PART 4 CHAPTER 10

FIRE SAFETY

JANUARY 2001

CONTENTS

<table>
<thead>
<tr>
<th>Sec.</th>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Requirements</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Fire Pumps and Fire Main</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Fixed Gas Fire Extinguishing System</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Fire Extinguishers</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Fire Extinguishing Arrangement in Machinery Spaces</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Fixed Foam and Pressure Water Spraying Fire Extinguishing Systems</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Special Arrangements in Machinery Spaces</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>Automatic Sprinkler, Fire Detection and Fire Alarm Systems</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>Fixed Fire Detection and Fire Alarm Systems</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>Ventilation Systems</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>Fireman's Outfit</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>Miscellaneous Items</td>
<td>33</td>
</tr>
<tr>
<td>13</td>
<td>Arrangement for Helicopter Decks</td>
<td>34</td>
</tr>
<tr>
<td>14</td>
<td>Fire Control Plans and Drills</td>
<td>35</td>
</tr>
<tr>
<td>15</td>
<td>Fire Safety Measures for Cargo Ships</td>
<td>36</td>
</tr>
<tr>
<td>16</td>
<td>Fire Safety Measures for Cargo Ships less than 500 Gross Tonnage</td>
<td>42</td>
</tr>
<tr>
<td>17</td>
<td>Fire Safety Measures for Fishing Vessels</td>
<td>43</td>
</tr>
</tbody>
</table>
CHANGES IN THE RULES

General


The rule changes come into force 1 January 2002.

This chapter is valid until superseded by a revised chapter.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.

Main changes

- **General**
  - The New Machinery Project called for restructurin of the machinery chapters in Pt.4. As a result of this restructuring, Ch.6 has been renumbered to read Ch.10.
  - The amendments are based on updated requirements adopted by IMO and IACS.

- **Sec.1 General Requirements**
  - Items A104 and C206 have been added. Previous items C206 to C209 have been renumbered C207 to C210.

- **Sec.2 Fire Pumps and Fire Main**
  - Item B204 has been expanded with IACS U1 SC23 and item B208 has been added.
  - Items C201 and C401 have been expanded.

- **Sec.3 Fixed Gas Fire Extinguishing System**
  - Item A206, A213, A214 and B305 have been expanded.

- **Sec.4 Fire Extinguishers**
  - Item A103 has been expanded.

- **Sec.5 Fire Extinguishing Arrangement in Machinery Spaces**
  - Item A101 has been expanded with a Guidance note.

- **Sec.11 Fireman's Outfit**
  - Item A101 has been expanded.

- **Sec.12 Miscellaneous Items**
  - Item A801 has been expanded with a Guidance note.

- **Sec.13 Arrangement for Helicopter Decks**
  - Previous item A103 on requirements from national authority has been deleted.

- **Sec.15 Fire Safety Measures for Cargo Ships**
  - Item B604 has been expanded to cover that watertight doors are to be made of steel.
  - Item B802 has been expanded with IACS U1 SC127.

- **Sec.16 Fire Safety Measures for Cargo Ships less than 500 Gross Tonnage**
  - Item B401 has been expanded.

Corrections and Clarifications

In addition to the above stated rule amendments, some detected errors have been corrected, and some clarifications have been made in the existing rule wording.

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Computer Typesetting (FM+SGML) by Det Norske Veritas
Printed in Norway by GCS AS.
CONTENTS

SEC. 1 GENERAL REQUIREMENTS ..................... 5
A. Scope ....................................................... 5
A 100 Adopted International Maritime Standards .... 5
B. Classification ............................................. 5
B 100 Application .......................................... 5
B 200 Rule references .................................... 5
C. Definitions ................................................ 5
C 100 Ship type definitions and size .................. 6
C 200 Fire technical definitions ....................... 5
C 300 Space definitions .................................. 6
C 400 Definitions on equipment, control stations and hydrostatic terms ................................. 7
C 500 System definitions ................................ 7
D. Documentation .......................................... 7
D 100 Plans and particulars .............................. 7

