PART 4 CHAPTER 10

FIRE SAFETY

JULY 2004

CONTENTS

<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec. 1 General Requirements</td>
</tr>
<tr>
<td>Sec. 2 Fire Safety Measures for Cargo Ships of Less Than 500 Gross Tonnage</td>
</tr>
<tr>
<td>Sec. 3 Fire Safety Measures for Cargo Ships of 500 Gross Tonnage and Above</td>
</tr>
<tr>
<td>Sec. 4 Fire Safety Measures for Issue of SOLAS Safety Certificates</td>
</tr>
<tr>
<td>App. A Interpretations and Clarifications to SOLAS Ch. II-2</td>
</tr>
<tr>
<td>App. B Fixed Gas Fire-extinguishing Systems</td>
</tr>
<tr>
<td>App. C High Expansion and Inside Air Foam Systems</td>
</tr>
</tbody>
</table>

DET NORSKE VERITAS

Veritasveien 1, NO-1322 Høvik, Norway Tel.: +47 67 57 99 00 Fax: +47 67 57 99 11
INTRODUCTION

General
The Executive Board approved this new chapter in June 2004. These rules come into force on 1 January 2005.
This chapter is valid until superseded by a revised chapter. Supplements will not be issued except for an updated list of minor amendments and corrections presented in Pt.0 Ch.1 Sec.3. Pt.0 Ch.1 is normally revised in January and July each year.
Revised chapters will be forwarded to all subscribers to the rules. Buyers of reprints are advised to check the updated list of rule chapters printed Pt.0 Ch.1 Sec.1 to ensure that the chapter is current.

Introduction
This new chapter is moved from Pt.3 Ch.3 Sec.10.
In addition, DNV guidelines/interpretations on fire safety issues, e.g. for extinguishing systems, have been reintroduced in the rules.
DNV guidelines/interpretations to SOLAS Ch.II-2, plus all relevant IACS interpretations to Ch.II-2 have been reinserted in the rules as appendices, being an implicit part of DNV's scope when so authorised by the flag administration to issue SOLAS Safety Certificates.
DNV's interpretations of SOLAS on high expansion foam extinguishing systems have also been updated and aligned with accepted industry standards as of today.
Main class fire safety rules for cargo vessels < 500 gross tonnage have been updated to be in line with IACS Internal Guideline No.2 for small vessels.
C 200 Fire-extinguishing systems for cargo holds .................... 22
C 300 CO₂ high pressure fire-extinguishing systems for machinery spaces ............................................................ 22

D. Low Pressure CO₂ Systems .............................................. 23
D 100 General ............................................................................ 23
D 200 Testing............................................................................. 24

APP. C  HIGH EXPANSION AND INSIDE AIR FOAM SYSTEMS .............................................................................. 25
A. General.................................................................................. 25
A 100 Application ..................................................................... 25
A 200 Water and foam concentrate supply systems .................. 25
A 300 Foam generating components and foam generator room ........................................................................ 25
A 400 System arrangement....................................................... 25
A 500 Arrangement for machinery spaces and cargo pump rooms ........................................................... 26
A 600 Arrangement for ro-ro spaces ........................................ 26
SECTION 1
GENERAL REQUIREMENTS

A. Application

A 100 Application

101 Unless explicitly stated, the requirements of this chapter do not apply to:

— ships of war and troopships
— ships not propelled by mechanical means
— wooden ships of primitive build
— pleasure yachts not engaged in trade
— fishing vessels.

B. Scope of Work

B 100 Classification

101 The requirements in Sec.2 apply to cargo ships of less than 500 gross tonnage assigned main class.

102 The requirements in Sec.3 apply to cargo ships of 500 gross tonnage and above assigned main class.

103 Supplementary requirements will be enforced for ships with additional class notations as required by the respective parts of the rules.

Guidance note:
Other requirements in Pt.1, Pt.2, Pt.3 and Pt.4 may apply in addition to these rules.

B 200 SOLAS safety certificates

201 It is the responsibility of the government of the flag state to ensure that ships are provided with the fire safety measures required by the International Convention for the Safety of Life at Sea, 1974, as amended (hereafter referred as SOLAS) when such requirements apply.

202 Where the government of the flag state has authorised the Society to issue the SOLAS safety certificates on its behalf, the Society will give effect to the fire protection, detection and extinction requirements of Ch.II-2 of SOLAS.

203 The requirements in Sec.4 apply as the basis for stating compliance with Ch.II-2 of SOLAS and as part of the basis for the issue of SOLAS safety certificates. Compliance with requirements in Sec.4 will automatically result in compliance with requirements in Sec.3 for assignment of main class.

C. Submission of Documentation

C 100 General

101 Verification of design is based on an assessment of plans and documentation containing relevant information elements.

102 Plans and documentation shall be submitted for assessment as required by Sec.2, Sec.3 and Sec.4 respectively depending on the Society’s scope of work.

D. Definitions

D 100 Definitions

101 Accommodation spaces are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, game and hobby rooms, barber shops, pantries containing no cooking appliances and similar spaces. (SOLAS Reg. II-2/3.1).

102 “A” class divisions are those divisions formed by bulkheads and decks which comply with the following criteria:

— they are constructed of steel or other equivalent material
— they are suitably stiffened
— they are insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature, within the time listed below:

— class "A-60" 60 minutes
— class "A-30" 30 minutes
— class "A-15" 15 minutes
— class "A-0" 0 minutes

— they are so constructed as to be capable of preventing the passage of smoke and flame for the full duration of the one-hour standard fire test
— the Society shall require a test of a prototype bulkhead or deck in accordance with the Fire Test Procedures Code to ensure that it meets the above requirements for integrity and temperature rise.

(SOLAS Reg. II-2/3.2)

103 Atriums are public spaces within a single main vertical zone spanning three or more open decks. (SOLAS Reg. II-2/3.3)

104 “B” class divisions are those divisions formed by bulkheads, decks, deckheads or linings, which comply with the following criteria:

— they are constructed of approved non-combustible materials and all materials used in the construction and erection of “B” class divisions shall be non-combustible, with the exception that combustible veneers may be permitted provided they meet other requirements of this chapter
— they have an insulation value such that the average temperature of the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225°C above the original temperature, within the time listed below:

— class "B-15" 15 minutes
— class "B-0" 0 minutes

— they are so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test
— the Society shall require a test of a prototype division in accordance with the Fire Test Procedures Code to ensure that it meets the above requirements for integrity and temperature rise.

