMO resolution A.997(25), Survey Guidelines under the Harmonized System of Survey and Certification, 2007, as amended, unless otherwise specified in this publication. The IMO guideline is also applied as applicable for the HSC Code and the MODU Code.

1.4 Definitions

1.4.1 See Rules Pt.1 Ch.1 Sec.1 A

2 Applicable Statutory Requirements

2.1 Application

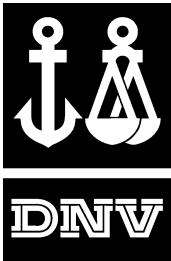
2.1.1 When the Society acts on behalf of a flag administration, the Society follows international statutory instruments, IACS Unified Interpretations and DNV Statutory Interpretations, and generally follows guidance issued by IMO in Circulars etc. unless the flag administration has instructed the Society otherwise.

2.2 IACS Unified Interpretations (IACS UIs)

2.2.1 An overview and the text of all IACS UIs are given on IACS homepage, <http://www.iacs.org.uk/> and in the IMO-Vega database that can be ordered through IMO or DNV.

2.3 Amendments and adoption

2.3.1 New and amended SI's shall be applied from 6 months after date of publishing, unless otherwise noted. Interpretations shall however only be applied for vessels where the relevant part of the convention or code is in force.



DNV STATUTORY INTERPRETATIONS

SOLAS INTERPRETATIONS

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SOLAS CH. II-1: CONSTRUCTION

General

For non-propelled vessels or cargo ships with a tonnage of less than 500 (length of less than 24 meters regarding load line), IACS Rec. No. 99 or national requirements may be applied for issuance of safety certificates. For such units, an MO will be issued identifying the standard applied.

Documentation Requirement

Documents for cargo ships of 500 gross tonnage and above when the government of the flag state has authorised the Society to issue the SOLAS safety construction certificate (CCC) on their behalf, shall be submitted for approval according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
External access by accommodation ladder - arrangement	Z030 – System arrangement plan	

SOLAS II-1/3-9 Means of Embarkation on and Disembarkation from Ships

MSC Circ.1331 shall be followed to obtain compliance with requirements in Regulation 3-9.

For Newbuildings – vessels constructed on or after 1 January 2010

DNV product certificate is required for gangways and accommodation ladder including its winch.

Small freeboard

Ships with small freeboard may be exempted from carrying gangways or accommodation ladders. Exemptions will from case to case be based on decision made the flag administration.

An accommodation ladder to be operable also during cargo operations in port.

I.e. for vessels (e.g. bulk carriers) that in its nature makes an accommodation ladder located midship (in cargo area) unavailable during cargo operations in port, there will also have to be an accommodation ladder mounted outside the cargo area (typically aft in the accommodation area).

In cases where the construction of the vessel (e.g. very short accommodation structure) makes this impractical, an acceptance of this must be obtained from the Flag Administration. Ref. Reg. II-1/3.9.1.

SOLAS CH. II-2: CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION, FSS CODE

General

For non-propelled vessels or cargo ships with a tonnage of less than 500, IACS Rec. No. 99 or national requirements may be applied for issuance of safety certificates. For such units, an MO will be issued identifying the standard applied

Documentation Requirement

Documents for cargo ships of less than 500 gross tonnage assigned main class and which are in line with IACS IG2 for ships with unrestricted service, shall be submitted for approval according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Structural fire protection plan	G060 – Structural fire protection drawing	— Details of fire insulation and specification of materials and doors — Application of fire rated divisions for all areas and spaces
Penetration details drawing	V060 – Penetration drawings	— Details of ventilation duct penetrations through fire divisions — Details of cable penetrations through fire divisions — Details of pipe penetrations through fire divisions
Fire main system drawing	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan	— Fire pumps — Arrangement and construction details of fire main and isolating valves — Number and positions of hydrants and hoses — Fire pump capacity calculations
Arrangement drawings for each fixed fire-extinguishing system (if relevant)	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan Z160 – operation manual	— Specification and location of all equipment — Reference to equipment certificates — Calculations for the quantity of the media used and the proposed rates of application — Release instructions — Control and monitoring system
Escape route plan	G120 – Escape route drawing	— Arrangement of escape routes including stairways, escape trunks and escape ladders
Fire control plan	G040 – Fire control plan	— Showing all fire safety measures onboard

For fire safety component and systems, the following shall be submitted for approval or review:

- copies of the DNV type approval certificates, or
- fire test reports for the constructions and equipment which shall be used onboard, or
- type approval certificate issued by flag state (including MED as applicable).

Documents for cargo ships of 500 gross tonnage and above assigned main class, shall be submitted for information according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Fire control plan	G040 – Fire control plan	— Showing all fire safety measures onboard

Documents for cargo ships of 500 gross tonnage and above when the government of the flag state has authorised the Society to issue the SOLAS safety equipment certificate (CEC) and SOLAS safety construction certificate (CCC) on their behalf, shall be submitted for approval according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Fire Control Plan	G040 – Fire control plan	— Equipment as described in SOLAS Ch.II-2/Reg.15.2.4

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Structural fire protection plan	G060 – Structural fire protection drawing	<ul style="list-style-type: none"> — Method of construction — Categories of spaces — Details of fire insulation and specification of materials and doors — Application of fire rated divisions for all areas and spaces — Draught stops
Ventilation system drawing	V010 – Ducting diagram (DD) V050 – Duct routing sketch	<ul style="list-style-type: none"> — Duct layout and construction details — Specification of fire insulated ducts — Position, dimension and details of fire dampers — Arrangement of means of control for closure of openings and stop of ventilation fans
Penetration details drawing	V060 – Penetration drawings	<ul style="list-style-type: none"> — Details of ventilation duct penetrations through fire divisions — Details of cable penetrations through fire divisions — Details of pipe penetrations through fire divisions
Escape route plan	G120 – Escape route drawing	<ul style="list-style-type: none"> — Arrangement of primary and secondary escape routes including stairways, escape trunks and escape ladders — Width of escape routes including doors — Inclination of stairways/ladders
Fire main system drawing	S010 – Piping diagram S030 – Capacity analysis Z030 – System arrangement plan	<ul style="list-style-type: none"> — Fire pumps including emergency fire pump — Arrangement and construction details of fire main and isolating valves — Number and positions of hydrants and hoses — Fire pump capacity calculations
Arrangement drawings for fixed fire-extinguishing system in machinery spaces	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan Z160 – Operation manual	<ul style="list-style-type: none"> — Specification and location of all equipment — Reference to equipment certificates — Calculations for the quantity of the media used and the proposed rates of application — Release instructions — Control and monitoring system
Arrangement drawings for fixed local-application fire-extinguishing system in machinery spaces	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan Z160 – Operation manual	<ul style="list-style-type: none"> — Reference to equipment certificates — Specification and location of all equipment — Calculations for the quantity of the media used and the proposed rates of application — Release instructions — Control and monitoring system
Arrangement drawings for fixed fire-extinguishing system in cargo spaces (if relevant)	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan Z160 – Operation manual	<ul style="list-style-type: none"> — Specification and location of all equipment — Reference to equipment certificates — Calculations for the quantity of the media used and the proposed rates of application — Release instructions — Control and monitoring system
Arrangement drawings for each fixed fire-extinguishing system in service spaces, accommodation spaces and other spaces (if relevant)	S010 – Piping diagram S030 – Capacity Z160 – Operation manual	<ul style="list-style-type: none"> — Specification and location of all equipment — Reference to equipment certificates — Calculations for the quantity of the media used and the proposed rates of application — Release instructions — Control and monitoring system
Arrangement drawings for automatic sprinkler, fire detection and fire alarm system (if relevant)	S010 – Piping diagram S030 – Capacity Z160 – Operation manual	<ul style="list-style-type: none"> — Sprinklers grouped into sections — Specification and location of, pumps, tanks, alarms and activators — Relevant information as specified for arrangement drawings for fixed fire detection and fire alarm system
Arrangement drawings for fixed fire detection and alarm systems	I200 – Control and monitoring system documentation Z030 – System arrangement plan	<ul style="list-style-type: none"> — Specification of control panel (central unit), indication units, detectors, alarm devices and manual call points — Location of equipment including cable routing and loops — Power supply arrangement — Details of smoke extraction system (where relevant)

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Arrangement plan for helicopter deck (as relevant)	S010 – Piping diagram S030 – Capacity Z030 – System arrangement plan	<ul style="list-style-type: none"> — Details of construction — Means of escape — Fire-fighting appliances — Drainage Facilities — Helicopter refuelling and hangar facilities

For constructions and equipment required by SOLAS to be tested in accordance with the Fire Test Procedure Code, the following applies:

- copies of the certificates of approval and fire test reports for the equipment that shall be used onboard, but which have not been approved by the Society or the government of the flag state, shall be submitted for approval.

SOLAS II-2/3 Definitions

Regulation 3.1

Induction cooking tops with power output up to 5 kW (called “induction heaters” in IMO MSC/Circ.1120, 3.1 sub item 1) are allowed used in pantries and dining rooms.

SOLAS II-2/5 Fire Growth Potential

Control of air supply and flammable liquid to the space

Regulation 5.2.1.2

This applies to all ventilation fans (circulation fans included).

Fire protection materials

Regulation 5.3.1

Concerning the use of asbestos, see Rules for Classification of Ships Pt.4 Ch.1 Sec.2 A200.

Neither combustible nor oil-absorbing materials shall be used as flooring, bulkhead lining, ceiling or deck in the engine control room, machinery spaces, shaft tunnel or rooms where oil tanks are located.

SOLAS II-2/6 Smoke Generation Potential and Toxicity

Paints, varnishes and other finishes, primary deck coverings

Regulation 6.2 and 5.3

The first footnote to the table on page 29 in MSC/Circ.1120 is explaining that the term “exposed surfaces” used in regulation II-2/5.3.2.4.1.1 to include the floor coverings. Thus, the requirement for low flame-spread in column (D) in the table will apply to the floor coverings in corridors and stairways and not to the floor coverings in cabins and public spaces.

The term “exposed interior surfaces” in regulation 6.2 is normally interpreted to have the same meaning as “exposed surfaces” mentioned above. However, since the footnote is not indicated for the requirement for smoke and toxic products in column (E) in the table, the smoke and toxicity test for floor coverings in cabins and public spaces are not required.

SOLAS II-2/7 Detection and Alarm

General requirements

Regulation 7.2

General requirements for control and monitoring, as given in the Rules for Classification of Ships Pt.4 Ch.9 apply, including documentation types to be submitted.

Requirements of the FSS Code Ch.9 Fixed fire detection and fire alarm systems

FSS Code Ch.9.2.1.1

When it is intended that a particular section or detector shall be temporarily switched off, this state shall be clearly indicated. Reactivation of the section or detector shall be performed automatically after a preset time.

FSS Code Ch.9.2.3.1

When fire detectors are provided with the means to adjust their sensitivity, necessary arrangements shall be ensured to fix and identify the set point.

SOLAS II-2/8 Control of Smoke Spread

Protection of control stations outside machinery spaces

Regulation 8.2

As equally effective means, in case of ventilators these shall be fitted with steel dampers which shall be easily closed within the control station in order to maintain the absence of smoke in the event of fire.