SEC. 2 FIRE PUMPS AND FIRE MAIN .......... 9
A. General ................................................... 9
A 100 Application ........................................... 9
B. Fire Pumps ................................................ 9
B 100 Capacity of fire pumps ............................ 9
B 200 Arrangement and number of fire pumps ........ 9
C. Water Distribution System ......................... 11
C 100 Diameter of and pressure in the fire mains 11
C 200 Number and position of hydrants ............... 11
C 300 Pipes and hydrants ............................... 11
C 400 Fire hoses ......................................... 11
C 500 Nozzles .............................................. 12
C 600 International shore connection ................. 12
C 700 Pump arrangement for other fire systems 12

SEC. 3 FIXED GAS FIRE EXTINGUISHING SYSTEM ............... 13
A. General ................................................... 13
A 100 Application ........................................... 13
A 200 General requirements ......................... 13
B. Carbon Dioxide Systems ............................ 14
B 100 General requirements for CO₂ fire extinguishing systems 14
B 200 CO₂ fire extinguishing systems for cargo holds 14
B 300 CO₂ high pressure fire extinguishing systems for machinery spaces 14
C. Low Pressure CO₂ Systems ....................... 15
C 100 General .............................................. 15
C 200 Vessels and relevant devices .................. 15
C 300 Refrigerating plant ................................ 16
C 400 Pipes and fittings ................................ 16
C 500 Control of smothering system operation 16
C 600 Release control .................................... 16
C 700 Testing ............................................... 16
D. Halogenated Hydrocarbon Systems ............... 16
D 100 Application ........................................... 16
E. Steam Systems .......................................... 16
E 100 General .............................................. 16
F. Other Gas Systems ..................................... 17
F 100 General .............................................. 17

SEC. 4 FIRE EXTINGUISHERS .................... 18
A. General ................................................... 18
A 100 General requirements for all extinguishers 18
B. Portable Foam Applicator .......................... 18
B 100 Definition ............................................ 18
B 200 Requirement ...................................... 18
C. Portable Fire Extinguishers in Accommodation, Service Spaces and Control Stations 18
C 100 Requirement ...................................... 18
D. Fire Extinguishers in Machinery Spaces 18
D 100 Requirement ...................................... 18

SEC. 5 FIRE EXTINGUISHING ARRANGEMENT IN MACHINERY SPACES .......... 19
A. Spaces Containing Oil-fired Boilers or Oil Fuel Units ... 19
A 100 General .............................................. 19
B. Spaces Containing Internal Combustion Machinery .... 19
B 100 General .............................................. 19
C. Spaces Containing Both Oil Fired Boilers and Internal Combustion Machinery 19
C 100 General .............................................. 19
D. Spaces Containing Steam Turbines or Other Enclosed Steam Engines 19
D 100 General .............................................. 19

SEC. 6 FIXED FOAM AND PRESSURE WATER SPRAYING FIRE EXTINGUISHING SYSTEMS ............... 21
A. General ................................................... 21
A 100 Application ........................................... 21
B. Fixed Low-Expansion Foam Fire - Extinguishing Systems in Machinery Spaces 21
B 100 General .............................................. 21
C. Fixed High-Expansion Foam Fire - Extinguishing Systems in Machinery Spaces 21
C 100 General .............................................. 21
C 200 Arrangement ....................................... 21
C 300 Capacity ............................................ 22
C 400 Foam generator ................................... 22
C 500 Foam generator room ............................ 22
D. Pressure Water-Spraying Systems in Machinery Spaces 22
D 100 General .............................................. 22
E. Pressure Water Spraying Systems for Special Category Spaces in Passenger Ships 22
E 100 General .............................................. 22

SEC. 7 SPECIAL ARRANGEMENTS IN MACHINERY SPACES ............... 24
A. General ................................................... 24
A 100 Application ........................................... 24
A 200 General requirements ............................ 24
SEC. 8 AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS ......................................................... 25
A. General .................................................................................. 25
A 100 Application ........................................................................ 25
A 200 General ............................................................................... 25
A 300 Arrangement ....................................................................... 25
A 400 Capacity ............................................................................ 25
A 500 Pumps and piping system .................................................. 25
A 600 Power sources ..................................................................... 25
A 700 Testing ................................................................................ 25
A 800 Maintenance ....................................................................... 25
A 900 Controls .............................................................................. 25