(SOLAS Reg. II-2/3.4)

105 Bulkhead deck is the uppermost deck up to which the transverse watertight bulkheads are carried. (SOLAS Reg. II-2/3.5)
**Cargo area** is that part of the ship that contains cargo holds, cargo tanks, slop tanks and cargo pump-rooms including pump-rooms, cofferdams, ballast and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces. (SOLAS Reg. II-2/3.6)

**A cargo ship** is any ship that is not a passenger ship. (SOLAS Reg. I/2(g))

**Cargo spaces** are spaces used for cargo, cargo oil tanks, tanks for other liquid cargo and trunks to such spaces. (SOLAS Reg. II-2/3.8)

**Central control station** is a control station in which the following control and indicator functions are centralised:
- fixed fire detection and fire alarm system
- automatic sprinklers, fire detection and fire alarm system
- fire door indicator panels
- fire door closure
- watertight door indicator panels
- watertight door closure
- ventilation fans
- general/fire alarms
- communication systems including telephones
- microphones to public address systems. (SOLAS Reg. II-2/3.9)

**“C” class divisions** are divisions constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of this chapter. (SOLAS Reg. II-2/3.10)

A division consisting of a non-combustible core and combustible veneers may be accepted as a B or C class division, provided that the non-combustible core is tested in accordance with the Fire Test Procedures Code, part 1, that the B class division is tested in accordance with the Fire Test Procedures Code, part 3, and that the veneers mounted to the non-combustible core are tested in accordance with the Fire Test Procedures Code, part 5 and part 2 if applicable. (IACS UI SC125)

**Chemical tanker** is a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product of a flammable nature listed in chapter 17 of the International Bulk Chemical Code, as defined in regulation VII/8.1. (SOLAS Reg. II-2/3.11)

**Closed ro-ro spaces** are ro-ro spaces which are neither open ro-ro spaces nor weather decks. (SOLAS Reg. II-2/3.12)

**Closed vehicle spaces** are vehicle spaces which are neither open vehicle spaces nor weather decks. (SOLAS Reg. II-2/3.13)

**Combination carrier** is a cargo ship designed to carry both oil and solid cargoes in bulk. (SOLAS Reg. II-2/3.14)

**Combustible material** is any material other than a non-combustible material. (SOLAS Reg. II-2/3.15)

**Continuous “B” class ceilings or linings** are those “B” class ceilings or linings which terminate at an “A” or “B” class division. (SOLAS Reg. II-2/3.16)

**Continuously manned central control station** is a central control station which is continuously manned by a responsible member of the crew. (SOLAS Reg. II-2/3.16)

**Control stations** are those spaces in which the ship’s radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized. Spaces where the fire recording or fire control equipment is centralized are also considered to be a fire control station. (SOLAS Reg. II-2/3.18)

**Control stations** are spaces containing emergency sources for emergency lighting, wheel house and chartroom, spaces containing the ship's radio equipment, fire-extinguishing rooms. Spaces containing the following battery sources shall be regarded as control stations regardless of battery capacity:
- emergency batteries in separate battery room for power supply from blackout till start of emergency generator
- emergency batteries in separate battery room as reserve source of energy to radiotelegraph installation
- batteries for start of emergency generator
- and in general, all emergency batteries required in pursuance of Ch.8 Sec.2.C. (IACS UI SC17)

**Crude oil** is any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes crude oil where certain distillate fractions may have been removed from or added to. (SOLAS Reg. II-2/3.19)

**Dangerous goods** are those goods referred to in regulation VII/2. (SOLAS Reg. II-2/3.20)

**Deadweight** is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the ship. (SOLAS Reg. II-2/3.21)

**Fire Safety Systems Code** means the International Code for Fire Safety Systems as adopted by the Maritime Safety Committee of the Organization by resolution MSC.98(73), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I thereof. (SOLAS Reg. II-2/3.22)

**Fire Test Procedures Code** means the International Code for Application of Fire Test Procedures as adopted by the Maritime Safety Committee of the Organization by resolution MSC.61(67), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I thereof. (SOLAS Reg. II-2/3.23)

**Flashpoint** is the temperature in degrees Celsius (closed cup test) at which a product will give off enough flammable vapour to be ignited, as determined by an approved flashpoint apparatus. (SOLAS Reg. II-2/3.24)
126 *Gas carrier* is a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas or other products of a flammable nature listed in chapter 19 of the International Gas Carrier Code, as defined in regulation VII/11.1. (SOLAS Reg. II-2/3.25)

127 *Helideck* is a purpose-built helicopter landing area located on a ship including all structure, fire-fighting appliances and other equipment necessary for the safe operation of helicopters. (SOLAS Reg. II-2/3.26)

128 *Helicopter facility* is a helideck including any refuelling and hangar facilities. (SOLAS Reg. II-2/3.27)

129 *Lightweight* is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and seawater in tanks, consumable stores, and passengers and crew and their effects. (SOLAS Reg. II-2/3.28)

130 *Low flame-spread* means that the surface thus described will adequately restrict the spread of flame, this being determined in accordance with the Fire Test Procedures Code. (SOLAS Reg. II-2/3.29)

131 *Machinery spaces* are machinery spaces of category A and other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces. (SOLAS Reg. II-2/3.30)

132 *Machinery spaces of category A* are those spaces and trunks to such spaces which contain either:

- internal combustion machinery used for main propulsion
- internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW
- any oil-fired boiler or oil fuel unit, or any oil-fired equipment other than boilers, such as inert gas generators, incinerators.

(SOLAS Reg. II-2/3.31)

133 *Main vertical zones* are those sections into which the hull, superstructure and deckhouses are divided by "A" class divisions, the mean length and width of which on any deck does not in general exceed 40 m. (SOLAS Reg. II-2/3.32)

134 *Non-combustible material* is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C, this being determined in accordance with the Fire Test Procedures Code. (SOLAS Reg. II-2/3.33)

135 *Oil fuel unit* is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0.18 N/mm². (SOLAS Reg. II-2/3.34)

Oil fuel unit includes any equipment used for the preparation and delivery of oil fuel, heated or not, to boilers (including inert gas generators) and engines (including gas turbines) at a pressure of more than 0.18 N/mm².

(IACS UI SC16)

136 *Open ro-ro spaces* are those ro-ro spaces that are either open at both ends or have an opening at one end and are provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, having a total area of at least 10% of the total area of the space sides. (SOLAS Reg. II-2/3.35)

137 *Open vehicle spaces* are those vehicle spaces either open at both ends, or have an opening at one end and are provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, having a total area of at least 10% of the total area of the space sides. (SOLAS Reg. II-2/3.36)

138 *A passenger ship* is a ship which carries more than twelve passengers. (SOLAS Reg. I/2(f))

139 *Prescriptive requirements* means the construction characteristics, limiting dimensions, or fire safety systems specified in the rules. (SOLAS Reg. II-2/3.38)

140 *Public spaces* are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces. (SOLAS Reg. II-2/3.39)

141 *Rooms containing furniture and furnishings of restricted fire risk* are those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

- case furniture such as desks, wardrobes, dressing tables, bureaux, dressers, are constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 mm may be used on the working surface of such articles
- free-standing furniture such as chairs, sofas, tables, are constructed with frames of non-combustible materials
- draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool having a mass of mass 0.8 kg/m², this being determined in accordance with the Fire Test Procedures Code
- floor coverings have low flame-spread characteristics;
- exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics
- upholstered furniture has qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code
- bedding components have qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code.

(SOLAS Reg. II-2/3.40)

142 *Ro-ro spaces* are spaces not normally subdivided in any way and normally extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction. (SOLAS Reg. II-2/3.41)

143 *Ro-ro passenger ship* means a passenger ship with ro-ro spaces or special category spaces. (SOLAS Reg. II-2/3.42)
Steel or other equivalent material means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g. aluminium alloy with appropriate insulation).

(SOLAS Reg. II-2/3.43)

145 Sauna is a hot room with temperatures normally varying between 80º-120ºC where the heat is provided by a hot surface (e.g. by an electrically-heated oven). The hot room may also include the space where the oven is located and adjacent bathrooms.

(SOLAS Reg. II-2/3.44)

146 Service spaces are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, storerooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.

(SOLAS Reg. II-2/3.45)

147 Special category spaces are those enclosed vehicle spaces above and below the bulkhead deck, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.