SOLAS II-2/9 Containment of Fire

Thermal and structural boundaries

Regulation 9.2.2.3.2.2

In addition to electrical distribution boards, PA/audio-racks/DVD-players and similar electronic equipment may also be located behind panels/lining within accommodation subject to the following:

- If located in an identifiable space having a deck area of less than 4 m², this space is to be categorized as (7) and be protected by smoke detectors and sprinklers. An identifiable space will normally be an enclosure which can be walked into, with equipment accessed from inside the space.
- If not located in an identifiable space but in an extended enclosure behind panels/lining, served from the panel side, this enclosure is to be protected by smoke detectors. This should be the typical situation for audio/video racks and distribution boards arranged in the open behind panels/lining.

Regulation 9.2.2.3.2.2

- (5) Storage of petrol (e.g. for marinas and water-scooter) is accepted on open decks.
- (8) Steam Rooms: If the amount of combustible materials exceeds what is specified in Ch.II-2, Reg. 5.3.2 the steam rooms to be treated as sauna with respect to fire protection.
- (9) steam power pack/systems less than 5kW less and located inside the steam room.
- (11) Cold Stores/refrigerated spaces shall have a temperature below +5°C.
- (13) steam power pack exceeding 5 kW
- (14) Class I and class II liquids according to NFPA Fire Protection Handbook, shall be considered as flammable liquids. Class I liquids have flash points below 100°F (37.8°C) and vapour pressures not exceeding 40 psia at 100°F (37.8°C). Class II liquids have flash points at or above 100°F (37.8°C) and below 140°F (60°C).
- (14) For not portable fuel tanks the requirements in Ch.II-2/18.7 of SOLAS shall be applied.

Table 9.2

It is not considered reasonable to apply the superscript “a” relaxation for the deck between two galleys. Therefore a C-class deck will not be accepted between two galleys. Either the deck shall be of class “A-30” according to Table 9.2 or the deck shall be (at least 30%) open to provide one galley space on two deck levels.

Regulation 9.2.3.3.2

- (1) Navigation equipment room (radio transmitter). Battery rooms. (Requirements for location of the emergency source of electrical power are further given in the Rules for Classification of Ships Pt.4 Ch.8 Sec.2 C.)
- (5) Provision chambers shall be treated as store rooms. Refrigerated provision chambers are considered as category (5) service spaces if thermally insulated with non-combustible materials.
- (7) Electrical equipment rooms (auto telephone exchange, air conditioning duct spaces).
- (10) Open deck are those spaces which have permanent openings towards open deck of not less than 30% of the area of the greatest length of the space or 10% of the area of all vertical sides, whichever is greatest.

The space shall be naturally ventilated by permanent openings, which may be part of the calculated openings above, to ensure that smoke are not accumulated.

1. When calculating 30% permanent openings against open deck the following procedure is to be used:

1.1. The greatest length of the room shall be considered as basis for calculating the required size of the opening(s), this is not necessarily a bulkhead adjacent to the open deck.

1.2. If the permanent opening(s) are not located in the bulkhead of greatest length, openings may be located in one of the shorter bulkheads. In addition, at least 20% of the required size of openings shall then be installed in the bulkhead opposite to the bulkhead where the main openings are installed, or in the side bulkheads. Openings located in the side bulkheads shall then be located such that they are closer to the opposite bulkhead than to the bulkhead where the main opening(s) are provided. Preferably the additional openings shall be located as close to the opposite bulkhead as possible.

1.3. Openings should be located as high in the bulkheads as possible.

1.4. In a room where only one of the shorter bulkheads are provided with permanent openings, and it is not

possible to install at least 20% of the required openings in opposite or side bulkheads as required above, the room can not be considered as open deck and have to be assigned a category other than 10.

Table 9.5

Footnote d):

A galley next to a provision room requires an “A-0” bulkhead.

Protection of openings in fire-resisting divisions

Regulation 9.4.1.2

Light fixtures inserted in class B-15 ceiling panels shall in general be made of metal. Plastic materials or other combustible materials are not accepted. In general, any opening shall be arranged to maintain the class B-15 integrity and insulation. This will imply that class B-15 “boxes” shall be made to cover any holes and openings for light fixtures. Smaller openings, e.g. for single spotlights with diameter of 80 mm or less, may be accepted without the B-15 box.

Regulation 9.4.2.4

Watertight doors in fire-resisting divisions shall be made of steel.

Protection of openings in machinery space boundaries

Regulation 9.5

Hatches giving access to the engine room for the transport of goods shall be weather-tight. Where remote control for closing of the hatch is not provided, a signboard to the effect that the hatch-cover shall be closed at all times, except during transfer of goods, shall be posted.

Ventilation systems

Regulation 9.7.1.2

The fire dampers should be easily accessible. Where they are placed behind ceilings or linings, these latter should be provided with an inspection door on which a plate reporting the identification number of the fire damper. Such plate and identification number should be placed also on any remote control required.

The indicator may be located behind panel. The indication should be “true indication”.

Regulation 9.7.1.2.2

The regulation should be practised with “or equivalent” at the end of the sentence. One equivalent solution is joining of 200/900 mm long steel sleeves of 3 mm thickness through “A” class divisions to Spiro ducts by means of inserting short linings/ nipples into each end of the steel sleeves onto which the Spiro ducts are drawn, and with the connection sealed with aluminium tape to make it air tight, shall be accepted by DNV as equivalent to tested ventilation duct penetrations if the Spiro ducts are adequately supported with solid clamps/hangers/ supports, which will ensure that the linings/nipples and Spiro ducts can not be dislocated.

Regulation 9.7.3.1.2

The fire damper remote controls should be easily accessible as well as prominently and permanently marked and should indicate whether the fire damper is open or closed.

Regulation 9.7.3.2

Thin steel ducts will be accepted without additional steel sleeve. If a steel sleeve is installed, the sleeve may be of thin steel sheet of thickness not less than 0.5 mm.

Regulation 9.7.5.1

The requirements applies to any exhaust duct serving open galley equipment from which grease can be expected to enter the exhaust, e.g. galley ranges, fryers, deep-fat cooking equipment. Non-greasy branches which are branched from the greasy exhaust should be provided with a fire damper. The duct part between the damper and the connection to the greasy duct shall have fixed means of extinguishing and construction and insulation according to Reg. 9.7.2.1.2.1 and 9.7.2.1.2.2.

Regulation 9.7.5.1.1

As there is no available IMO documentation which provide guidance to “alternative approved grease removal system” per today, the system will be evaluated on a case-by-case basis based on the manufacturers recommendations and specification e.g. UV filters and steam system.

SOLAS II-2/10 Fire Fighting

Water supply systems

Regulation 10.2.1.5.1

When calculating the number of hydrants, the length of the water jet shall be taken as maximum 7 m.

Regulation 10.2.1.6

Pressure at hydrant to include static pressure drop at highest hydrant and estimated dynamic pressure loss.

Regulation 10.2.2.3.2.2

Guidance note:

See Rules for Classification of Ships Pt.4 Ch.8 Sec.2 for requirements for cables to remain operable during a fire condition.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Portable fire extinguishers

Regulation 10.3.2.1

In vessels of less than 1000 gross tonnage, at least three portable fire extinguishers shall be provided.

Regulation 10.5

50 kg dry powder or 45 kg CO₂ is considered as equivalent to 135 l foam liquid.

25 kg dry powder or 20 kg CO₂ is considered as equivalent to 45 l foam liquid.

FSS Code Ch.4.3 Engineering specifications

The fire-extinguishing medium in the extinguishers shall be suitable for the potential fire hazards in the protected spaces.

Fixed fire-extinguishing systems

Regulation 10.4

On completion, the system shall be function tested. Detailed requirement for high pressure CO₂ systems and high--expansion foam system can be found in Sec.2 and Sec.3.

Regulation 10.4.1

- For specific interpretations and clarifications for fixed gas fire-extinguishing systems see Sec.2.
- For specific interpretations and clarifications for fixed high-expansion foam fire-extinguishing systems and equivalent systems (inside air foam) see Sec.3.

Fire-extinguishing arrangements in machinery spaces

Regulation 10.5.1.1

Oil fired machinery other than boilers, such as fired inert gas generators, incinerators and waste disposal units shall be considered the same as boilers which requires one of the total fixed fire-extinguishing system required by regulation 10.4.1.1.

Regulation 10.6.1

Small spaces with a floor area exceeding 2 m² shall be protected with a sprinkler head. Spaces smaller than 2 m² may be equipped with a smoke detector in lieu of a sprinkler head.

Sprinkler systems in Store room:

Maker's recommendations to be followed, in addition this applies: Sprinklers should preferably be located in aisles (walkway between shelves), then an air gap of about 100 mm between stored items and deck head is accepted. In case the sprinklers are located above shelves, there should be a 500 mm void below sprinklers (entire area) and this maximum storage height shall be properly marked on bulkheads. For hi-fog nozzles this distance is 300 mm.

Reg. 10.6.4.3

The deep fat fryer shall have permanent disconnection upon activation of the extinguishing system.

Fire-extinguishing arrangements in cargo spaces

Regulation 10.7

Cable reels in enclosed spaces (less than 10% openings in sides and ceiling) shall be provided with a fixed fire

extinguishing system. This can be a fire gas extinguishing system if the space can be sealed off in case of a fire or a water spray system designed with 10 litre/minute/m² of exposed cable reels area for spaces that are not reasonably gas tight. (Cable reels being handled or stored on open decks or spaces with more than 10% openings in sides and ceiling need not be provided with a fixed fire extinguishing systems.)

Regulation 10.7

Seismic cables containing liquid with flashpoint below 60°C shall be protected by a fixed fire extinguishing system covering the areas where they are stored and handled.

Guidance note:

A suitable fixed fire extinguishing system is a low expansion foam system with the following capacity:

- 3 litre/minute/m² of streamer deck area
- 10 litre/minute/m² of cable reels area.

Foam concentrate shall be provided for at least 20 minutes of foam generation.

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Fire-fighter's outfits

Regulation 10.10.3

Spare charges for breathing apparatus shall be stored in the same location as the breathing apparatus.

SOLAS II-2/12 Notification of Crew and Passengers

General requirements

Requirements for internal communication, as given in the Rules for Classification of Ships Pt.3 Ch.3 Sec.10 apply.

Reference is also given to Ch.III/6.4.2 and 6.5.

SOLAS II-2/13 Means of Escape

Means of escape from control stations, accommodation spaces and service spaces

Regulation.13.3.2

When a room is located inside another room and the escape is into this other room, we have a **room-in-room arrangement**. Such escape arrangements shall normally be avoided, but may be accepted for small rooms inside galleys (chef's office, bell-box), bedrooms in cabin suites, for casino offices, pantries etc. An additional fire alarm (room-in-room alarm) is to sound inside such isolated rooms upon fire detection in the room outside. A separate drawing should be made by the yard which clearly identifies all room-in-room arrangements.

Regulation.13.3.2

AC rooms are considered only temporarily employed. Hence, two escape ways are required if:

- 1) The room is more than 50 m².
- 2) The room span over two or more decks. At least one escape is required on each deck level.

Regulation.13.3.2

A minimum of two escape routes are required for public spaces and spaces normally manned if the area is 28 m² or more.

Regulation.13.3.2

Crew working spaces facing open decks which are not normally manned (e.g. AC rooms, deck stores, emergency generator room, lift machinery rooms and similar rooms at upper decks) are accepted to have primary escapes to open decks cat.(5).

Pantries and galleys shall normally have primary escapes directly to corridors and stairways. If part of a primary escape has to cross an open deck, this escape way shall be cat. (4), incl. emergency lighting and anti-slip, minimum width = 1800 mm.