SEC. 9 FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS .................................................................................. 27
A. Fire Detection and Fire Alarm Systems ..................................... 27
A 100 General ............................................................................... 27
A 200 Installation ........................................................................ 27
A 300 Sample Extraction Smoke Detection Systems ................. 27
A 400 Alarm ................................................................................ 27
A 500 Placement .......................................................................... 27
A 600 Design ................................................................................ 27
A 700 Testing ................................................................................ 27
A 800 Maintenance ....................................................................... 27
A 900 Testing ................................................................................ 27

SEC. 10 VENTILATION SYSTEMS ............................................ 30
A. General .................................................................................. 30
A 100 General requirements ........................................................ 30
A 200 Ventilation .......................................................................... 30
A 300 System ................................................................................ 30

SEC. 11 FIREMAN’S OUTFIT ...................................................... 32
A. General .................................................................................. 32
A 100 General ............................................................................... 32
A 200 Extent of outfit ...................................................................... 32
A 300 Number of outfits ............................................................... 32
A 400 Arrangement of outfit ......................................................... 32
A 500 Fireman’s work ................................................................... 32
A 600 Service ................................................................................ 32
A 700 Pumps ................................................................................ 32
A 800 Portable .............................................................................. 32
A 900 Other .................................................................................. 32

SEC. 12 MISCELLANEOUS ITEMS ............................................ 33
A. General .................................................................................. 33
A 100 Division penetrations .......................................................... 33
A 200 Pipe materials .................................................................... 33
A 300 Electric radiators ................................................................. 33
A 400 Cellulose-nitrate based films .............................................. 33
A 500 Waste-receptacles ............................................................... 33
A 600 Insulation surface .............................................................. 33
A 700 Paint lockers and flammable liquid lockers ....................... 33
A 800 Seismic cables containing flammable liquids ................... 33
A 900 Use of asbestos ................................................................. 33

SEC. 13 ARRANGEMENT FOR HELICOPTER DECKS .......... 34
A. General .................................................................................. 34
A 100 Arrangement ....................................................................... 34

SEC. 14 FIRE CONTROL PLANS AND DRILLS .......... 35
A. General .................................................................................. 35
A 100 General ............................................................................... 35
A 200 Fire control plans ............................................................... 35
A 300 Maintenance and operation instructions .............................. 35
A 400 Fire drills ........................................................................... 35

SEC. 15 FIRE SAFETY MEASURES FOR CARGO SHIPS ................................................................. 36
A. General .................................................................................. 36
A 100 Application ......................................................................... 36
A 200 Rule references ................................................................. 36
A 300 Installation ......................................................................... 36
A 400 Means of escape ............................................................... 36
A 500 Protection of stairways and lift trunks in accommodation spaces, service spaces and control stations .................. 36
A 600 Doors in fire resisting divisions ......................................... 36
A 700 Ventilation systems .......................................................... 36
A 800 Restricted use of combustible materials ............................ 36
A 900 Details of construction ..................................................... 36

C. Arrangements for Gaseous Fuel for Domestic Purposes 40
C 100 General ............................................................................... 40

D 100 General ............................................................................... 40
D 200 Automatic .......................................................................... 40
D 300 Sprinklers ......................................................................... 40
D 400 Administration ................................................................... 40
D 500 System .............................................................................. 40

E. Fire Protection Arrangements in Cargo Spaces .................. 40
E 100 General ............................................................................... 40
E 200 Ro-ro cargo spaces ........................................................... 40
E 300 Cargo spaces, other than ro-ro cargo spaces, intended for the carriage of motor vehicles ....................................... 40

SEC. 16 FIRE SAFETY MEASURES FOR CARGO SHIPS LESS THAN 500 GROSS TONNAGE 42
A. General .................................................................................. 42
A 100 Application ......................................................................... 42
B. Fire Extinction .......................................................................... 42
B 100 Fire pumps ........................................................................ 42
B 200 Water distribution system ................................................ 42
B 300 Portable fire extinguishers ................................................ 42
B 400 Non-portable fire extinguishers ........................................ 42
B 500 Fireman’s outfit ............................................................... 42