(SOLAS Reg. II-2/3.46)

148 A standard fire test is a test in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve in accordance with the test method specified in the Fire Test Procedures Code.

(SOLAS Reg. II-2/3.47)

149 A tanker is a cargo ship constructed or adapted for the carriage in bulk of liquid cargoes of an inflammable nature.

(SOLAS Reg. I/2(h))

150 Vehicle spaces are cargo spaces intended for carriage of motor vehicles with fuel in their tanks for their own propulsion.

(SOLAS Reg. II-2/3.49)

151 Weather deck is a deck which is completely exposed to the weather from above and from at least two sides.

(SOLAS Reg. II-2/3.50)
SECTION 2
FIRE SAFETY MEASURES FOR CARGO SHIPS
OF LESS THAN 500 GROSS TONNAGE

A. General

A 100 Application
101 The requirements in this section apply to cargo ships of less than 500 gross tonnage assigned main class and which are in line with IACS IG2 for ships with unrestricted service.
102 Where the government of the flag state has prescribed specific rules and regulations for fire safety measures, such rules and regulations may be considered as the basis for assignment of main class on the condition that they are deemed to provide a level of safety acceptable to the Society.

A 200 Submission of documentation
201 Plans and documentation containing the information elements as described in Table A1 shall be submitted for approval.
202 Table A1 shows information elements that shall be submitted for approval and gives reference to specific parts of the rules for the scope of verification.

<table>
<thead>
<tr>
<th>Preferred plan or document</th>
<th>Information elements</th>
<th>Verification reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural fire protection plan</td>
<td>Details of fire insulation and specification of materials and doors</td>
<td>B700</td>
</tr>
<tr>
<td>Penetration details drawing</td>
<td>Details of ventilation duct penetrations through fire divisions</td>
<td>B700</td>
</tr>
<tr>
<td>Fire main system drawing</td>
<td>Fire pumps</td>
<td>B100</td>
</tr>
<tr>
<td></td>
<td>Arrangement and construction details of fire main and isolating valves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number and positions of hydrants and hoses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire pump capacity calculations</td>
<td></td>
</tr>
<tr>
<td>Arrangement drawings for each fixed fire-extinguishing system (if relevant)</td>
<td>Specification and location of all equipment</td>
<td>B400</td>
</tr>
<tr>
<td></td>
<td>Reference to equipment certificates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calculations for the quantity of the media used and the proposed rates of application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Release instructions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control and monitoring system</td>
<td></td>
</tr>
<tr>
<td>Escape route plan</td>
<td>Arrangement of escape routes including stairways, escape trunks and escape ladders</td>
<td>B600</td>
</tr>
<tr>
<td>Fire control plan</td>
<td>Showing all fire safety measures onboard</td>
<td>B</td>
</tr>
</tbody>
</table>

203 For ‘A’ and ‘B’ class divisions including penetrations and for portable fire extinguishers, the following applies:
— copies of the certificates of approval and fire test reports for the constructions and equipment which shall be used onboard but have not been approved by the Society or the government of the flag state, shall be submitted for approval.

B. Suppression of Fire

B 100 Fire pumps
101 Ships above 150 gross tonnage shall be provided with at least one independent power driven fire pump.
102 Ships of 150 gross tonnage and below shall be provided with at least one power driven fire pump, which may be driven by the main engine.
103 The capacities of the main fire pumps referred to in either 101 or 102 shall be as required for ships of 500 gross tonnage and above (ref. SOLAS Ch. II-2/10.2.2) but shall not be less than 15 m³/hour.
104 In every such ship, there shall be provided, in a position outside the space containing the main fire pumps, an additional:
— power driven fire pump for ships above 150 gross tonnage — hand-operated fire pump for ships of 150 gross tonnage and below.

The additional pump shall have sufficient capacity and pressure to provide a 6 m jet throw with nozzles not less than 10 mm diameter. The jet throw shall be capable of being directed on to any part of the ship.

B 200 Fire mains and hydrants
201 The fire main shall have a diameter of sufficient size to maintain a steady distribution and pressure.
202 A sufficient number of fire hydrants shall be provided and so located that at least one powerful jet of water can reach any normally accessible part of the ship. At least one hydrant shall be provided in the machinery space.
203 Not less than three (3) fire hoses of at least 15 m in length, complete with couplings and nozzles, shall be provided.
204 The nozzles shall be of dual purpose (spray/jet) type with 12 mm jet and integral shut-off. The jet may be reduced to 10 mm and shut-off omitted for hand pump hoses.

B 300 Fire extinguishers
301 The capacity of every portable fire extinguisher shall be at least equivalent to that of a 9 L liquid extinguisher.
302 Not less than three (3) portable fire extinguishers shall be provided in the accommodation and service spaces.
303 Not less than two (2) portable fire extinguishers, suitable
for extinguishing oil fires, shall be provided in each boiler room, cargo pump room and spaces containing any part of any oil fuel installation.

304 In machinery spaces containing internal combustion machinery, one (1) portable fire extinguisher shall be provided for every 375 kW of engine power, however, the total number shall not be less than two (2) and need not exceed six (6).

305 For ships above 150 gross tonnage, at least one fire extinguisher equivalent to that of at least one (1) 45 L liquid extinguisher shall be provided in every machinery spaces of category A.

B 400 Fixed fire-extinguishing systems

401 For ships above 350 gross tonnage, a fixed fire-extinguishing system shall be provided in machinery spaces of category A and in cargo pump rooms. The system shall be as required for ships of 500 gross tonnage and above (ref. SOLAS Ch. II-2/10.4)

B 500 Cargo tank protection

501 Mobile foam applicators shall be provided on cargo tank decks.

B 600 Fire-fighter’s outfits

601 Ships above 150 gross tonnage shall be provided with at least two (2) complete sets of fire-fighter’s outfits stored in separate locations. Ships of 150 gross tonnage and below shall be provided with at least one (1) complete set of fire-fighter’s outfit.

602 The fire-fighter’s outfits shall be as required for ships of 500 gross tonnage and above (ref. SOLAS Ch. II-2/10.10).

B 700 Structural fire protection

701 Boundaries of the wheelhouse and of the machinery spaces shall be A-60 class against adjacent spaces. Where, in the opinion of the Society, the adjacent spaces are of negligible fire risk, the boundaries may be A-0 class.

702 Boundaries of escape routes shall be of B-0 class.

C. Escape

C 100 Means of escape

101 Escape routes shall be maintained in a safe condition, free of obstacles, and shall be easily accessible and clearly marked.

102 At least one (1) escape route shall be available from all spaces or groups of spaces normally accessible to the crew.

103 At least two (2) widely separated escape routes shall be provided from the accommodation and service spaces (at each level).
SECTION 3
FIRE SAFETY MEASURES FOR CARGO SHIPS
OF 500 GROSS TONNAGE AND ABOVE

A. General

A 100 Application

101 The requirements in this section apply to cargo ships of 500 gross tonnage and above assigned main class.

A 200 Submission of documentation

201 The following information elements, concerning escape routes, shall be included on a suitable plan and be submitted for approval:
   — arrangement and indication of primary and secondary escape routes (stairways, escape trunks and escape ladders)
   — width of escape routes including doors
   — inclination of stairways and ladders.