Two escape routes as widely separated as possible to be required from all sun decks and passenger spaces on open decks.

Reg. 13.3.2.1.1

This regulation applies to WT (watertight) doors and SWT (semi watertight) doors below the bulkhead deck. This applies whether the doors are designed for more or less water pressure or are of a more or less heavy construction and includes doors above the bulkhead deck which can be partly submerged at intermediate stages of flooding.

SWT doors shall comply with the requirements to doors in WT bulkheads as detailed in UI SC156.

WT doors used above the bulkhead deck shall also comply with item 4 in MSC Circ.541.

Regulation 13.3.2.4

Designer doors (decorative doors):

- not to interfere physically with fire doors,
- hinged type designer doors are to swing open in escape direction and to have hinge system for staying open when swung to the bulkhead,
- sliding type designer doors with electrical door drive systems shall go to open position and stay in open position upon loss of power, el. fault condition and “close fire doors” status from bridge, if located in escape ways,
- sliding type designer doors with electrical door drive systems shall go to open or neutral (manual) position upon loss of power, el. fault condition and “close fire doors” status from bridge, if not located in escape ways.

The sliding doors from stairways to open deck should comply with the last item meaning that it shall be possible to open these doors manually if power is off.

Reg. 13.3.2.4.5

FSS Code Ch.13.2.3.1 “doorways and corridors...included in the means of escape shall be sized in the same manner as stairways” does not apply to cabin doors.

Regulation 13.3.3.1

Restricted space or group of spaces in the accommodation:

A Restricted space in the accommodation is understood as a normally employed space within an other space, e.g. a smoker's room at the back of a dining area. For such group of spaces minimum two escape routes are required, see figure 1. Equivalent arrangements will be considered.

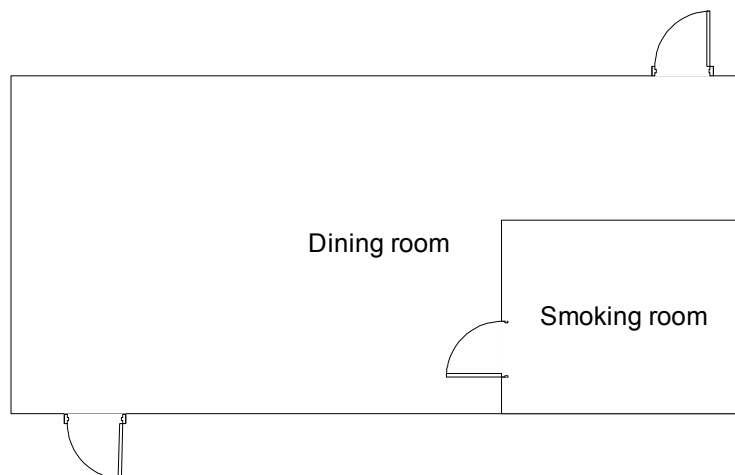


Figure 1
Minimum two escape routes required

Storage spaces and similar spaces entered only occasionally are in this context not considered to be normally employed. For such group of spaces minimum one escape route is required, see figure 2.

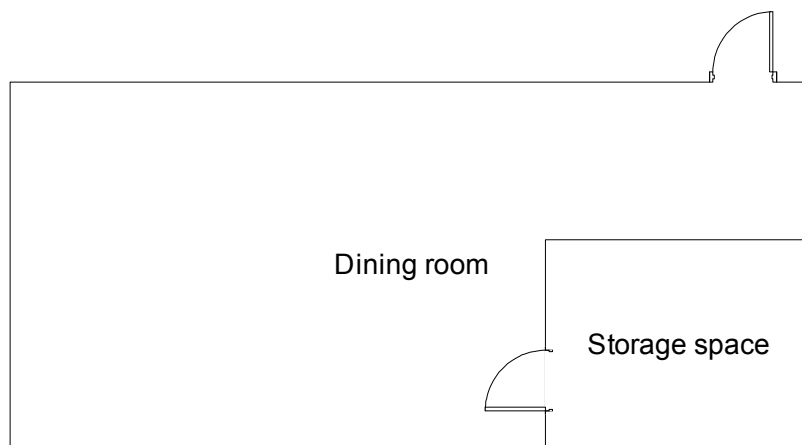


Figure 2
Minimum one escape route required

Cabins consisting of more than one space need also not be provided with more than one escape route.

Regulation 13.3.3.2

The term “lowest open deck” shall be understood as the lowest fire category 10 area (regulation 9.2.3.3.2). This applies regardless of position of accommodation and position of this open deck (forward / aft). Areas of open deck of insignificant area (mooring stations, etc.) can be disregarded.

Regulation 13.3.3.3 and.4

For spaces above the lowest open deck, DNV may on a case by case basis accept trunk or ladders to deck above as means of escape from corridors that otherwise would be considered dead end corridors. This is, however, only accepted if two other means of escape according to Regulation 13.3.3.3 is arranged from one end of such corridor. A window is however not accepted in this regard.

Regulation 13.3.3.4

A dead end corridor is defined as a corridor or part of a corridor from which there is only one escape route.

Means of escape from machinery spaces

Regulation 13.4.2.1

Two means of escape is only required from the lowest part of the engine room, not from each level.

Guidance note:

Where the lower part of the engine room is a space with a height lower than 2.3 m (standard deck height for $L > 125$), the two means of escape may apply to the first deck with standard deck height. The two means of escape do not apply to spaces below the machinery floor plating, regardless of height.

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Regulation 13.4.2.1.2

If the escape route in the lower part of the space is provided with doors and stairs of adequate size throughout the route, the route will normally be regarded as sufficient. However when the escape route depends on one or more hatches to reach the open deck, one of these hatches will have to comply with the minimum internal dimensions of at least 800 mm × 800 mm that would apply to the trunk/hatch solution that can be accepted in 13.4.2.1.1. Emergency lighting provisions in accordance with SOLAS Ch. II-1 Reg. 43 to be provided along the escape routes.

Regulation 13.4.2.3

For machinery spaces other than those of category A, a single escape route can be accepted if the space is entered only occasionally or if the travel distance from main working and operating positions to door is 5 meters or less.

Emergency Escape Breathing Devices (EEBD)

Regulation 13.4.2

The minimum number of EEBDs shall be kept within accommodation-

— dining room

- smoking room
- storage space.

Spaces shall be as follows:

- for cargo ships: two (2) EEBDs and one (1) spare EEBD;
- for passenger ships carrying not more than 36 passengers:
 two (2) EEBDs for each main vertical zone, except those defined in the regulation 13.3.4.5, and a total of two (2) spare EEBDs; and
- for passenger ships carrying more than 36 passengers:
 four (4) EEBDs for each main vertical zone, except those defined in the regulation 13.3.4.5, and a total of two (2) spare EEBDs.

Regulation 13.4.3

- 1) This interpretation applies to machinery spaces where crew are normally employed or may be present on a routine basis.
- 2) In machinery spaces for category A containing internal combustion machinery used for main propulsion, EEBDs shall be positioned as follows:
 - one (1) EEBD in the engine control room, if located within the machinery space;
 - one (1) EEBD in workshop areas if not arranged with a direct access to an escape way; and
 - one (1) EEBD on each deck or platform level near the escape ladder constituting the second means of escape from the machinery space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).

Alternatively, different number or location may be determined by the Society taking into consideration the layout and dimensions or the normal manning of the space.

- 3) For machinery spaces of category A other than those containing internal combustion machinery used for main propulsion, one (1) EEBD shall, as a minimum, be provided on each deck or platform level near the escape ladder constituting the second means of escape from the space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).
- 4) For other machinery spaces, the number and location of EEBDs are to be determined by the Society.

Regulation 13.4.2.3

Some of the 4 EEBDs within each main fire zone are accepted to be fitted in service spaces within accommodation.

Means of escape from ro-ro spaces

Regulation 13.6

The fore and aft end of the ro-ro space is considered as the area being within the distance equal to the breadth (b) of the cargo space from the most forward and aftermost point of the cargo space, see figure 3.

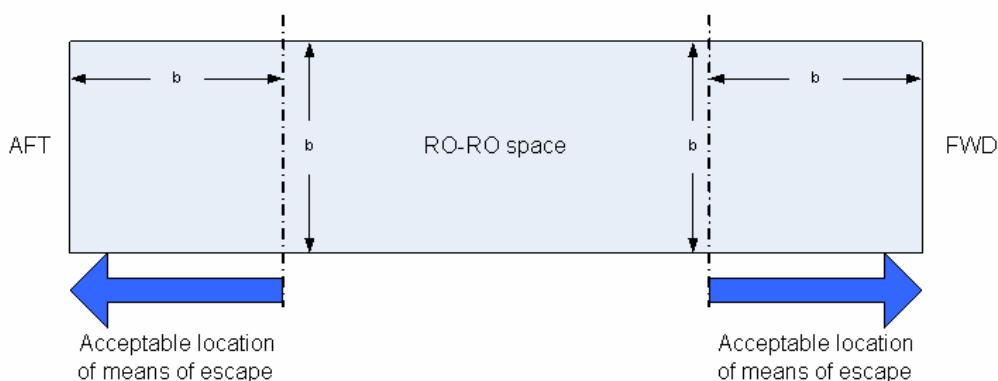


Figure 3
Fore and aft end of ro-ro space

SOLAS II-2/15 Instructions, Onboard Training and Drills

Fire Control Plan

Regulation 15.2.4.2

For Passenger Ships, an approved copy of the Fire Control Plan shall be available onboard the ship at all times.

SOLAS II-2/18 Helicopter Facilities

Structure

Regulation 18.3.2.1 and 2

The additional requirements in regulation 18.3.2.1 and 2 will only apply if the aluminium “is not made equivalent to steel”. There is no available IMO document which provides guidance on how a helideck in aluminium can be documented to be equivalent to a helideck in steel. DNV has in previous cases given the following opinions:

- the definition of “steel or other equivalent material” in regulation 3.43 is not applicable for a helideck which is elevated above the ship structure.

Guidance note:

If accepted by the flag administration, an un-insulated aluminium helicopter deck may be considered as equivalent to steel if the deck construction is tested for a pool fire for at least 10 minutes.

The deck shall during the test show no signs of leakage of fuel and the structure shall be maintained without any deformations.

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Fire-fighting appliances

Regulation 18.5.1.3

In addition to the pop-up spray system, a portable foam applicator shall be provided for flexibility in fire fighting operations. This may apply one of the hydrants / hoses required by Reg. 18.5.5. The portable foam applicator shall comply with IMO FSS Code Ch.4.3.2 (1.5 m³ foam / minute) or with Ch.4.3.2 as amended (200 l premix / minute).

Helicopter refuelling and hangar facilities

Regulation 18.7.11

Where a water spray system is installed as the fire-extinguishing system in a hangar, the arrangement shall be in accordance with the Rules for Classification of Ships Pt.6 Ch.1 Sec.2 G300.

A section of fire detectors covering a helicopter hangar, shall not include fire detectors or manual call points covering machinery spaces of category A.

SOLAS II-2/19 Carriage of Dangerous Goods

General

Requirements are included in the Rules for Classification of Ships Pt.5 Ch.11.

SOLAS II-2/20 Protection of Vehicle, Special Category and Ro-Ro Spaces

Precaution against ignition of flammable vapours in closed vehicle spaces, closed ro-ro spaces and special category spaces

Regulation 20.3.2

All electrical circuits terminating in the cargo holds, that are not of certified safe type suitable for zone 1, shall be provided with multipole linked isolating switches situated outside the cargo holds, and accessible only to authorized personnel. Provision shall be made for isolation, and for locking in the off position, of the means of control of such circuits. Emergency consumers are not allowed to be disconnected.