SEC. 17 FIRE SAFETY MEASURES FOR FISHING VESSELS ......................................................... 43
A. General .................................................................................. 43
A 100 Application ......................................................................... 43
B. Fire Safety Measures ................................................................ 43
B 100 Fire pumps and water distribution system ......................... 43
B 200 Fire safety arrangements in machinery spaces .................. 43
B 300 Fireman’s outfit ............................................................... 43
B 400 Fire protection of bulkheads and decks ............................ 43
B 500 Portable fire extinguishers ................................................ 43
SECTION 1
GENERAL REQUIREMENTS

A. Scope

A 100 Adopted International Maritime Standards

101 The requirements of this chapter cover the fire technical regulations of SOLAS 74 Chapter II-2 including later amendments as in force per 1 July 1998.

The International Association of Classification Societies' (IACS) interpretations of SOLAS have further been incorporated into the rule text in this chapter.

Fire technical requirements in SOLAS, compulsory to specific types of vessel, are covered by the Part and Chapter for the relevant additional class notation, as referred to in B 105.

102 With reference to Pt. I Ch. 1 Sec. 3, plan approval and survey with subsequent issuance of relevant SOLAS Certificates, if carried out by a recognised SOLAS contracting government in which the vessel is registered, may be accepted as basis for the requirements to fire safety for the class.

103 Text quoted from SOLAS is printed in italics.

For the application of these rules, wherever the term Administration is quoted, this is to read as the Society.

104 IMO MSC/Circ. 847, "Interpretations of vague expressions and other vague wording in SOLAS Chapter II-2" is to be regarded as part of the rules, although the entire text of this IMO Circular is not included in the rules.

B. Classification

B 100 Application

101 The requirements in this chapter apply to all ships assigned main class, except as specified in 102.

102 The present regulations, unless expressly provided otherwise, do not apply to:

- ships of war and troopships
- cargo ships less than 500 gross tonnage
- ships not propelled by mechanical means
- wooden ships of primitive build
- pleasure yachts not engaged in trade
- fishing vessels.

(SOLAS Reg. I/3)

See also 105 concerning cargo ships less than 500 gross tonnage and fishing vessels.

103 Consideration will be given to ships classed for restricted or special service.

104 The Administration of a State may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this Chapter unreasonable or unnecessary, exempt from those requirements individual ships or classes of ships entitled to fly the flag of that State which, in the course of their voyage, do not proceed more than 20 miles from the nearest land.

(SOLAS Reg. II-2/1.4.1)

105 The requirements may also be applicable to other ships than specified in 102. Such applications will be stated in connection with additional classes. For cargo ships less than 500 gross tonnage Sec.16 will apply. For fishing vessels Sec.17 will apply.

106 Consideration will be given to ships not covered by 102 and 105.

B 200 Rule references

201 Special requirements applicable to additional class notations are placed under:

| Passenger Ships | Pt.5 Ch.2 |
| Oil Carriers | Pt.5 Ch.3 |
| Chemical Carriers | Pt.5 Ch.4 |
| Liquefied Gas Carriers | Pt.5 Ch.5 |
| Fishing Vessels | Sec.17 |
| Fire Fighter I (or II or III) | Pt.5 Ch.7 |
| Additional Fire Protection (F-AMC) | Pt.6 Ch.4 |
| Dangerous Goods | Pt.5 Ch.11 |

C. Definitions

C 100 Ship type definitions and size

101 A "passenger" is every person other than:

- the master and the members of the crew or other persons employed or engaged in any capacity on board a ship on the business of that ship, and
- a child under one year of age.

(SOLAS Reg. I/2(e))

102 A "passenger ship" is a ship which carries more than twelve passengers.

(SOLAS Reg. I/2(f))

103 A "cargo ship" is any ship which is not a passenger ship.

(SOLAS Reg. I/2(g))

104 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))

105 A "fishing vessel" is a vessel used for catching fish, whales, seals, walrus or other living resources of the sea.

(SOLAS Reg. I/2(i))

C 200 Fire technical definitions

201 "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. Any other material is a combustible material.