202 The fire control plan shall be submitted for information.

B. Means of Escape

B 100 General

(SOLAS Reg. II-2/13.2)

101 Unless expressly provided otherwise, at least two widely separated and ready means of escape shall be provided from all spaces or group of spaces.

102 Lifts shall not be considered as forming one of the required means of escape.

B 200 Means of escape from accommodation spaces, service spaces and control stations

(SOLAS Reg. II-2/13.3.1 and 13.3.3)

201 Stairways and ladders shall be so arranged as to provide ready means of escape to the lifeboat and life raft embarkation deck from passenger and crew accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces.

202 Unless expressly provided otherwise, a corridor, lobby, or part of a corridor from which there is only one route of escape shall be prohibited. Dead-end corridors used in service areas which are necessary for the practical utility of the ship, such as fuel oil stations and athwartship supply corridors, shall be permitted, provided such dead-end corridors are separated from crew accommodation areas and are inaccessible from passenger accommodation areas. Also, a part of a corridor that has a depth not exceeding its width is considered a recess or lobby.

203 All stairways in accommodation and service spaces and control stations shall be of steel frame construction except where the Society sanctions the use of other equivalent material.

204 If a radiotelegraph station has no direct access to the open deck, two means of escape from or access to, the station shall be provided, one of which may be a porthole or window of sufficient size or other means to the satisfaction of the Society.

205 Doors in escape routes shall, in general, open in the direction of escape, except that:
   — individual cabin doors may open into the cabins in order to avoid injury to persons in the corridor when the door is opened
   — doors in vertical emergency escape trunks may open out of the trunk in order to permit the trunk to be used both for escape and for access.

206 At all levels of accommodation there shall be provided at least two widely separated means of escape from each restricted space or group of spaces.

207 Below the lowest open deck the main means of escape shall be a stairway and the second escape may be a trunk or a stairway.

208 Above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof.

209 No dead-end corridors having a length of more than 7 m shall be accepted.

210 Exceptionally, the Society may dispense with one of the means of escape, for crew spaces that are entered only occasionally, if the required escape route is independent of watertight doors.

211 Stairways and corridors used as means of escape shall be not less than 700 mm in clear width and shall have a handrail on one side. Stairways and corridors with a clear width of 1 800 mm and over shall have handrails on both sides. "Clear width" is considered the distance between the handrail and the bulkhead on the other side or between the handrails. The angle of inclination of stairways should be, in general, 45°, but not greater than 50°, and in machinery spaces and small spaces not more than 60°. Doorways which give access to a stairway shall be of the same size as the stairway (FSS Code Ch.13.3).

B 300 Means of escape from machinery spaces

(SOLAS Reg. II-2/13.4.2)

301 Except as provided in 302, two means of escape shall be provided from each machinery space of category A. In particular, one of the following provisions shall be complied with:

1) Two sets of steel ladders as widely separated as possible leading to doors in the upper part of the space similarly separated and from which access is provided to the open deck. One of these ladders shall be located within a protected enclosure from the lower part of the space it serves to a safe position outside the space. Self-closing fire doors of the same fire integrity standards shall be fitted in the enclosure. The ladder shall be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The enclosure shall have minimum internal dimensions of at least 800 mm x 800 mm, and shall have emergency lighting provisions.

2) One steel ladder leading to a door in the upper part of the space from which access is provided to the open deck and, additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the open deck.

302 In a ship of less than 1 000 gross tonnage, the Society may dispense with one of the means of escape required in 301, due regard being paid to the dimension and disposition of the upper part of the space. In addition, the means of escape from machinery spaces of category A need not comply with the re-
requirement for an enclosed fire shelter. In the steering gear space, a second means of escape shall be provided when the emergency steering position is located in that space unless there is direct access to the open deck.

303 From machinery spaces other than those of category A, two escape routes shall be provided except that a single escape route may be accepted for spaces that are entered only occasionally, and for spaces where the maximum travel distance to the door is 5 m or less.

B 400 Means of escape from ro-ro spaces
(SOLAS Reg. II-2/13.6)

401 At least two means of escape shall be provided in ro-ro spaces where the crew are normally employed. The escape routes shall provide a safe escape to the lifeboat and life raft embarkation decks and shall be located at the fore and aft ends of the space.

C. Fire Control Plans

C 100 Fire control plans
(SOLAS Reg. II-2/15.2.4)

101 General arrangement plans shall be permanently exhibited for the guidance of the ship’s officers, showing clearly for each deck:

— the control stations
— the various fire sections enclosed by "A" class divisions
— the sections enclosed by "B" class divisions together with particulars of the fire detection and fire alarm systems
— the sprinkler installation
— the fire-extinguishing appliances
— means of access to different compartments, decks and such like
— the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section.

Alternatively, at the discretion of the Society, the aforementioned details may be set out in a booklet, a copy of which shall be supplied to each officer, and one copy shall at all times be available on board in an accessible position. Plans and booklets shall be kept up to date; any alterations thereto shall be recorded as soon as is practicable. Descriptions in such plans and booklets shall be in the language or languages required by the Society. If the language is neither English nor French, a translation into one of those languages shall be included.

102 A duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel.

Guidance note:
Refer to "Graphical symbols for shipboard fire control plans" adopted by IMO by Res. A.952(23).

---e-n-d---o-f---G-u-i-d-a-n-c-e---n-o-t-e---
SECTION 4
FIRE SAFETY MEASURES FOR ISSUE OF SOLAS SAFETY CERTIFICATES

A. General

A 100 Application
101 The requirements in this section apply 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.

A 200 Purpose
201 The purpose of this section shall provide a set of clarifying requirements for Ch.II-2 of SOLAS. The clarifying requirements are made up of the Society’s and IACS’ interpretations to Ch.II-2 of SOLAS and are meant as a further detailing and clarification of the basic SOLAS requirement.

A 300 Scope
301 All requirements in Ch.II-2 of SOLAS are considered as part of the Society’s scope under the authorization from the government of the flag state.
302 Where IMO has issued interpretations to Ch.II-2 of SOLAS, such interpretations are regarded as part of SOLAS and the Society’s scope.
303 All requirements of Appendices A, B and C herein are considered as part of the Society’s scope.
   — Appendix A contains the Society’s and IACS’ general interpretations and clarifications to Ch.II-2 of SOLAS.
   — Appendix B contains the Society’s interpretations and clarifications to Reg. Ch.II-2/11.4 and the FSS Code Ch.5 for fixed gas fire-extinguishing systems.
   — Appendix C contains the Society’s interpretations and clarifications to Reg. Ch.II-2/11.4 and the FSS Code Ch.6 for fixed foam fire-extinguishing systems.
304 If any contradictory requirements are identified, the requirements of Ch.II-2 of SOLAS and of the FSS-Code shall prevail.