If electrical circuits of the gas detection system are located in the cargo hold, the system shall be of the certified

safe type (see Ch.8).

“No smoking” notices shall be posted in way of all accesses to these compartments.

SOLAS II-2/21 Casualty Threshold, Safe Return to Port and Safe Areas

Introduction

Resolution MSC 216(82) amendments to SOLAS Ch. II-2/21 is applicable to passenger ships with keel laid on or after 1 July 2010 having length, as defined in regulation II-1/2.5, of 120 m or more or having three or more main vertical zones.

A draft “Explanatory notes for the application of the safe return to port requirements” (IMO FP53/18/1 Annex, Appendix “Interpretations for application on passenger ships”) is developed in the light of the experience gained so far. This is given in S200 to S2500 and will be the basis for the Society's work when acting on behalf of a flag administration.

Application

Regulation 21.1

All main vertical zones in the ship should be counted, irrespective of whether they contain accommodation spaces or not.

Horizontal fire zones (special category and ro-ro spaces) should not be included in the count.

Spaces at the extremities of the ship that do not contain any equipment or systems other than bilge pumps, piping and flooding detection devices, may not be considered as main vertical zones for the purpose of this regulation.

Where the main fire compartmentation of a vessel has been approved following the methodology of SOLAS Ch II-2, Reg. 17 (Alternative design and arrangements) the effect on the return to port capability of the vessel should be explicitly included in the analysis. Special attention is to be given to the determination and assignment of Safe Areas.

Purpose

Regulation 21.2

These rules provide design criteria. The decision on whether or not to evacuate the ship remains with the Master. In actual situations the Master may well decide based on the actual appraisal of the situation that it is safer to evacuate for accidents that are below the casualty threshold or to remain on board for accidents that are above it.

Casualty threshold

Regulation 21.3

“A” class boundaries refers to both bulkheads and decks.

The rating of “A” class boundaries does not affect the application of this regulation.

Spaces extending vertically for more than one deck, such as stairwells, lift trunks and atriums, should be considered as single spaces and lost in their entirety unless they are subdivided by continuous “A” class divisions.

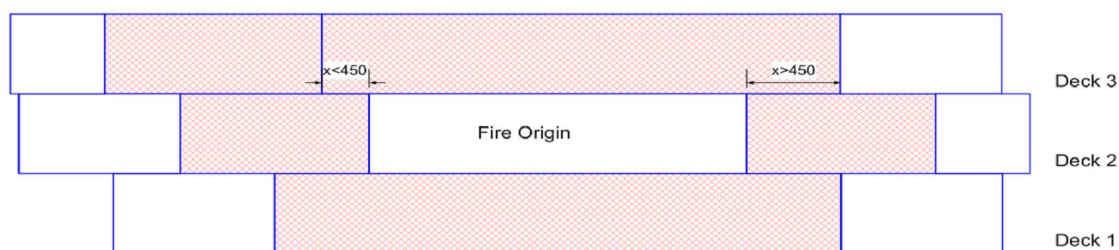
Although in special category and ro-ro spaces, casualties extending for more than the length of one main vertical zone can be considered exceeding the casualty threshold, the location of essential systems, or any of their components in such spaces, has to be specially examined as to ensure that a casualty within such spaces would not compromise the operation of the essential systems in the remaining fire zones of the ship.

Where a space is not protected by a fixed fire extinguishing system the “nearest “A” class boundaries, which are not part of the space of origin”,

- a) may be in a different main vertical zone, in which case safe area(s) for all people on board must be provided outside those two zones, and
- b) have to be at a distance of at least 450 mm from the boundaries of the space of origin in the horizontal and/or vertical direction,
- c) should include spaces one deck upwards and downwards.

In the event of a T- junction, see sketch below. If the overlap of spaces above or to the side is less than 450 mm

then the fire will affect further compartments.



Spaces in which the risk of fire originating is negligible shall not be considered as spaces of origin of a fire.

However, these spaces may be affected by a fire when they are part of the extended boundaries of a space of origin not protected by a fixed fire-extinguishing system.

Examples of such spaces include, but may not be limited to:

- a) spaces with restricted accessibility for inspection and/or maintenance only, such as:
 - i) void spaces,
 - ii) trunks only containing pipes for liquids other than flammable ones, and
 - iii) cofferdams.
- b) tanks
- c) chain lockers
- d) cable trunks only containing electrical cables and closed on all boundaries
- e) ventilation trunks except if containing galley range exhaust and laundry exhaust ducts, or any other duct presenting a fire hazard
- f) cross flooding arrangements
- g) vertical escape trunks from machinery spaces, service spaces, control stations and other crew accommodation spaces
- h) walk-in safes
- i) CO₂ storage rooms.
Storage rooms for other gases will be considered on a case by case basis
- j) busbars enclosed in “A” class divisions
- k) A-0 enclosures within spaces of Category 1, 2 or 4 only containing isolation valves or section valves forming part of the sprinkler or equivalent systems and protected by a water nozzle, and
- l) shaft tunnels with no fire load other than paint.

When stairways, corridors with “A” class boundaries or any other space which is used to access another space is lost following a fire casualty, any space accessible through the lost space without a second means of access is considered unavailable but undamaged, hence all equipment and systems located within that space are not to be considered accessible. Piping, cabling, transformers, junction boxes etc. are unaffected.

For passenger ships carrying less than 36 passengers the space of origin is any space bounded by “A” class bulkheads, steel equivalent decks or the external shell of hull and superstructures. Where the deck between two spaces is constructed of steel or equivalent material, it shall be considered to form part of the “A” class boundary provided all penetrations are fire-tight.

In the context of a flooding casualty, progressive flooding through unprotected openings and pipes should be considered.

Safe return to port

Regulation 21.4

Wet steel pipes carrying water based liquids and passing through and not serving spaces affected by a fire casualty are considered to remain operational, provided they are of substantial thickness (ref. ICLL 66 Reg. 22(3) as interpreted by IACS UI LL36/Rev.1 paragraph (b)) or insulated to class A-60 and fully welded.

If provided with fittings, they are to be tested according to IACS UR P2.11.5.5.6 fire test.

All pipes and vent ducts passing through and not serving a compartment affected by a flooding casualty are considered to remain operational provided they, together with relevant fittings, are capable of withstanding the

head of water expected at their location.

Electrical Cables are considered to continue to work in a space affected by a flooding casualty provided the end of the cables are located outside the flooded compartment or any connections, joints and devices have a degree of protection IPX8 (head of water expected at their location for a period not inferior to that estimated for the safe return to port).

Fire resistant cables complying with IEC 60331-21, IEC 60331-31 or EN 50200 passing through and not serving spaces are considered operational after a fire casualty, provided they have no connections, joints or equipment connected to them within the space affected by the casualty.

Installation of these cables should be made to support their survival in a fire casualty and during its fire fighting.

An electrical balance should be submitted for each of the following return to port scenarios:

- a) Minimum electrical generating capacity available.
- b) Any other scenario of reduced power that would cause any essential system to run at reduced capacity due to lack of electrical generating capacity.

In connection with the above:

- a) All essential systems and their auxiliaries and systems needed to support safe areas should be included with a utilisation factor of 1.
- b) HVAC systems shall be specially considered.

An emergency generator can be used to support Return to Port function, as long as its ability to provide other required emergency services is not impaired.

Propulsion

Regulation 21.4.1

For the fire casualty, the ship should be able to maintain a speed of min 6 knots while heading into Beaufort 8 weather and sea conditions.

Evidence of compliance with the a.m. conditions has to be provided, e.g. by model tank tests in sea keeping conditions including consideration of wind forces.

Configuration for power generation and propulsion in the worst scenario is to be verified during normal sea trials.

A steel shaft line passing through a space affected by a flooding or fire casualty, may be considered operational if it is enclosed in a protected tunnel or alternatively if:

- a) in the flooding case it can be shown that it can operate under water, and
- b) in the fire case it is protected by a dedicated water based fire extinguishing system. A shaft line passing through a Category A machinery space is not to be considered operational.

Particular attention is to be given to the bearings and seals to avoid progressive flooding.

Manual control at local positions can be accepted, provided adequate communication is arranged and it is demonstrated that the loss of any control and monitoring system does not prevent or impair any such manual/local control of the propulsion and electrical power generation systems. Consideration should be given to the provision of machinery alarms when operating in that manner.

Steering systems and steering control systems

Regulation 21.4.2

When documenting that steering system is operable the following should be taken into consideration:

- a) local control of remaining steering system is acceptable
- b) emergency means of steering, e.g. by azimuth thrusters, pump jets or rudder propellers, may be considered
- c) tunnel thrusters are not considered adequate for emergency steering.

Navigational systems

Regulation 21.4.3

In case of fire casualty affecting the navigating bridge, the following navigation equipment (portable or fixed) should be available in another location:

- a) barograph, hand wind-speed meter, and suitable devices to receive weather forecast maps
- b) compass (magnetic or gyro) and bearing repeater

- c) nautical charts and publications or ECDIS
- d) receiver for a global navigation satellite system (e.g. GPS)
- e) rudder, propeller thrust and pitch indicators (or means of communication)
- f) 9 GHz Radar
- g) automatic identification system (AIS)
- h) (optional: Echo Sounding Device)
- i) (optional: International Code of Signals and Signal flags).

The following equipment should remain operational:

- a) whistle
- b) navigation lights
- c) daylight signal lamp.

Means of portable or fixed internal communication should be available.

Systems for fill, transfer and service of fuel oil

Regulation 21.4.4

Systems for fill, transfer and service of

- a) fuel oil,
- b) other flammable hydrocarbons, or
- c) any fluid that may be flammable or dangerous if heated to a very high temperature,

are not to be considered operational within spaces affected by a fire casualty.

Internal communication

Regulation 21.4.5

Portable equipment may be accepted provided that repeater system remains operational after the casualty and charging capability is available in more than one main vertical zone.

Public address systems, arranged as general alarm systems, should remain operational in the main vertical zones not affected by the casualty.

External communication

Regulation 21.4.6

Portable equipment may be accepted. Charging capability for any portable devices shall be available in more than one main vertical zone.

Fire main

Regulation 21.4.7

Manual start of remaining fire pumps after a casualty is accepted.

The system is to be so arranged that the requirement to reach any part of the ship with at least two jets of water not emanating from the same hydrant, is fulfilled in all areas of the ship not affected by the casualty. To obtain compliance with this requirement, two lengths of hoses may be accepted, served from hydrants in the adjacent main vertical zone.

Fixed fire-extinguishing systems

Regulation 21.4.8

When carbon dioxide system is the sole fixed fire extinguishing system, there should be two CO₂ rooms each holding a quantity capable of protecting the largest space. In case there is only one room containing all the CO₂ bottles, there should be enough capacity to protect the largest and the second largest space.

Sprinkler or equivalent fixed fire-extinguishing systems are accepted to be lost only in spaces directly affected by the fire casualty and in other spaces that are protected by the same section, i.e. are controlled by the same section valve, provided each section should not serve more than one deck area in one main vertical zone.

Section valves located within the space affected by the fire casualty are considered to be not operational unless they are suitably fire rated or fire protected, e.g. contained within a solely dedicated and adequately protected locker enclosed by "A" class boundaries.