(SOLAS Reg. II-2/3.1)

202 "A standard fire test" is one 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. The test methods shall be in accordance with the Fire Test Procedures Code.

(SOLAS Reg. II-2/3.2)

203 "A class divisions" are those divisions formed by bulkheads and decks which comply with the following:

1. they shall be constructed of steel or other equivalent material;
2. they shall be suitably stiffened;
3. they shall be so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test;

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4. they shall be 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.

5. the Administration 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-2/3.3)

204 "B' class divisions" are those divisions formed by bulkheads, decks, ceilings or linings which comply with the following:

1. they shall be 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;

2. they shall 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.

3. they shall be constructed of approved non-combustible materials and all materials entering into 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;

4. the Administration 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)

205 "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-2/3.5)

206 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)

207 "Continuous 'B' class ceilings or linings" are those "B' class ceilings or linings which terminate only at an "A' or "B' class division.

(SOLAS Reg. II-2/3.6)

208 "Steel or other equivalent material". Where the words "steel or other equivalent material" occur, "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-2/3.7)

209 "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-2/3.8)

210 Primary deck covering is a deck covering which will not readily ignite or give rise to toxic or explosive hazards at elevated temperatures. Testing is to be based on IMO Res. A.687(17) or an equivalent test procedure.

C 300 Space definitions

301 "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-2/3.9)

302 "Accommodation spaces" are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.

(SOLAS Reg. II-2/3.10)

303 "Public spaces" are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

(SOLAS Reg. II-2/3.11)

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

(SOLAS Reg. II-2/3.12)

305 "Cargo spaces" are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces.

(SOLAS Reg. II-2/3.13)

306 "Ro-ro cargo spaces" are spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which 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-2/3.14)

307 "Open ro-ro cargo spaces" are ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead to the satisfaction of the Administration.

(SOLAS Reg. II-2/3.15)

308 "Closed ro-ro cargo spaces" are ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks.

(SOLAS Reg. II-2/3.16)

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

(SOLAS Reg. II-2/3.17)

310 "Special category spaces" are those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.

(SOLAS Reg. II-2/3.18)
311 "Machinery spaces of category A" are those spaces and trunks to such spaces which contain:

- .1 internal combustion machinery used for main propulsion; or
- .2 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; or
- .3 any oil-fired boiler or oil fuel unit.

(SOLAS Reg. II-2/3.19)

Spaces which contain oil fired equipment other than boilers, such as inert gas generators, incinerators, waste disposal units etc., are to be considered as machinery spaces of category A.

(IACS UR F35 / UI SC15)

312 "Machinery spaces" are all machinery spaces of category A and all 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-2/3.20)

C 400 Definitions on equipment, control stations and hydrostatic terms

401 "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-2/3.21)

Oil fired inert gas generators are to be defined as 'Oil fuel unit'.

(IACS UI SC16)

402 "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.

(SOLAS Reg. II-2/3.22)

'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 are to be regarded as control stations regardless of battery capacity:

- .1 emergency batteries in separate battery room for power supply from blackout till start of emergency generator;
- .2 emergency batteries in separate battery room as reserve source of energy to radiotelegraph installation;
- .3 batteries for start of emergency generator;
- .4 and in general, all emergency batteries required in pursuance of Ch.8 Sec.2 C.

(IACS UI SC17)

403 "Central control station" is a control station in which the following control and indicator functions are centralized:

- .1 fixed fire detection and alarm system;
- .2 automatic sprinklers, fire detection and alarm system;
- .3 fire door indicator panels;
- .4 fire door closures;
- .5 watertight door indicator panels;
- .6 watertight door closure;
- .7 ventilation fans;
- .8 general/fire alarms;
- .9 communication systems including telephones; and
- .10 microphones to public address systems.

(SOLAS Reg. II-2/3.22-1)

404 "Continuously manned central control station" is a central control station which is continuously manned by a responsible member of the crew.