A 400 Submission of documentation
401 Plans and documentation containing the information elements as described in Table A1 shall be submitted for approval.
402 Table A1 includes a column marked “Verification reference” which gives reference to specific parts of Ch.II-2 of SOLAS and indicates the detailed scope of the verification covered herein.
For constructions and equipment required by SOLAS to be tested in accordance with the Fire Test Procedure Code the following applies:

**Table A1 Information elements to be submitted for approval**

<table>
<thead>
<tr>
<th>Preferred plan or document</th>
<th>Information elements</th>
<th>Verification reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Control Plan</td>
<td>— Equipment as described in SOLAS Ch.II-2/Reg.15.2.4</td>
<td>SOLAS Ch.II-2, Regulations: 10.3, 10.10, 15.2.4, 19.3.6, 19.3.7 and 20.6.2 as applicable</td>
</tr>
<tr>
<td>Structural fire protection plan</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 4.4, 5.3, 6.8, 9.2, 9.4, 9.5, 9.6, 11.2, 11.3, 11.4, 19.3.8, 20.2.2 and 20.5 as applicable</td>
</tr>
<tr>
<td>Ventilation system drawing</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 5.2, 8.2, 8.3, 8.5, 9.7, 19.3.4 and 20.3.1 as applicable</td>
</tr>
<tr>
<td>Penetration details drawing</td>
<td>— Details of ventilation duct penetrations through fire divisions — Details of cable penetrations through fire divisions — Details of pipe penetrations through fire divisions</td>
<td>SOLAS Ch.II-2, Regulation 9.3</td>
</tr>
<tr>
<td>Escape route plan</td>
<td>— Arrangement of primary and secondary escape routes including stairways, escape trunks and escape ladders — Width of escape routes including doors — Inclination of stairways/ladders</td>
<td>SOLAS Ch.II-2, Regulation 13</td>
</tr>
<tr>
<td>Fire main system drawing</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulation 10.2</td>
</tr>
<tr>
<td>Arrangement drawings for fixed fire-extinguishing system in machinery spaces</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 10.4 and 10.5</td>
</tr>
<tr>
<td>Arrangement drawings for fixed local-application fire-extinguishing system in machinery spaces</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 10.4 and 10.5.6</td>
</tr>
<tr>
<td>Arrangement drawings for fixed fire-extinguishing system in cargo spaces (if relevant)</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 10.4, 10.7, 10.8, 10.9, 19.3.1, 19.3.9 and 20.6.1 as applicable</td>
</tr>
<tr>
<td>Arrangement drawings for each fixed fire-extinguishing system in service spaces, accommodation spaces and other spaces (if relevant)</td>
<td>— 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</td>
<td>SOLAS Ch.II-2, Regulations: 10.4, 10.6.3, 10.6.4</td>
</tr>
<tr>
<td>Arrangement drawings for automatic sprinkler, fire detection and fire alarm system (if relevant)</td>
<td>— 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 systems</td>
<td>SOLAS Ch.II-2, Regulations 10.6.1 and 10.6.2 as applicable</td>
</tr>
<tr>
<td>Arrangement drawings for fixed fire detection and alarm systems</td>
<td>— 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)</td>
<td>SOLAS Ch.II-2, Regulations 7, 19.3.3 and 20.4 as applicable</td>
</tr>
<tr>
<td>Arrangement plan for helicopter deck (as relevant)</td>
<td>— Details of construction — Means of escape — Fire-fighting appliances — Drainage Facilities — Helicopter refuelling and hangar facilities</td>
<td>SOLAS Ch.II-2, Regulation 18</td>
</tr>
</tbody>
</table>

403 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 has not been approved by the Society or the government of the flag state, shall be submitted for approval.
APPENDIX A
INTERPRETATIONS AND CLARIFICATIONS TO SOLAS CH. II-2

A. General

A 100 Application

101 This appendix shall be regarded as the Society’s interpretations of SOLAS Ch. II-2 and is considered as part of the scope described in Sec.4.

102 Each interpretation starts with a reference to the applicable technical requirement of SOLAS or the FSS Code. Following the interpretation text, reference is made to the applicable IACS interpretation. For interpretations made by the Society, this is so indicated with “(DNV)”.

B. SOLAS Reg.II-2/4 Probability of Ignition

B 100 Miscellaneous items of ignition sources and ignitability

101 SOLAS Reg. II-2/4.4.2
This regulation is not intended to preclude the use of containers constructed of combustible materials in galleys, pantries, bars, garbage handling or storage spaces and incinerator rooms provided they are intended purely for the carriage of wet waste, glass bottles and metal cans and are suitably marked. (IACS UI SC 166)

C. SOLAS Reg.II-2/5 Fire Growth Potential

C 100 Control of air supply and flammable liquid to the space

101 SOLAS Reg.II-2/5.2.1.1
Ventilation inlets and outlets located at outside boundaries shall be fitted with closing appliances as required by Reg. II-2/5.2.1.1 and need not comply with Reg. II-2/9.7.3.1 (IACS UI SC 100)

102 SOLAS Reg. II-2/5.2.1.2
This applies to all ventilation fans (circulation fans included). (DNV)

C 200 Fire protection materials

201 SOLAS Reg. II-2/5.3
Regarding non-combustible materials, combustible materials and surface flame spread, the following applies:

---

Fig. 1
Schematic showing components for methods IC, IIC and IIIC - (IACS UI SC126)
<table>
<thead>
<tr>
<th></th>
<th>A Non-combustible material (Reg. II-2/5.3.1.2.2)</th>
<th>B Non-combustible material (Reg. II-2/5.3.1.1)</th>
<th>C Low flame spread (Reg. II-2/5.3.2.4)</th>
<th>D Equivalent volume (Reg. II-2/5.3.2)</th>
<th>E Calorific value (Reg. II-2/5.3.2)</th>
<th>F Smoke production (Reg. II-2/5.3.2)</th>
<th>G Not readily ignited (Reg. II-2/4.4.4 and 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moulding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Painted surfaces or Veneer or Fabric or Foils</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Painted surfaces or Veneer or Fabric or Foils</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Decorative panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Painted surfaces or Veneer or Fabric or Foils</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Skirting board</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Insulation</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Surfaces and paints in concealed or inaccessible spaces</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Draught stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Grounds and supports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Lining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Primary deck covering first layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Floor finishing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Window box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Window box surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Window box surface in concealed or inaccessible spaces</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Ceiling panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Vapour barriers used on pipes for cold services (see UI SC 102) may be of combustible materials providing that their surface has low flame spread characteristics (Reg. II-2/5.3.1.1)
2) Applicable to paints, varnishes and other finishes (Reg. II-2/6.2)
3) Only in corridors and stairway enclosures
Cold service is understood to mean refrigeration systems, i.e. systems with temperatures below ambient air and sea water. (IACS UI SC102)

Concerning the use of asbestos, see Ch. 1 Sec.2 A200. (DNV)

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 (see also SOLAS Ch. II-2 Reg. 4.4.3). (DNV)

D. SOLAS Reg.II-2/6 Smoke Generation Potential and Toxicity

D 100 Paints, varnishes and other finishes, primary deck coverings

101 SOLAS Reg. II-2/6.2 and II-2/6.3

Regarding materials properties concerning smoke generation and toxicity, see C201. (IACS UI SC126)
not be fitted with a fixed fire detection system.
(IACS UI SC 160)

E 400 Requirements of the FSS Code Ch. 9 Fixed fire
detection and fire alarm systems

401 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 au-
tomatically after a preset time.
(DNV)

402 FSS Code Ch. 9.2.1.4 and 9.2.4.3.2
The requirement that a system be so arranged that a loop can-
not be damaged at more than one point by a fire, is considered
satisfied by arranging the loop such that the data highway will
not pass through a space covered by a detector more than once.
The requirement that a system be so arranged to ensure that
any fault occurring in the loop will not render the whole loop
ineffective, is considered satisfied when a fault occurring in
the loop only renders ineffective a part of the loop not being
larger than a section of a system without means of remotely
identifying each detector.
(IACS UI SC117)