Means should be provided to prevent uncontrolled leaks in case of loss of any pump or pump unit. In case of loss of one pump or pump unit as a result of a fire or flooding casualty in one space all sections should be provided with the total required flow and pressure for each section.

Water mist systems intended for total flooding protection of machinery spaces should be so designed that in case of loss of any section valve it would still be possible to supply the entire system at the required performance, except where another fixed fire extinguishing system is provided for the protection of such spaces. Duplication of valves, fire protection of valves or use of fire rated valves may be considered.

Indication of activated sections in the continuously manned central control station for sprinkler or equivalent fixed fire extinguishing systems, located outside the main vertical zone where the space affected by the casualty is located, should continue to function after a fire or flooding casualty.

Manual non-monitored valves in sprinkler or equivalent fixed fire extinguishing systems and systems for the total flooding protection of machinery spaces, are acceptable for emergency operation and should normally be closed and locked. Such valves need not be provided with indication in the continuously manned central control station provided that they are accessible and clearly marked.

Normally open valves may be installed in a limited number, if these valves are required to be closed for the operation following a casualty. These valves need to be provided with indication at the continuously manned control station.

When sprinkler or equivalent fixed fire extinguishing systems include additional emergency feed, risers, connections or other emergency means to comply with this regulation, the hydraulic calculations should be revised to take this into account.

For sprinkler or equivalent fixed fire extinguishing systems, the sea water supply should be arranged in a way that it cannot be lost as a result of the same casualty involving the pump or pump unit.

Local application systems are not required to remain operational following a casualty, unless they form part of a total flooding system for the protection of machinery spaces.

Fire and smoke detection systems

Regulation 21.4.9

Fire and smoke detection systems are accepted to be lost only in spaces directly affected by the fire casualty and in other spaces on the same deck that are part of the same section, provided all other detectors remain operational on any other decks served by that section.

Bilge and ballast systems

Regulation 21.4.10

The ballast pumping system and all associated equipment for its operation should be operational in spaces served by the system and not directly affected by the casualty.

Electrical power for bilge and ballast pumps should be available in case of a casualty.

Manual control at local positions may be accepted provided adequate communication is arranged.

Power-operated watertight and semi-watertight doors

Regulation 21.4.11

Open/closed indication should remain operational, except for doors in the boundary of spaces directly affected by a fire casualty.

Flooding detection

Regulation 21.4.13

Flooding detection systems are accepted to be lost only in spaces directly affected by the fire casualty and in other spaces in the same compartment that are part of the same system section provided all other detectors remain operational in any other compartment served by that system section.

Safe areas, functional requirements

Regulation 21.5.1.1

Safe areas could be a number of spaces distributed on board and should preferably be arranged in accommodation spaces. Sizing of safe areas where passengers are accommodated could be based on the time needed for safe return to port operation. For safe return to port operations longer than 12 hours a minimum space of 2 m² per passenger should be provided.

The selection of safe areas may be based on scenarios and environmental conditions. In such cases, additional information should be provided for assessment and on board.

Means of access from safe areas to life saving appliances should be provided, either externally or via internal routes which should remain available within the main vertical zone where the casualty has occurred.

For each of the basic services it should be identified which damage scenarios within the fire casualty threshold would affect the service and what measures to be taken.

Safe areas, sanitation

Regulation 21.5.1.2.1

A minimum of one toilet per 50 persons or fraction should remain operational. Grey and black water is accepted to be disposed into the sea.

Safe areas, water

Regulation 21.5.1.2.2

A minimum of 3 litres per person per day drinking water should be available. Additional water for food preparation and hygiene may need to be provided.

Safe areas, food

Regulation 21.5.1.2.3

Dry food is accepted. Storage of food should be distributed to provide access from safe areas. Depending on the choice of food, facilities and resources for preparation of food should be considered.

Safe areas, alternate space for medical care

Regulation 21.5.1.2.4

In addition to the ship's hospital or medical centre one or more locations on the ship should be provided which are to:

- a) be in a different main vertical zone
- b) be easily accessible
- c) have lighting and power supply from the emergency system.

Safe areas, means of preventing heat stress and hypothermia

Regulation 21.5.1.2.6

Heat stress and hypothermia should take into account external weather conditions, which may depend on area(s) of operation of the vessel. Casualty scenarios within the threshold for which there is a reduction in air-conditioning or heating capacity, should be identified and consequences assessed.

Safe areas, light

Regulation 21.5.1.2.7

Battery operated lighting may be acceptable.

Safe areas, ventilation

Regulation 21.5.1.2.8

Ventilation volume should be available as a minimum of 4.5 m³/hour and person.

FSS Code Ch.5 Fixed Gas Fire-extinguishing Systems

General requirements for all Gas Fire-extinguishing Systems

FSS Code Ch. 5.2.1.1.3

Arrangement of bottles shall be such as to provide access for the necessary checking of fire-extinguishing medium in the containers.

FSS Code Ch. 5.2.1.1.4

Unless otherwise specified, the maximum ambient temperature shall be understood as 55°C. Certification of the bottles shall be carried out according to Rules for Classification of Ships Pt.4 Ch.7 Sec.1 D as for CO₂ bottles.

FSS Code Ch. 5.2.1.3.2

For CO₂ systems, an automatic time delay unit for the release of the extinguishing medium shall be fitted. The

time delay unit shall be equipped with an override and signboard describing emergency bypass operating instructions. In the case of an electric time delay, a dedicated battery (UPS) may be accepted as an alternative to the override function.

Equivalent gas systems (systems designed according to IMO MSC/Circ.848) need not be provided with a time delay unit, when the protected space has a gas concentration being below the defined LOAEL level of the agent in question (for this purpose 52% can be applied for inert gas systems).

IMO Code on Alarms and Indicators

The alarm shall be both audible and visual and shall be so located as to be audible and visual throughout the protected space with any machinery operating. The audible alarm should be distinguished from other alarms by adjustment of sound pressure or sound patterns. The visual alarm shall be red as per ISO 2412. Cargo handling spaces (cargo pump room and gas compressor rooms) need not to be fitted with visual alarm.

Any alarm components installed inside cargo pump room, cargo compressor rooms, paint lockers, battery room (as applicable) and similar gas hazardous spaces shall be certified safe according to the hazardous area classification in question.

Alarms shall be pneumatically or electrically operated. If electrically operated, the alarm shall be supplied with power from the main and emergency source of electrical power. If pneumatically operated the alarm shall not be driven by CO₂ (nor any other agent used as fire extinguishing media). The pneumatic source shall be available even with a fire in any protected space. Any stop valve fitted in the air supply line shall be sealed in open position.

The requirement for the release controls applies also in the case where the CO₂ room is installed aft of cargo area and accommodation is provided forward of cargo area.

Warning signs shall be provided outside each entrance to all spaces protected with a gas fire extinguishing system.

FSS Code Ch.5.2.2.1

Protected spaces can be divided into sections when such spaces are divided by divisions of A0 class and when the spaces have independent or adequately separated ventilation systems. Spaces without such divisions and separation shall for the purpose of determining quantity of extinguishing agent be considered as one section.

Regulation 10.4.3/FSS Code Ch.5.2

Small local systems, like for instance extinguishing systems for galley exhaust ducts, small switchboard rooms and paint lockers can be exempted from some of the requirements pertaining to fire extinguishing gas systems. Systems are in this context considered as small local systems if the total amount of agent is limited (this may for instance be one small CO₂ cylinder for a standard galley or six 45 kg CO₂ cylinders inside a large engine room) and there is in general a short distance between area where the agent is stored, position of release controls and entry to the protected space.

Small local systems can be stored in position that does not comply with regulation 10.4.3 when the amount of gas is small compared to the volume of the storage space. The case where the gas due to an accident is released into the space where it is stored shall be calculated and the gas concentration should in general not exceed 8% CO₂ or the NOAEL specification for the gas in question. Calculations are not required for cabinets located on open deck. The space shall be provided with mechanical ventilation if located inside accommodation while natural ventilation is accepted where the storage space has direct entrance from open deck. Storage inside corridors and staircases shall be avoided.

Time delays are not required for small local systems. The requirement for discharge alarm and two release controls can be waived for small local systems when the system is covering spaces that are normally unmanned (stores, etc.) and when the release control is located immediately outside the entrance to the protected space. Discharge alarm and two release controls are in any case not required for concealed spaces (ventilation ducts, scavenge belt, etc.)

Piping through accommodation and service spaces will be considered in each case for small local systems (see FSS Code Ch.5.2.1.3).

Special considerations will be made for systems not required to be fitted by the regulations.

Pipes serving gas hazardous spaces such as cargo pump room or cargo compressor rooms can be routed through other enclosed spaces (machinery spaces, etc.) if the pipes inside the enclosed spaces are:

- connected with full penetration butt welds (flanges or threaded connections are not accepted for this part)
- the pipe penetration(s) into the gas hazardous space is welded from both sides
- the pipes inside the enclosed spaces are tightness tested at approximately 7 bar. Flanges shall be provided outside the enclosed space(s) at locations suitable for testing

For pipes routed through gas hazardous spaces without serving these, the number of couplings shall be limited

and the piping shall be tightness tested.

General requirements for CO₂ Fire-Extinguishing Systems

FSS Code Ch. 5.2.2

Calculations according to a recognised standard (NFPA 12, 2005 edition, ISO 6183, 1990 edition or equivalent) shall be performed.

Opening of the valves to the pilot cylinders is not regarded as one separate control. There shall be a release box for each protected space in which personnel normally work or to which they have access. The space served shall be identified at the release box. These requirements apply for all CO₂-systems.

The pilot cylinders shall have capacity to operate the system three times even under unfavourable temperature conditions.

The number of nozzles shall be sufficient to provide an even distribution of CO₂ gas throughout the space.

In cases where the CO₂ room is readily accessible, one release station may be acceptable. One section valve ("control valves" as per FSS Code) for each of the protected spaces shall be fitted to the piping system of the total flooding system. The operation of those valves shall be controlled from the position where the CO₂ system is released.

This shall be arranged, if possible, by interlocking devices on the control handles, so that any fault in the sequence of operation does not prevent the release of CO₂ gas. The section valve shall be manually operable even with maximum CO₂ pressure acting on it.

The CO₂ bottle valves shall be of a type which makes it possible to close the bottles after testing the release system without emptying the CO₂ content.

Bottles shall not contain more than 45 kg of CO₂ and the ratio of charge shall not exceed 0.67 kg/litre. The company charging the bottles shall issue a certificate for the ratio of charge. Bottles of sizes up to 53.3 kg (80 litre) may be approved case by case based on satisfactory handling arrangements. All bottles shall be of the same size. Each CO₂ bottle shall be delivered with DNV product certificate according to Rules for Classification of Ships Pt.4 Ch.7 Sec.1.

The connection between the bottle-valve and the manifold for the CO₂ battery is normally to be flexible high pressure hose of approved type. Other types of connections which are considered equivalent (stainless steel tubes) may be accepted.

Non-return valves shall be fitted between the separate bottles and the manifold, in order that a bottle, if necessary, can be disconnected from the battery without putting the whole installation out of action. The non-return valve shall be fitted to the manifold. If the non-return valve is fitted in the upper portion of the bottle valve, a notice shall be posted, which clearly to the manifold, even if the appropriate bottle has been temporarily removed.