(SOLAS Reg. II-2/3.22-2)

405 Rooms containing furniture and furnishings of restricted fire risk are, for the purpose of regulation 26 (Pt.5 Ch.2 Sec.2 E700) those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

- .1 all case furniture such as desks, wardrobes, dressing tables, bureaux, dressers, is 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;
- .2 all free-standing furniture such as chairs, sofas, tables, is constructed with frames of non-combustible materials;
- .3 all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool of mass 0.8 kg/m, this being determined in accordance with the Fire Test Procedures Code;
- .4 all floor coverings have low flame characteristics;
- .5 all exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics; and
- .6 all upholstered furniture has qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code;
- .7 all 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-2/3.23)

406 "Bulkhead deck" is the uppermost deck up to which the transverse watertight bulkheads are carried.

(SOLAS Reg. II-2/3.24)

407 "Deadweight" is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the load water-line corresponding to the assigned summer freeboard and the lightweight of the ship.

(SOLAS Reg. II-2/3.25)

408 "Lightweight" is the displacement of a ship in tonnes without cargo fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.

(SOLAS Reg. II-2/3.26)

409 "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.

(SOLAS Reg. II-2/3.35)

C 500 System definitions

501 A total flooding fire-extinguishing system is a permanently fixed system designed for extinguishing in the complete volume of an enclosure.

502 Local application fire-extinguishing system is a permanently fixed system designed for extinguishing of local outbreaks.

D. Documentation

D 100 Plans and particulars

101 In cases where the National Authorities do not survey the ship, as specified in A102, the following plans and particulars are to be submitted for approval:

- fire pumps and fire main including emergency fire pump and number and positions of hydrants and hoses
- capacity calculation for fire pumps
— fixed fire extinguishing arrangement in engine and boiler room. Specification and location of equipment and calculation of discharge capacities, if required
— fixed fire extinguishing arrangement in cargo spaces. Specification and location of equipment and calculation of discharge capacities, if required
— fire control plan. Equipment according to Sec.14 is to be included on the plan in addition to details of fire items not shown on other drawings
— automatic sprinkler, fire alarm and fire detection system. Sprinklers grouped into sections, specification and locations of pumps, tanks, alarms and activators, if applicable
— for fixed fire detection and alarm systems in accommodation spaces, service spaces, machinery spaces and cargo spaces, if required: Specification and location of detectors, alarm devices and call points, and cable routing layout drawing
— ventilation systems. Layout, dimensions and penetrations of ducts through fire divisions and details of fire dampers
— penetration of cables and pipes through fire divisions
— arrangement of means of control for closure of openings, stop of ventilation fans and stop of fuel oil pumps in machinery spaces of category A.

**Cargo ships**

— ventilation systems in cargo spaces
— structural fire protection drawings showing method of construction, key numbers according to Sec.15 B300 for all rooms, the fire insulation and draught stops. Details of insulation and specification of materials. Doors in fire divisions
— means of escape from different compartments
— fire extinguishing system for cargo spaces
— protection of ro-ro cargo spaces and cargo spaces intended for carriage of motor vehicles with fuel in their tanks for their own propulsion with ventilation system, fire main, fire extinction and precautions against ignition of flammable vapours, if applicable.

**102** Fire fighting equipment required to be of an approved type, such as hoses, extinguishers, gas cylinders, emergency pumps, breathing apparatuses etc. are to be approved by the Society or a recognised SOLAS contracting government administration.

Documentation verifying approval is in such cases to be submitted.

**103** For instrumentation and automation, including computer based control and monitoring, see Ch.9 Sec.1.
SECTION 2
FIRE PUMPS AND FIRE MAIN

A. General

A 100 Application

101 Every ship is to be provided with fire pumps, fire mains, hydrants and hoses complying as applicable with the requirements of this regulation.

(SOLAS Reg. II-2/4.1)

B. Fire Pumps

B 100 Capacity of fire pumps

101 The required fire pumps shall be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in paragraph 4 (C100), as follows:

.1 Pumps in passenger ships, not less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping; and

.2 pumps in cargo ships, other than any emergency pump, not less than four-thirds of the quantity required under Regulation II-1/21 to be dealt with by each of the independent bilge pumps in a passenger ship of the same dimension when employed in bilge pumping, provided that in no cargo ship need the total required capacity of the fire pumps exceed 180 m³/hour.