403 FSS Code Ch. 9.2.2
The main (respective emergency) feeder shall run from the
main (respective emergency) switchboard to the change-over
switch without passing through any other distributing switch-
board.
(IACS UI SC35)

404 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.
(DNV)

405 FSS Code Ch. 9.2.4.1.1 and 9.2.5.1.1
Section: Group of fire detectors and manually operated call
points as reported in the indicating unit(s).
Loop: Electrical circuit linking detectors of various sections
and connected to the control panel.
(IACS UI SC115)

F. SOLAS Reg.II-2/8 Control of Smoke Spread

F 100 Protection of control stations outside machinery
spaces

101 SOLAS Reg. II-2/8.2
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.
(DNV)

102 SOLAS Reg. II-2/Table 9.5
The required division of steel between control stations and
open decks may in the case of an emergency generator be pro-
vided with openings for intake of combustion air to the diesel
engine and for intake of cooling air in the case of an air cooled
diesel engine. These openings need not be fitted with means
for closure for fire integrity purposes, unless a fixed gas fire
fighting system for the emergency generator space is fitted.
(IACS UI SC66)

Footnote d):
A galley next to a provision room requires an “A-0” bulkhead.
(DNV)

103 SOLAS Reg. II-2/9.2.3.4.1
Dumb waiters shall be regarded as lifts.
(IACS UI SC46)

104 SOLAS Reg. II-2/9.2.4.2.5
For the portions which face the cargo area, the A 60 standard
insulation should be provided up to the underside of the deck
of the navigation bridge.
(IACS UI SC174)

G. SOLAS Reg.II-2/9 Containment of Fire

G 100 Thermal and structural boundaries

101 SOLAS Reg. II-2/9.2.3.3.2

(1) Navigation equipment room (radio transmitter). Battery
rooms. (Requirements for location of the emergency
source of electrical power are further given in Ch.8 Sec.2
C.)

(5) Provision chambers shall be treated as store rooms. Re-
frigerated provision chambers are considered as category
(5) Service spaces if thermally insulated with non-com-
bustible materials.

(7) Electrical equipment rooms (auto telephone exchange, air
conditioning duct spaces).

(9) Provision chambers shall be treated as store rooms. Re-
frigerated provision chambers are considered as category
(9) service spaces if thermally insulated with combustible
materials.
(IACS UI SC45)

102 SOLAS Reg. II-2/Table 9.5

Footnote d):
A galley next to a provision room requires an “A-0” bulkhead.
(DNV)

103 SOLAS Reg. II-2/9.2.3.4.1
Dumb waiters shall be regarded as lifts.
(IACS UI SC46)

104 SOLAS Reg. II-2/9.2.4.2.5
For the portions which face the cargo area, the A 60 standard
insulation should be provided up to the underside of the deck
of the navigation bridge.
(IACS UI SC174)

G 200 Protection of openings in fire-resisting divisions

201 SOLAS Reg. II-2/9.4.2
Balancing openings or ducts between two enclosed spaces are
prohibited except for openings as permitted by Reg. 9.4.2.
(IACS UI SC119)

202 SOLAS Reg. II-2/9.4.2.3
Ventilation openings may also be permitted in "B" class doors
leading to lavatories, offices, pantries, lockers, store rooms etc.
(IACS UI SC67)

203 SOLAS Reg. II-2/9.4.2.4
Watertight doors in fire resisting divisions shall be made of
steel.
(DNV)

G 300 Protection of openings in machinery space
boundaries

301 SOLAS Reg. II-2/9.5
Hatches to engine room for transport of goods shall be weather-
tight. Where remote control for closing of the hatch is not
provided, signboard to the effect that the hatch-cover shall be
closed at all times except during transfer of goods, shall be
posted.
(DNV)
G 400  Ventilation systems

401  SOLAS Reg. II-2/9.7.1.1
Flexible bellows of combustible material may be used for connecting fans to the ducting in air conditioning room.
(IACS UI SC 99)

402  SOLAS Reg. II-2/9.7.1.1
Combustible gaskets in flanged ventilation duct connections are not permitted within 600 mm of an opening in an A class or B class division and in ducts required to be of A class construction.
(IACS UI SC 175)

403  SOLAS Reg. II-2/9.7.5.2.1
Grease trap, fire damper, fan shut-off and fixed fire-extinguishing are only required when a galley exhaust duct passes through accommodation spaces or spaces containing combustible materials. The term “spaces containing combustible materials” will normally apply to all spaces in accommodation.
(IACS UI SC 106)

Fire dampers required by Reg. 9.7.5.2.1 do not need to pass the fire test in Res. A 754(18), but should be of steel and capable of stopping the draught. The requirements for “A” class apply only to the part of the duct outside of the galley.
(IACS UI SC118)

H. SOLAS Reg.II-2/10 Fire Fighting

H 100  Water supply systems

101  SOLAS Reg. II-2/10.2.1.5.1
When calculating the number of hydrants, the length of water jet shall be taken as maximum 7 m.
(DNV)

102  SOLAS Reg. II-2/10.2.2.3.1.2
Unless the two main fire pumps, their sea suction and the fuel supply or source of power for each pump are situated within compartments separated at least by A-0 divisions, so that a fire in any one compartment will not render both fire pumps inoperable, an emergency fire pump should be fitted. An arrangement in which one main fire pump is located in a compartment having more than one bulkhead or deck adjacent to the compartment containing the other main fire pump should also require an emergency fire pump.
(IACS UI SC 162)

The room(s) where the emergency fire pump and prime mover are installed shall have adequate space for maintenance work and inspections.
(IACS UR M62)

103  SOLAS Reg. II-2/10.2.2.3.1.2
Not only emergency pumps, but also sea water inlet, suction and delivery pipes with valves etc. shall be outside the compartment containing the other fire pumps. Only short lengths of suction and discharge piping may, however, under certain circumstances penetrate the machinery spaces if enclosed in substantial steel casing (Reg. II-2/10.2.1.4.1).

The sea-chest with valve and the main part of the suction piping should be, in general, outside the machinery spaces. If this arrangement cannot be made, the sea chest may be fitted in the machinery spaces on the condition that the valve is remotely controlled from a position near the pump, in the same compartment, and the suction pipe is as short as practicable.
In lieu of the steel casing the pipe may be insulated equivalent to class A-60 standard. The pipe should have substantial wall thickness and in no case less than 11 mm and should be all welded except for flanged connection to the sea inlet valve.
(IACS UI SC 19)

104  SOLAS Reg. II-2/10.2.2.3.2.2
The electrical cables to the emergency fire pump shall not pass through the machinery spaces containing the main fire pumps and their source(s) of power and prime mover(s). They shall be of a fire resistant type where they pass through other high fire risk areas.
(IACS UI SC 165)

Guidance note:
See Ch.8 Sec.2 for requirements for cables to remain operable during a fire condition.

105  FSS Code Ch. 12.2.2.1.1
If the emergency fire pump is the main supply of water for any fixed fire-extinguishing system provided to protect the space where the main fire pumps are located, the pump should have the capacity for this system and, in addition, the capacity required by SOLAS Reg.II-2/4.3.3.2 and II-2/4.3.3.2.1.
(IACS UI SC 163)

106  FSS Ch. 12.2.2.1.3
Where necessary to ensure priming, the emergency fire pump should be of the self priming type.
(IACS UI SC 164)

It should be demonstrated by calculation that this paragraph is satisfied at:

— the lightest seagoing condition, with account being taken of 22.5° roll and 10° pitch
— a loading condition without cargo or ballast water, with 10% stores and fuel remaining, roll and pitch not being taken into account.