The CO₂ manifold (piping connecting the CO₂ cylinders to the section valves) shall be made of steel, or equivalent material, with the wall thickness of which shall be at least as given in Table C1. The CO₂ manifold shall comply with the requirements specified in Rules for Classification of Ships Pt.2 Ch.1 or other recognised standard (DIN 2448, ISO 9329 part 1 and 2, ISO 9330 part 1 and 2), and shall be certified by the Society.

In piping sections where valve arrangements introduce sections of closed piping, such sections shall be fitted with a pressure relief valve and the outlet of the valve shall be led to open deck.

All discharge piping, fittings and nozzles in the protected spaces shall be constructed of materials having a melting temperature which exceeds 925°C. The piping and associated equipment shall be adequately supported.

The section valves shall be of steel or equivalent material and shall comply with PN 100 (nominal pressure). Valves above 31 mm (1¼ inch) shall be of flanged type.

The wall thickness of CO₂ pipes fitted between valves and nozzles is at least to comply with Table C1. Fittings used to join this part of the CO₂ pipes may be of malleable cast iron or nodular cast iron.

<i>External diameter D (mm)</i>	<i>From CO₂ bottles to valves (mm)</i>	<i>From valves to nozzles (mm)</i>
21.3 – 26.9	3.2	2.6
30.0 – 48.3	4.0	3.2
51.0 – 60.3	4.5	3.6
63.5 – 76.1	5.0	3.6
82.5 – 88.9	5.6	4.0
101.6	6.3	4.0
108.0 – 114.3	7.1	4.5
127.0	8.0	4.5
133.0 – 139.7	8.0	5.0
152.4 – 168.3	8.8	5.6

Remarks to the table:

- 1) The external diameter and thicknesses are in accordance with ISO Recommendations R 336 for welded and seamless steel pipes. For pipes covered by other standards, thickness slightly less may be accepted.
- 2) The minimum wall thickness for larger diameters will be subject to special consideration.
- 3) In general, the minimum wall thickness is the nominal wall thickness, and no allowance need be made for negative tolerance and reduction in thickness due to bending.
- 4) The minimum wall thickness for threaded pipes shall be measured at the bottom of the thread.

The portion of the piping fitted outside the protected space shall be protected externally and internally against corrosion.

In order to reduce the pipe resistance, the pipes shall be laid as straight as possible and to follow the shortest way to the nozzles. Connecting pieces shall not be fitted in such a way that the pipe threads are exposed to corrosion. All pipes intended to carry CO₂ shall be free from debris, rust and scale.

The CO₂ piping system shall have a blowing-through connection for drying, ventilation and checking purposes. A gauge shall be fitted to the CO₂ manifold.

Regarding manufacture, workmanship, inspection and testing of pipes, see Rules for Classification of Ships Pt.4 Ch.6 Sec.7. For CO₂-manifolds the hydrostatic test pressure may be accepted as 1.25 times design pressure.

The CO₂ manifold shall be hydrostatically pressure tested to at least 1.25 times the relief valve setting, or minimum 125 bar prior to installation. The set pressure for the relief valve shall in any case be minimum 100 bar. After installation, the CO₂ manifold with all associated components including any release line incorporated in the system shall be pressure tested to at least 50 bar. All piping from section valves to nozzles shall be tightness tested and inspected with a blow through test.

A function test of the system shall be carried out to verify correct operating of release controls and alarms. The part of the gas distribution piping that runs through accommodation spaces shall be designed and tested in accordance with FSS Code Ch. 5.2.1.3.1. All other piping shall be tested to ensure that it is free from obstructions. As far as practicable, the function testing shall be performed in the most realistic manner.

Fire-extinguishing systems for cargo holds

The internal diameter of the pipes shall not be less than 19 mm. Branch pipes leading to the various nozzles may have an internal diameter of 13 mm. At suitable points, the pipeline shall have facilities for drainage and cleaning.

All CO₂ piping shall be led such that they are as visible and accessible. The piping to cargo holds are as far as practicable to be fitted below the weather deck and shall be laid as straight as possible. Branch pipes leading to the various nozzles shall be symmetrically installed. All piping shall be properly clamped and, where necessary, protected against external damage. The number of joints shall be kept to a minimum and all joints shall be of welded or flanged design.

CO₂ high pressure fire-extinguishing systems for machinery spaces, cargo handling spaces and ro-ro spaces

The diameter of CO₂ pipes shall be based on the quantity of CO₂ they are intended to carry. The maximum quantity of CO₂ which may be carried through any pipeline is given in Table C2. The total sectional area of the nozzles in protected space shall not be greater than 85% or less than 50% of the total sectional area of the CO₂ bottle valves intended for the respective rooms. Deviations from the requirements for pipe diameters and section area of nozzles table may be accepted when documented by calculations.

The following CO₂ gas concentration should be provided for cargo spaces and cargo handling spaces (calculated at the entire gross volume):

- 35% for cargo pump rooms in oil carriers (regulation 10.9)
- 45% for cargo pump rooms in chemicals carriers (IBC Code)
- 45% for ro-ro spaces (regulation 20.6)
- 45% for cargo compressor and cargo pump rooms on liquefied gas carriers (IGC Code).

<i>Maximum quantity of CO₂ (kg)</i>	<i>Internal diameter of pipeline (mm)</i>
45	13
100	19
135	25
275	32
450	38
1 100	50
2 000	76
3 250	89
4 750	101
6 800	114
9 500	127
15 250	152

Approximately 90% of the total quantity of CO₂ for engine room shall be discharged above, and approximately 10% below the floor. Special considerations will be made for spaces of limited volume (typically below 500 m³).

Low Pressure CO₂ Systems

General

Audible and visual alarms should be given in a continuously manned control station.

The refrigerating plant shall comply with the requirements given in Rules for Classification of Ships Pt.5 Ch.10 to the extent these are applicable.

The refrigerating capacity and the automatic control of each unit, shall be so as to maintain the required temperature under conditions of continuous operation during 24 hours at the sea temperature up to 32°C and ambient air temperature up to 45°C.

In the event of failure of either one of the refrigerating units, the other shall be actuated automatically. Provision shall be made for local manual control of the refrigerating plant.

The pipes, valves and fittings shall be in accordance with the requirements of the Society, for a design pressure not less than the design pressure of the CO₂ vessels.

Testing

The pipes, valves and fittings and assembled systems, shall be tested to the satisfaction of the Society.

In particular, the pipes from the vessel(s) to the release valves on the distribution manifold, shall be submitted to hydraulic test at pressure 1.5 times the design pressure.

All piping, after having been assembled on board, shall be tested for tightness and free flow of the CO₂.

The refrigerating plant, after having been fitted on board, shall be checked for its proper operation.

Equivalent Fixed Gas Fire Extinguishing Systems

General requirements

Equivalent fixed fire extinguishing system shall comply with IMO MSC/Circ.848, as amended in addition to part A and B of this appendix.

Equivalent fixed gas fire extinguishing systems may be accepted for use in other spaces, like switchboard rooms and cargo handling spaces. A higher gas concentration will in general be required for cargo handling spaces, in particular those handling methane.

For the purpose of calculating the quantity of extinguishing agent and the actual concentration based on net volume (for NOAEL and LOAEL verification), an ambient temperature for the protected space of 20°C may be applied.

Components of the gas extinguishing system shall comply with Rules for Classification of Ships Pt.4 Ch.1 to Pt.4 Ch.10 with pressure rating according to design pressure documented by maker. However, the NFPA 2001 may be applied as design standard for piping and couplings inside the protected space.

Cylinders (agent containers) shall not contain more than 81 Litre of agent. Larger cylinders may be approved case by case based on satisfactory handling arrangements. All bottles shall be of the same size. Each cylinder shall be delivered with DNV product certificate according to Rules for Classification of Ships Pt.4 Ch.7 Sec.1.

FSS Code Ch.6 Fixed Foam Fire Extinguishing Systems

General requirements to High Expansion and Inside Air Foam Systems

Application

Any fixed foam fire-extinguishing system shall comply with the requirements of IMO FSS Code Ch.6. Systems for machinery spaces and cargo pump rooms shall also comply with the following parts of this chapter *Application, Definitions, Water and foam concentrate supply systems, Foam generating components and foam generator room, System arrangement, Arrangement for machinery spaces and cargo pump rooms*, whereas systems for ro-ro spaces shall in addition to the FSS Code comply with the following parts of this chapter *Application, Definitions, Water and foam concentrate supply systems, Foam generating components and foam generator room, System arrangement and Arrangement for ro-ro spaces*.

Air intakes and sea water intakes, shall comply with applicable requirements for load line. Approvals for foam concentrate, foam filling rate and capacity, operation of dampers and similar are defined by the FSS Code.

An operation manual, describing standard release procedures as well as procedures in case of failure of essential components shall be available on board. The manual shall also identify which hatches, dampers and similar devices that are required to be opened when the system is operating. Release procedures (standard and failure) shall be listed on signboards at the release stations.

Manuals defining in detail maker's recommended maintenance and test procedures shall be available on board.

All systems not complying with FSS Code requirements for location and accessibility of foam generators, are for the purpose of these rules defined as inside air foam systems. These systems can also be approved under these rules on a case by case basis. Any inside air foam system shall be type approved by the Society. The foam production rate, total foam liquid capacity and location of generators are subject to special considerations, see the system's type approval certificate.

Definitions

Foam: the extinguishing medium produced when foam solution passes through a foam generator and is mixed with air.

Foam solution (premix): a solution of foam concentrate and water.

Foam concentrate: the liquid which, when mixed with water in the appropriate concentration forms a foam solution.

Foam generators: discharge devices or assemblies through which foam solution is aerated to form foam that is discharged directly into the protected space, typically consisting of a nozzle or set of nozzles and a casing. The casing is typically made of perforated steel / stainless steel plates shaped into a box that enclose the nozzle(s).

Foam inductor: mixing unit which does not need a dedicated foam pump in order to mix the foam concentrate into the water (typically within +30% /-0% of nominal mixing rate).

Foam proportioner: mixing unit which need a foam pump in order to mix the foam concentrate into the water (typically within +30% /-0% of nominal mixing rate).

Water and foam concentrate supply systems

The water supply pump shall be of self priming type unless the water is supplied from a tank with a guaranteed quantity corresponding to the maximum required foam production. The emergency fire pump can be used as supply pump provided that 25 m³/h at required pressure is dedicated for fire hose purposes and thus not included in the foam production capacity calculations.

The foam concentrate shall be stored in a special tank and fed to the foam generator by a suitable system, which shall be permanently adjusted for consumption of seawater or freshwater, as applicable. The tank for the foam concentrate shall be protected against inside corrosion and shall be suitable for storage of the intended foam concentrate. Means of measuring liquid level shall be provided.

Pressure gauges shall be fitted at both inlets (water supply and foam concentrations) and the outlet of the foam proportioner.

Piping and components coming into direct contact with the foam concentrate shall be made of corrosion resistant materials such as CuNi, stainless steel or marine bronze. Galvanised steel or equivalent is accepted for other piping.

For testing and drying purposes the piping system shall be fitted with connection for blowing through with compressed air.

The water supply pumps (regardless of size) and foam concentrate pumps with capacity exceeding 25 m³ / h (measured at 10 bar) shall be delivered with DNV product certificate. Foam concentrate pumps with lower capacity shall be delivered with certificate issued by the maker (work certificate).

Foam generating components and foam generator room

The high-expansion foam generating components (nozzles, mesh and any fans, etc.) shall be of approved type, based on a realistic full scale test.

The foam concentrate shall be type approved by the Society in addition to being mentioned on the type approval certificate for the high expansion or inside air foam system in question. The foam proportioner / inductor shall be type approved by the Society.