(SOLAS Reg. II-2/4.2.1)

102 Each of the required fire pumps (other than any emergency pump required in paragraph 3.3.2 (203.2) for cargo ships) shall have a capacity not less than 80% of the total required capacity divided by the minimum number of required fire pumps but in any case not less than 25 m³/hour and each such pump shall in any event be capable of delivering at least the two required jets of water. These fire pumps shall be capable of supplying the fire main system under the required conditions. Where more pumps than the minimum required pumps are installed the capacity of such additional pumps shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/4.2.2)

B 200 Arrangement and number of fire pumps

201 Ships shall be provided with independently driven fire pumps as follows:

.1 Passenger ships of 4,000 gross tonnage and upwards at least three.

.2 Passenger ships of less than 4,000 gross tonnage and cargo ships of 1,000 gross tonnage and upwards at least two.

.3 Cargo ships of less than 1,000 gross tonnage to the satisfaction of the Administration.

(SOLAS Reg. II-2/4.3.1)

.4 Cargo ships of less than 1000 gross tonnage but above 500 gross tonnage are to be provided with not less than two power fire pumps, one of which is to be an independently driven pump.

(IACS UI SC18)

202 Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted.

(SOLAS Reg. II-2/4.3.2)

203 The arrangement of sea connections, fire pumps and their sources of power shall be such as to ensure that:

.1 In passenger ships of 1,000 gross tonnage and upwards, in the event of a fire in any one compartment all the fire pumps will not be put out of action.

.2 In cargo ships of 1,000* gross tonnage and upwards if a fire in any one compartment could put all the pumps out of action there shall be an alternative means consisting of a fixed independently driven emergency pump which shall be capable of supplying two jets of water to the satisfaction of the Administration. The pump and its location shall comply with the following requirements:

.2.1 The capacity of the pump shall not be less than 40% of the total capacity of the fire pumps required by this Reg. and in any case not less than 25 m³/hour.

.2.2 When the pump is delivering the quantity of water required by paragraph 3.3.2.1 (203.2.1) the pressure at any hydrant shall be not less than the minimum pressures given in paragraph 4.2 (C102).

.2.3 Any diesel driven power source for the pump shall be capable of being readily started in its cold condition down to a temperature of 0°C by hand (manual) cranking. If this is impracticable, or if lower temperatures are likely to be encountered, consideration is to be given to the provision and maintenance of heating arrangements, acceptable to the Administration, so that ready starting will be assured. If hand (manual) starting is impracticable the Administration may permit other means of starting. These means shall be such as to enable the diesel driven power source to be started at least 6 times within a period of 30 minutes, and at least twice within the first 10 minutes.

For diesel engines above 15 kW, the engine is to be equipped with an approved auxiliary starting device, e.g. starting battery, independent hydraulic system, or independent air system.

.2.4 Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least three hours and sufficient reserves of fuel shall be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours.

For ships below 2000 gross tonnage the total running time may be reduced to 3 hours.

.2.5 The total suction head and the net positive suction head of the pump shall be such that the requirements of paragraphs 3.3.2.2 (203.2.2), 3.3.2.1 (203.2.1), 3.3.2.2 (203.2.2) and 4.2 (C102) of this regulation shall be obtained under all conditions of list, trim, roll and pitch likely to be encountered in service.

A condition of service is to be based upon a minimum draft for self propulsion of the ship. The emergency fire pump not installed at an adequate depth below water line, is to be of a self-priming type.
2.6 When the emergency fire pump is electrically driven, the power is to be supplied by a source other than that supplying the main fire pumps. The relevant electric cables are not to pass through the compartment containing the main fire pump. This source is to be located outside the space containing the main fire pumps and their source of power and is to be insulated to a standard of structural fire protection equivalent to a control station in Sec.15 B300.