Upon completion of the emergency fire pump installation, a performance test confirming the capacity required in the FSS Code, Ch.12, 2.2.1.1 and 105 should be carried out. As far as practicable, the test should be carried out at lightest seagoing draught at the suction position.

1) Where the length of the ship exceeds 100 m, the pitch may be taken as 500/L degrees where L = length of the ship, in metres, as defined in Pt.3 Ch.1 Sec.1.

(IACS UI SC 178)

H 200  Portable fire extinguishers

201  SOLAS Reg. II-2/10.3.2.1
In ships of less than 1000 gross tonnage, at least three portable fire extinguishers shall be provided.
(DNV)

202  SOLAS Reg. II-2/10.5
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.
(DNV)

203  FSS Code Ch.4.3
The fire-extinguishing medium in the extinguishers shall be suitable for the potential fire hazards in the protected spaces.
(DNV)

H 300  Fixed fire-extinguishing systems

301  SOLAS Reg. II-2/10.4
On completion, the system shall be function tested.  
(DNV)

302 SOLAS Reg. II-2/10.4.1
— For specific interpretations and clarifications for fixed gas fire-extinguishing systems see Appendix B.
— For specific interpretations and clarifications for fixed high-expansion foam fire-extinguishing systems see Appendix C.

303 SOLAS Reg. II-2/10.4.3
Small local extinguishing systems, like for instance extinguishing systems in galley exhaust ducts, where the amount of gas volume is small in proportion to the space where the bottles are stored, need not comply with this requirement.  
(DNV)

H 400 Fire-extinguishing arrangements in machinery spaces
401 SOLAS Reg. II-2/10.5.6
Any installation of nozzles on board should reflect the arrangement successfully tested in accordance with MSC/Circ. 913. If a specific arrangement of the nozzles is foreseen on board, deviating from the one tested as per MSC/circ. 913, it can be accepted provided such arrangement additionally passes fire tests based on the scenarios of this circular.

The automatic release should be activated by a detection system capable of reliably identifying the local zones. Consideration should be given to prevent accidental release.

Oil fired equipment, such as inert gas generators and thermal oil heaters should also be protected by this system, if located in machinery spaces above 500 m³.

Boiler fronts should be interpreted as the boiler burner location irrespective of the boiler design.

Grouped visual and audible alarms, as well as indication of the activated zone, should be provided in each protected space, in the engine control room and in the wheelhouse.  
(IACS UI SC176)

H 500 Fire-extinguishing arrangements in cargo spaces
501 SOLAS Reg. II-2/10.7.1.3
Ships of less than 2000 gross tonnage carrying petroleum products having a flash point exceeding 60°C (closed cup test) are not required to be fitted with a fixed fire-extinguishing system.  
(IACS UI SC48)

502 SOLAS Reg. II-2/10.7.2
This only applies to ships above 500 gross tonnage engaged in the carriage of dangerous goods.  
(IACS UI SC49)

503 SOLAS Reg. II-2/10.8 and FSS Code Ch. 14.2.3.2.3
Port and starboard monitors required by this regulation may be located in the cargo area as defined in Reg. II-2/3.6, provided they are aft of cargo tanks and that they protect below and aft of each other.  
(IACS UI SC169)

H 600 Fire-fighter’s outfits
601 SOLAS Reg. II-2/10.10.3
Spare charges for breathing apparatus shall be stored in the same location as the breathing apparatus.  
(DNV)

I. SOLAS Reg.II-2/11 Structural Integrity
Void

J. SOLAS Reg.II-2/12 Notification of Crew and Passengers
Void

K. SOLAS Reg.II-2/13 Means of Escape
K 100 Means of escape from control stations, accommodation spaces and service spaces
101 SOLAS Reg. II-2/13.3.4
The minimum number of EEBDs to be kept within accommodation spaces should 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.  
(DNV)

K 200 Means of escape from machinery spaces
201 SOLAS Reg. II-2/13.4.3
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 should 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 there is, however, a direct access to an escape way from the workshop, an EEBD is not required; 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 should, 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.  
(DNV)
L. SOLAS Reg.II-2/14 Operational Readiness and Maintenance

Void

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

Void

N. SOLAS Reg.II-2/16 Operations

Void

O. SOLAS Reg.II-2/17 Alternative Design and Arrangements

Void

P. SOLAS Reg.II-2/18 Helicopter Facilities

P 100 Helicopter refuelling and hangar facilities

101 SOLAS Reg. II-2/18.7.11
Where a water spray system is installed as fire-extinguishing system in hangar, the arrangement shall be in accordance with Pt. 6 Ch. 1 Sec. 2 G609.
A section of fire detectors which covers a helicopter hangar shall not include fire detectors or manual call points covering machinery spaces of category A.
(DNV)

Q. SOLAS Reg.II-2/19 Carriage of Dangerous Goods

Q 100 General

101 Requirements are included in Pt.5 Ch.11.

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

R 100 Precaution against ignition of flammable vapours in closed vehicle spaces, closed ro-ro spaces and special category spaces

101 SOLAS Reg. II-2/20.3.1.3
The requirements to indicate any loss of ventilation capacity is considered complied with by an alarm on the bridge, initiated by fall-out of starter relay of fan motor.
(IACS UI SC 75)

102 SOLAS Reg. II-2/20.3.2
All electrical circuits terminating in the cargo holds, that are not of certified safe type suitable for zone 1, are to be provided with multipole linked isolating switches situated outside the cargo holds, and accessible only to authorized personnel. Provision is to 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.
(DNV)

103 SOLAS Reg. II-2/20.3.2.1
The electrical equipment shall be of certified safe type suitable for use in Zone 1 as defined in IEC 79 (Gas Group II A and Temperature class T3).
(IACS UI SC 43)

104 SOLAS Reg. II-2/20.3.2.2
The enclosure for electrical equipment shall be at least of type IP 55
(IACS UI SC 42)

105 SOLAS Reg. II-2/20.3.3
The electrical equipment shall be of certified safe type suitable for use in Zone 1 as defined in IEC 79 (Gas Group II A and Temperature class T3).
(IACS UI SC 43)
APPENDIX B
FIXED GAS FIRE-EXTINGUISHING SYSTEMS

A. General

A 100 Application

101 This appendix shall be regarded as the Society’s interpretations to the FSS Code Ch. 5. The appendix shall be considered additional to the requirements of SOLAS Ch.II-2 and the FSS Code.

102 Where considered relevant, the interpretation starts with a reference to the applicable requirement the FSS Code. Where the interpretation is made by IACS, this is indicated after the interpretation.

B. Requirements for all Gas Fire-extinguishing Systems

B 100 General requirements

101 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.

102 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 Ch.7 Sec.1 D as for CO2 bottles.

103 FSS Code Ch. 5.2.1.3.2

The time delay unit shall be equipped with an override valve together with a signboard describing emergency operating instructions.

Guidance note:

In case of electric time delay, a dedicated battery (UPS) may be accepted as an alternative to the override valve.

---end of Guidance note---

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 air supply shall be taken from the starting air receivers. Any stop valve fitted in the air supply line shall be sealed in open position.

C. CO2 Fire-extinguishing Systems

C 100 General requirements

101 FSS Code Ch. 5.2.2.1.5 B104

With reference to Sec.2 Table A1, calculations according to a recognised standard (NFPA 12, ISO/DIS 6183 or equivalent) shall be performed.