The foam concentrate shall in general be supplied through foam pump(s) and foam proportioner(s). Foam inductors will only be accepted when it can be documented that the entire system can work at a wide range of foam concentrate mixing ratios.

All components in the foam generating system, shall be made of corrosion resistant materials such as CuNi or marine bronze. Stainless steel may be accepted for parts exposed to foam or seawater only when the system is operating, provided that a suitable flushing system is installed. The material and coating (if applicable) of the foam concentrate storage tank shall comply with the limitation stated in the type approval certificate issued by the Society and maker's specification for this particular concentrate.

The foam generating nozzles or meshes shall be made of a durable, non-shrinking material that is rot- and heat-resistant. These foam nozzles or meshes are also to have as large openings as possible. The nozzles shall be so constructed that they have the least possible chance of getting clogged.

All electrical components in connection with the foam generating components shall have at least IP54 rating.

The foam generator shall be supplied with a special air intake dimensioned according to the air consumption of the generator.

All foam generators shall be fitted with a damper as specified by the FSS Code Ch.6, 2.2.2.2. The damper shall, in addition to protection of the generator, prevent malfunction of the generator due to updraft of fumes in the distribution ducts from a fire in protected space. A manual release of the damper is also to be arranged.

The arrangement of the foam generator shall permit testing of the foam production without leading the expanded foam to the rooms to be protected, e.g. by providing means that permit foam to pass overboard or to open deck.

For both high expansion and inside air systems, two test valves capable of being connected to fire hoses, shall be installed on the distribution piping downstream the proportioner / inductor. One valve is for connecting a foam generator in an alternative location, for the purpose of testing satisfactory foam production. The other valve shall be used in order to maintain realistic pressure and flow through the proportioner during testing. Both valves may be used to direct water to outside the protected space when function testing the proportioner.

The foam generating components shall be so constructed and assembled that maintenance and replacement of essential parts, can easily be effected. The system shall be so arranged that nozzles and pipes can easily be rinsed and drained.

The foam generating components shall be placed in a special room, which is separated from all the rooms to be protected. Safe and readily available access to this foam generator room and to the water and foam pumps, shall be ensured even in case of fire in any of the protected spaces.

The foam generator room shall have a heating system which can keep the room permanently free from frost and mechanical ventilation for overpressure.

Bulkheads and decks in the foam generator room that are contiguous to the rooms to be protected, shall have A-60 rating.

System arrangement

All components in the foam system shall be permanently installed and ready for immediate use.

The ducts leading from the generators to the rooms that are protected, shall be made of steel, or equivalent fire resistant materials. They shall be dimensioned, stiffened and fastened such that they can withstand the normal mechanical and thermal strain they may be exposed to. Requirements for duct arrangement are given under the subsection for machinery spaces and cargo pump rooms and the subsection for ro-ro spaces.

The arrangement of the protected spaces shall be such that any possible overpressure in the space (caused by

fire) can be relieved as the room is being filled with foam.

The sources of power supply for the foam generating components, including water and foam pumps, etc. shall be supplied independently of any machinery or electrical installations located in the rooms to be protected.

Failure of single components, except emergency generator, water and foam pumps and piping, shall not prevent operation of the system. All valves shall be accessible and of a type that can be operated also manually (directly on stem or equivalent). Dampers need not to be readily accessible, if the control arrangement is of a robust design (dedicated accumulators needed for pneumatic systems) and several independent dampers and foam generators serve that space. A space shall normally not be served by only one generator. All components shall be able to operate even in case the control system fails.

The system shall be designed to produce foam at required rate within 1 minute from release (time to start emergency generator need not to be included in the 1 minute test).

The system may be divided into sections that may be released in sequence. The capacity and design of the entire system shall be based on the protected space demanding the greatest volume of foam. Two protected spaces need not to be served simultaneously when the boundaries between these spaces are of A-class standard.

Arrangement for machinery spaces and cargo pump rooms

The high expansion foam shall be distributed to the respective rooms by means of ducts. The ducts shall be dimensioned according to the size of the foam generator's outlet, and shall be so located that an even distribution of foam is obtained throughout the room to be protected.

As a minimum, the ducts shall for the main engine rooms be led to the lower part of the casing and shall provide unobstructed access to the main and auxiliary engines from the duct outlet. Adjacent spaces being fully or partially separated from the engine room (workshop, separator room, etc.) shall have separate ducts.

A one meter per minute discharge rate is defined by the FSS Code. This shall be calculated with respect to maximum horizontal area of the room, without reduction for engines, boilers, loose tanks, etc.

The foam production capacity is also to be sufficient to fill the whole room (entire volume enclosed by A-class boundaries) to the level of the main deck in the course of maximum 10 minutes.

The system shall also cover the lower part of the casing and in all cases the highest risk object in casing (for instance boiler).

Where a cargo pump room is covered by a foam system, the foam concentrate shall be approved for use with the cargo being carried

Arrangement for ro-ro spaces

The high expansion foam shall be distributed to the respective rooms by means of ducts. The ducts shall be dimensioned according to the size of the foam generator's outlet, and shall be so located that an even distribution of foam is obtained throughout the room to be protected.

The layout shall take into consideration obstructions that can be expected when cargo are on board. As a minimum, duct shall be led to every second deck, including movable decks. The horizontal spacing of ducts shall ensure rapid supply of foam to all parts of the protected space. This will be considered case by case based on a full scale test undertaken by the manufacturer.

The foam production capacity shall be sufficient to fill the whole room (entire volume enclosed by A-class boundaries) in the course of maximum 10 minutes.

Testing of high expansion and inside air system

The pipes, valves and fittings and assembled systems shall be tested to the satisfaction of the Society.

All distribution piping shall be blown through with air to ensure that the piping is free from obstructions

Function testing of the foam proportioner / inductor shall be performed. The mixing ratio shall be measured and be within the nominal mixing ratio defined by the type approval certificates (typically +30% /-0%). For foam proportioners using foam concentrates of Newtonian type with kinematic viscosity equal to or less than 100 cSt @ 0°C and density equal to or less than 1.1 kg/dm³ this test can be performed with water instead of foam concentrate. In case of non-Newtonian foam concentrates and concentrates with kinematic viscosity exceeding 100 cSt @ 0°C or density above 1.1 kg/dm³ the function test shall be performed with the actual foam concentrate. All foam inductors shall be function tested with the actual foam concentrate, regardless of foam type.

Function testing of at least one foam generator using foam concentrate mixed to water or seawater shall be performed. The system's ability to produce foam of acceptable quality shall be verified in the most realistic manner being practicable. This test can be done either inside the protected space or by moving one of the generators to an alternative location (e.g. open deck). The test flow should be higher than the minimum accepted flow for the foam proportioner / inductor. Test valves may be used. This requirement may only be

waived when an exception is specifically stated on the system's type approval certificate issued by the Society (based on extensive documentation, prototype testing and measurements on each ship).

Function testing of the power and control systems, water pump(s), foam pump(s), valves, remote and local releases stations and alarms shall also be performed.

SOLAS CH. III: LIFESAVING ARRANGEMENT, LSA CODE

General

For non-propelled vessels or cargo ships with a tonnage of less than 500, IACS Rec. No. 99 or national requirements may be applied for issuance of safety certificates. For such units, an MO will be issued identifying the standard applied.

Documentation Requirement

Documents for cargo ships of 500 gross tonnage and above when the government of the flag state has authorised the Society to issue the SOLAS safety construction certificate (CCC) and SOLAS safety equipment certificate (CEC) on their behalf, shall be submitted for approval according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Safety plan	G050	An arrangement plan for each deck showing the location of all lifesaving equipment.
Lifesaving arrangement plan	G160	Detailed drawing(s) showing the arrangement of survival- and rescue craft stowage, boarding, release and launching.
External access - pilot transfer	Z030	Plan and side view, and cross section.

Documents for passenger ships and special purpose ship with more than 60 persons when the government of the flag state has authorised the Society to issue the SOLAS passenger ship safety certificate (PSSC) and special purpose ship safety certificate (SPS) on their behalf, shall be submitted for approval according to this table:

<i>Object</i>	<i>Document type</i>	<i>Additional description</i>
Safety plan	G050	An arrangement plan for each deck showing the location of all lifesaving equipment.
Lifesaving arrangement plan	G160	Detailed drawing(s) showing the arrangement of survival- and rescue craft stowage, boarding, release and launching.
External access - pilot transfer	Z030	Plan and side view, and cross section.
Muster list and emergency instructions	G140	A drawing showing clear instructions for every person onboard that shall be followed in the event of an emergency.

Passenger Ships and Cargo Ships

SOLAS III/3 Definitions

Suez Canal crew

Suez Canal crew is considered as transit crew on a domestic voyage, and shall not be included in the total number of persons on board for which lifesaving appliances are provided.

SOLAS III/7 Personal life-saving appliances

The number of lifejackets for people on watch shall be minimum 2 in the engine control room and 2 in the wheelhouse.

On each side of the ship, there shall be a minimum of one lifebuoy with an attached line. No lifebuoy light or lifebuoy smoke signal shall be attached to this lifebuoy. These lifebuoys may be part of the total amount of life-saving appliances as described in regulation 22 and 32.

The three immersion suits for the rescue boat crew may be regarded as part of the number of suits provided for the total number of persons on board, for which lifesaving appliances is provided. This provided that the rescue boat crew are able to meet the requirement for 5 minutes preparation time, including to pick up the suits from where they are stowed. Immersion suites in locked cabins are considered not applicable for this purpose.

All immersion suits approved to be worn with approved lifejacket shall be stowed together with a lifejacket.

Guidance note:

For free-fall lifeboats inflatable lifejackets is strongly recommended.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Warm climates are considered between 30° North and 30° South, or according to MSC/Circ.1046.

SOLAS III/11 Survival craft muster and embarkation arrangements

If the embarkation ladders are not installed adjacent to any non-davit launched liferaft, means shall be provided to ensure that the liferaft painter can be easily transferred from the stowage location to the embarkation position.

For passenger vessels, descent units are accepted as replacement for embarkation ladders provided that:

- a) The number of descent units is the same as for embarkation ladders. Embarkation ladder or descent-unit shall be provided at each launching station or at every two adjacent embarkation stations. At least one embarkation ladder shall be provided on each side of the vessel in addition to the descent units.
- b) The descent units are able to reach the waterline from the deck at a trim of up to 10°, and a list of up to 20° either way in the lightest seagoing condition.
- c) There are openings in the rails (70 - 80 cm wide) to avoid that persons need to climb over the rail before descending.
- d) The fixing of the eyebolt is found acceptable by the attending surveyor.
- e) The various components transferring the load e.g. support arms, hooks, links, shackles, wires etc. shall be made according to recognised standards, with a minimum safety factor of at least 6, and are delivered with documentation for grade of material and testing. The units shall be stamped with SWL.
- f) The support arms have sufficient structural support in the pillars.
- g) Adequate onboard testing is carried out in the presence of attending DNV surveyor and the testing is to his/her satisfaction.
- h) One embarkation ladder is provided on each side of the vessel in addition to the descent units.

For liferafts required in regulation 31.4 (distance to nearest survival craft >100 m) a knotted rope or descent unit is acceptable as 'other means of embarkation'. A knotted rope is not acceptable for launching deck above 10 m in the lightest seagoing condition.