102 FSS Code Ch. 5.2.2.2

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.

C 200 Fire-extinguishing systems for cargo holds

201 Requirements in 303 to 316 shall be complied with.

202 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.

203 CO2 pipes connected to the valve register shall be led such that they are as visible and accessible as possible. The pipeline shall not be fitted behind ceiling or lining in the accommodation, unless the ceiling and lining are made detachable by fitting of separate cover plates. Pipes passing through accommodation spaces shall be seamless. The number of joints shall be kept to a minimum. Joints shall be of welded design.

204 The pipelines to cargo spaces 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.

205 The CO2 piping system shall have a blowing-through connection for drying and checking purposes.

C 300 CO2 high pressure fire-extinguishing systems for machinery spaces

301 The number of nozzles shall be sufficient to provide an even distribution of CO2 gas throughout the space. The total sectional area of the nozzles in engine or boiler room 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.

Where oil separators are installed in a separate room, additional nozzles for CO2 shall be fitted in this room.

302 Approximately 90% of the total quantity of CO2 for engine and boiler rooms shall be discharged above, and approximately 10% below the floor.

303 In cases where the CO2 room is readily accessible, one release station may be acceptable. One master valve 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 master valve shall be manually operable even with maximum CO2 pressure acting on it.

304 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.

305 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.

306 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 may be accepted.

307 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
11. The portion of the piping fitted outside the engine and boiler rooms shall be protected internally against corrosion.

12. 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 burrs, rust and scale.

13. 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. Deviations from the table may be accepted when documented by calculations.

### Table C1 Minimum wall thickness for steel pipes for fire-extinguishing CO₂ pipes

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

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.

14. Regarding manufacture, workmanship, inspection and testing of pipes, see Ch.6 Sec.7. For CO₂-manifolds the test pressure may be accepted as 1.25 times design pressure.

15. The distribution manifolds and the pipes between the cylinders and the manifolds shall be subject to a pressure test of at least 1.25 times the relief valve setting, or minimum 125 bar prior to installation. After installation, pipe sections between cylinders and master valves as well as any release line incorporated in the system shall be pneumatically pressure tested to at least 50 bar. All piping from master valves to nozzles shall be tightness tested.

16. A function test of the system shall be carried out to verify correct operating of release gear and alarms. The part of the gas distribution piping that runs through accommodation spaces shall be designed and tested in accordance with IMO MSC/Circ.847, 5.1.2. 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.

### D. Low Pressure CO₂ Systems

#### D 100 General

1. Where a low pressure CO₂ system is fitted to comply with FSS Code Ch.5.2.2, the following applies:

1) The system control devices and the refrigerating plants should be located within the same room where the pressure vessels are stored.

2) The rated amount of liquid carbon dioxide should be stored in vessel(s) under the working pressure in the range of 1.8 to 2.2 N/mm². The normal liquid charge in the container should be limited to provide sufficient vapour space to allow for expansion of the liquid under the maximum storage temperatures than can be obtained corresponding to the setting of the pressure relief valves but should not exceed 95% of the volumetric capacity of the container.

3) Provision should be made for:
   - pressure gauge
   - high pressure alarm: not more than setting of the relief valve
   - low pressure alarm: not less than 1.8 N/mm²
   - branch pipes with stop valves for filling the vessel
   - discharge pipes
   - liquid CO₂ level indicator, fitted on the vessel(s)
   - two safety valves.
4) The two safety relief valves should be arranged so that ei-
ther valve can be shut off while the other is connected to
the vessel. The setting of the relief valves should not be
less than 1.1 times working pressure. The capacity of each
valve should be such that the vapours generated under fire
condition can be discharged with a pressure rise not more
than 20% above the setting pressure. The discharge from
the safety valves should be led to the open.

5) The vessel(s) and outgoing pipes permanently filled with
carbon dioxide should have thermal insulation preventing
the operation of the safety valve in 24 hours after de-ener-
gizing the plant, at ambient temperature of 45°C and an ini-
tial pressure equal to the starting pressure of the
refrigeration unit.

6) The vessel(s) should be serviced by two automated com-
pletely independent refrigerating units solely intended for
this purpose, each comprising a compressor and the rele-
vant prime mover, evaporator and condenser.

7) The refrigerating capacity and the automatic control of
each unit should be so as to maintain the required temper-
ature under conditions of continuous operation during 24
hours at sea temperatures up to 32°C and ambient air tem-
peratures up to 45°C.

8) Each electric refrigerating unit should be supplied from
the main switchboard busbars by a separate feeder.

9) Cooling water supply to the refrigerating plant (where re-
quired) should be provided from at least two circulating
pumps one of which being used as a stand-by. The stand-
by pump may be a pump used for other services so long as
its use for cooling would not interfere with any other es-
sential service of the ship. Cooling water should be taken
from not less than two sea connections, preferably one port
and one starboard.

10) Safety relief devices should be provided in each section of
pipe that may be isolated by block valves and in which
there could be a build-up of pressure in excess of the de-
sign pressure of any of the components.

11) The piping system should be designed in such a way that
the CO₂ pressure at the nozzles should not be less than
1 N/mm².

12) Audible and visual alarms should be given in a central
control station when:
— the pressure in the vessel(s) reaches the low and high
values according to 2
— any one of the refrigerating units fails to operate
— the lowest permissible level of the liquid in the vessels
is reached.

13) If the system serves more than one space, means for con-
rol of discharge quantities of CO₂ should be provided, e.g.
automatic timer or accurate level indicators located at the
control position(s).

14) If a device is provided which automatically regulates the
discharge of the rated quantity of carbon dioxide into the
protected spaces, it should be also possible to regulate the
discharge manually.

(IACS UI SC 170)

102 The alarms required by 101, item 12 should be given in
a continuously manned control station.

103 The refrigerating plant shall comply with the require-
ments given in 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.

104 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.

D 200 Testing

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

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

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

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

205 At judgment of the Society, a discharge test may be re-
quired.
APPENDIX C
HIGH EXPANSION AND INSIDE AIR FOAM SYSTEMS

A. General

A 100 Application

101 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 A100 to A500, whereas systems for ro-ro spaces shall in addition to the IMO FSS Code comply with A100 to A400 and A600.

102 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 IMO FSS Code.

103 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.

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

105 All systems not complying with IMO 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 concentrate, foam filling rate and capacity, operation of dampers and similar are defined by the IMO FSS Code.

A 200 Water and foam concentrate supply systems

201 The water supply pump shall comply with requirements of Appendix A H106 for arrangement of pump 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.

202 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.

203 Both the water and foam supply lines shall be provided with pressure gauges.

204 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.

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

A 300 Foam generating components and foam generator for room

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

302 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.

303 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.

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

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

306 All foam generators shall be fitted with a damper as specified by the IMO FSS Code Ch.6, 2.2.2.2. The damper shall, in addition to protection of the generator, prevent mal-function 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.

307 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.

308 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.

309 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.

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

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

A 400 System arrangement

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

402 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.

403 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.

404 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.

405 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.

406 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).

407 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 demand 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.

A 500 Arrangement for machinery spaces and cargo pump rooms

501 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.

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

503 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.

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

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

A 600 Arrangement for ro-ro spaces

601 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.

602 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 any full scale test undertaken by the manufacturer.

603 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.