For vessels contracted on or after 1 January 2008 an embarkation ladder or other means of embarkation enabling descent to the water in a controlled manner as per SOLAS Reg. III/17 to be provided. For these vessels a knotted rope is not acceptable. *Note:* some Flags have made this requirement retro-active.

SOLAS III/13 Stowage of survival craft

On cargo vessels of 80 m in length and upwards but less than 120 m in length, the aft part of each davit launched liferaft shall be minimum 4 m forward of the vessel's propeller. On cargo vessels of 120 m in length and upwards and passenger vessels of 80 m in length and upwards, the aft part of each davit launched liferaft shall be minimum 6 m forward of the vessel's propeller.

Liferafts shall not be stowed directly above any embarkation station.

SOLAS III/16 Survival craft launching and recovery arrangements

The launching arrangement shall be designed so that the survival craft can be launched without having to be pushed outside the deck edge when the vessel is unfavourably heeled 20°.

Lifelines for partially enclosed lifeboats shall be of 20 mm to 24 mm diameter good quality manila rope or synthetic rope of equivalent strength. Property of grip is essential and care shall be taken to ensure that the ropes are suitable for the purpose. Grip properties of synthetic rope, if used, shall be comparable with manila.

SOLAS III/17 Rescue boat embarkation, launching and recovery arrangements

The launching arrangement shall be designed so that the rescue boat can be launched without having to be pushed outside the deck edge when the vessel is unfavourably heeled 20°.

The aft part of the rescue boat shall be minimum 4 m forward of the vessel's propeller.

Securing point shall be provided for the painter necessary to enabling launching of the rescue boats when the vessel is at 5 knots headway. The location of such securing points shall be suitable to assure an angle less than 45° between painter and horizontal and to avoid disturbance from bow-wave.

When hull shape, painter securing point, davit type and rescue boat type is identical on sister vessels, documentation of the testing according to IMO Res.81(70), Part 2, 5.4 may be based on the first vessel in the series.

Foul weather recovery strops shall be dimensioned with a safety factor of 6 for the weight of fully loaded and equipped rescue boat. Passenger Ships (Additional Requirements)

SOLAS III/21 Survival craft and rescue boats

More than four davit launched liferafts assigned to one davit are in general not acceptable on passenger ships. However, if the installation test in IMO Res. MSC.81(70), part 2, item 6.2.6 shows that more than 4 life rafts are possible to launch within the 30 minutes evacuation time, more rafts are acceptable.

SOLAS III/22 Personal life-saving appliances

Lifebuys located inside, or at pilot stations shall not be included in minimum required number nor in the number of lifebuys with light.

For vessels where lifejackets are stowed in cabins more than two decks below or above the muster stations, additional lifejackets shall be provided corresponding to the number of persons berthed within the most populated main vertical zone (MVZ). However, if the number of passengers berthed on decks more than two decks below or above the muster stations are more than the number within the most populated MVZ, then additional lifejackets corresponding to this number must be provided.

SOLAS III/26 Additional requirements for ro-ro passenger ships

In Ro-Ro passenger vessels every fourth life raft shall contain a Search And Rescue Transponder (SART). That means, if the vessel has 1-4 rafts, 1 SART is required. If the vessel has 5-8 rafts, it will require 2 SARTs and further. In this respect the spare rafts are included.

The SART referred to above shall be kept inside the raft equipment pack.

The rafts referred to above shall have fastening device for the SART including antenna at least 1 m above water level.

The SART referred to above shall be mounted and serviced by a specialist firm. SARTs in wheel-marked rafts shall also be wheel-marked.

Cargo Ships (Additional Requirements)

SOLAS III/31 Survival craft and rescue boats

A liferaft is considered easy side-to-side transferable only on a single open deck level on a flat surface without obstructions. Such liferaft shall have a weight less than 185 kg and not be certified for more than 25 persons. Transfer via stairs, doors or a corridor is not considered easy.

A davit used for both the rescue boat and the survival craft, is only acceptable if the crew members normally assigned to the life raft stations demonstrate that:

- the different requirements for the release hooks for the survival craft and for the rescue boat are met
- the stowage requirements of regulation 13.1.1, 13.1.3, 14.1, 14.3 and 31.1.5 are met
- all survival craft and rescue boat the launching appliance is intending to serve can be launched by gravity or stored mechanical power

Guidance note:

The release hook requirement may for instance be met by the use of two hooks in a triangle suspension.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

SOLAS III/32 Personal life-saving appliances

The number of lifejackets and immersion suits for people on watch shall be minimum 2 in the engine control room and 2 in the wheelhouse and 2 close to remotely located survival craft.

Lifebuys located inside, or at pilot stations shall not be included in the minimum required number nor in the number of lifebuys with light.

SOLAS III/33 Survival craft embarkation and launching arrangements

Securing point shall be provided for the painter necessary to enabling launching of the lifeboats on board vessels with GT 20 000 and upwards when the vessel is at 5 knots headway speed. The location of such securing points shall be suitable to assure an angle less than 45° between painter and horizontal and to avoid disturbance from bow-wave.

Life-saving Appliances and Arrangements Requirements (LSA-Code)

LSA-Code Ch.IV, Regulation 4.7 Free-fall lifeboats

The free-fall certification height is generally considered as the height from the still water surface to the lowest point of the lifeboat in its launched configuration when the vessel is in its lightest seagoing condition without list or trim. However, for oil tankers, chemical tankers and gas carriers, item 4.7.3.2 of the LSA Code will apply.

LSA-Code Ch.VI Launching and embarkation appliances

The efficient hand gear for launching appliance for rescue boat shall be dimensioned for recovery of the rescue boat with full complement of persons and equipment.

SOLAS CH. V: SAFETY OF NAVIGATION

Documentation requirements

Documents shall be submitted as required by this table:

Documentation requirements			
Object	Documentation type	Additional description	For approval (AP) or For information (FI)
Navigation bridge	N010 Bridge design drawing	Including navigation equipment located outside bridge area if related to primary bridge functions.	AP
	N020 Vertical field of vision		AP
	N030 Horizontal field of vision		AP
Navigation lights, day signals/shapes and sound signals according to COLREG	Z030 System arrangement plan	Including details of lanterns and their horizontal- and vertical locations	AP
Navigational equipment	Z090 Equipment list		AP

For general requirements to documentation, see Rules for Ships Pt.0 Ch.3 Sec.1.

For a full definition of the documentation types, see Rules for Ships Pt.0 Ch.3 Sec.2.

SOLAS V/18 Approval, surveys and performance standards of navigational systems and equipment and voyage data recorder

Regulation 18.1

For all navigation equipment required by regulation 19, DNV will ask for valid type approval certificate. Long-Range Identification and Tracking of Ships (LRIT) is exempted from this requirement unless the flag administration have specified differently.

Regulation 18.2

Performance standards for navigation and communication equipment frequently use the term: “installed on or after (a specific date is given)”.

The installation date is equivalent to the date the equipment is mounted in its final position.

It is recommended that the installation date for the equipment in this category is documented by an installation report or a written statement from the responsible installation company or yard.

This is applicable if no other requirements are given by the administration. All other cases regarding the installation status are to be clarified with the administration.

SOLAS V/19 Carriage requirements for shipborne navigational systems and equipment

Regulation 19.2.1.8

Sound reception system is required installed on all ships with totally enclosed bridges constructed on or after 1 July 2002.

A ships bridge is considered totally enclosed, unless it is provided with open bridge wings.

An open bridge wing, in this context, is an outdoor area adjacent to the enclosed wheelhouse which is:

- easily accessible for the officer of the navigational watch
- designed in such way that lookout (by sight and hearing) can be posted in various weather and sea conditions
- enabling efficient communication between the lookout and the officer of the navigational watch.

Traditional offshore vessel designs often call for installation of sound reception system.

A catwalk surrounding the bridge, only being accessible from the bridge via doors in the aft of the bridge, is not consider as open bridge wings in accordance with above interpretation.

Exemption from the requirement of installing sound reception system may only be given on the basis of acceptance by the Flag Administration.

Regulation 19.2.9.2

The device for measuring speed and distance over the ground, as required for ships of 50 000 gross tonnage and upwards, shall have a valid type approval certificate confirming compliance with relevant parts of the IMO performance standards for Speed and Distance Measuring Device (SDME).

Regulation 19.6

This clause applies to integrated systems installed on or after 2009-07-01 on ships constructed on or after 2002-07-01.

In case of failure in any part of the integrated navigation system all other parts of the integrated system shall maintain normal operation, except parts being directly dependant of the failing part (e.g. a heading control system is directly dependent on data from the heading sensor). Likewise, a failure in one navigation equipment or system shall not render any other navigation equipment or systems inoperable, except equipment or systems being directly dependent of the failing equipment/system.

Navigational equipment and systems only interfaced through networks (two or more networks) shall have a fail-safe-mode *). Subsequent to failure of both (all) networks the fall-back topology shall at least provide the following functionality:

- Ships of more than 10 000 gross tonnage, shall have one operational ARPA radar provided with heading data from a heading measuring system (gyro or THD) and speed data from a speed measuring system (speed log).
- Ships of more than 3 000 but less than 10 000 gross tonnage shall have one operational ATA or ARPA radar provided with heading data from a heading measuring system (gyro or THD) and speed data from a speed measuring system (speed log).
- Ships of more than 300 but less than 3 000 gross tonnage, shall have one operational EPA, ATA or ARPA radar provided with heading data from a heading measuring system (gyro or THD) and speed data from a speed measuring system (speed log).
- Unless paper navigational charts are carried and used, the ECDIS or the ECDIS back-up shall be operational with position data from a GNSS receiver.

*) If the manufacturer can document that the network systems used are fully independent (e.g. different make / type of hardware/software platform), this requirement does not apply.

SOLAS V/23 Pilot ladder arrangements

See SOLAS Regulation II-1/3-9 for requirements to accommodation ladders.

SOLAS V/28 Records of navigational activities and daily reporting

Records of navigational activities- DNV will follow Resolution A.916(22) - Guidelines for the recording of events related to navigation.

SOLAS CH. IX: MANAGEMENT FOR THE SAFE OPERATION OF SHIPS, ISM CODE

5 Master's responsibility and authority

5.1.1

The master's review of the safety management system shall be carried out at least annually and documented.

12 Company verification, review and evaluation

12.1

Companies claiming to be unable to carry out internal audit within the 12 month period, should properly document the reason why the audit was carried out outside the required time frame, and present these records for verification at annual company audit and relevant ship board audit. The acceptability of any exceptional circumstances will be considered by the auditor at the external audit. Some flag states requires acceptance by the Recognised Organisation or by the flag state prior to postponement of the internal audit. The Company is responsible for identifying and complying with such flag state requirements. In all cases, there shall not be less than five internal audits of any ship and office during the five year validity of certification.

12.2

Management review shall be carried out at least annually and documented.

Resolution A.1022(26) Guidelines on the Implementation of the International Safety Management (ISM) Code by Administrations

3 The Certification Process

3.2 Initial verification

3.2.3

The company shall have satisfactorily completed the initial audit and possess a DOC (not interim) issued on behalf of the relevant flag state applicable for the vessel type, before an initial audit on that vessel type can be carried out.

SOLAS CH. XI-2: SPECIAL MEASURES TO ENHANCE MARITIME SECURITY

SOLAS XI-2/6 Ship Security Alert System

All SSAS (Ship Security Alert System) installations shall be either type or case approved. Onboard verification shall not be replaced by an approval or acceptance document, especially with regard to the subsequent installation and operational performance features of the onboard system.