2.7 No direct access shall be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable an Administration may accept an arrangement where the access is by means of an airlock, each of the two doors being self-closing, or through a watertight door capable of being operated from a space remote from the machinery space and the space containing the emergency fire pump and unlikely to be cut off in the event of fire in those spaces. In such cases a second means of access to the space containing the emergency fire pump and its source of power shall be provided.

2.8 Ventilation arrangements to the space containing the independent source of power for the emergency fire pump shall be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.

If the room is to be mechanically ventilated the power is to be supplied by the emergency source. The room where the emergency fire pump prime mover is located is to be illuminated from the emergency source of supply and is to be well ventilated.

2.9 The space containing the fire pump shall not be contiguous to the boundaries of machinery spaces of category A or those spaces containing main fire pumps. Where this is not practicable, the common bulkhead between the two spaces shall be insulated to a standard of structural fire protection equivalent to that required for a control station in regulation 44 (Sec.15 B300).

Where an emergency fire pump is required according to 203.2, the fire pump and its source of power are to be outside the space containing the main fire pumps. Sea water inlet, suction and delivery pipes are to be outside the space containing the main fire pumps except for short lengths of pipe enclosed in substantial steel casing. If sea chest is located inside the space containing main fire pump, the sea chest valve is to be operable from a position close to the pump.

2.10 If water is needed for any fixed fire extinguishing system provided to protect the space where the main fire pumps are located, the capacity of the emergency fire pump is to be sufficient for simultaneously supplying water to this and the fire main.

2.11 The emergency fire pump may also be used for other suitable purposes subject to approval in each case.

2.12 Upon completion of the emergency fire pump installation a running test of 4 hours duration is to be carried out. This test is to be a full load trial, and the water pressure in the fire main is to be checked.

3 In passenger ships of less than 1,000 gross tonnage and cargo ships of less than 1000* gross tonnage, if a fire in any one compartment could put all the pumps out of action the alternative means of providing water for fire-fighting purposes are to the satisfaction of the Administration.

3.1 The alternative means to be provided in accordance with the provisions of paragraph 3.3.3 (203.3) shall be an independently driven, power-operated emergency fire pump and with its source of power and sea connection located outside the machinery space.

4 In addition, in cargo ships where other pumps, such as general service, bilge and ballast, etc., are fitted in a machinery space, arrangements shall be made to ensure that at least one of these pumps, having the capacity and pressure required by paragraphs 2.2 (102) and 4.2 (102), is capable of providing water to the fire main.

(SOLAS Reg. II-2/4.3.3, * IACS UR F30, IACS UI SC19)

204 The arrangements for the ready availability of water supply shall be:

1 In passenger ships of 1,000 gross tonnage and upwards such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of a required fire pump.

Only one of the required fire pumps needs to be provided with automatic starting.

(IACS U1 SC23)

2 in passenger ships of less than 1,000 gross tonnage and in cargo ships to the satisfaction of the Administration

3 in cargo ships with a periodically unattended machinery space or when only one person is required on watch there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurization of the fire main system by one of the main fire pumps, except that the Administration may waive this requirement for cargo ships of less than 1,000 gross tonnage if the arrangement of the machinery space access makes it unnecessary.

4 In passenger ships, if fitted with periodically unattended machinery spaces in accordance with regulation II-1/54, the Administration shall determine provisions for fixed water fire-extinguishing arrangement for such spaces equivalent to those required for normally attended machinery spaces.

(SOLAS Reg. II-2/4.3.4)

205 Relief valves shall be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves shall be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.

(SOLAS Reg. II-2/4.3.5)

206 Where centrifugal fire pumps are used, a non-return valve is to be fitted to the pump.

207 In tankers isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 m to preserve the integrity of the fire main system in case of fire or explosion.

(SOLAS Reg. II-2/4.3.6)

208 For ships with class notation ICE, at least one of the fire pumps is to be connected to a sea chest, which is in compliance with Pt.5 Ch.1 Sec.2 C300.

(IACS UR F41)
C. Water Distribution System

C 100 Diameter of and pressure in the fire mains

101 The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously, except that in the case of cargo ships the diameter need only be sufficient for the discharge of 140 m³/hour.

(SOLAS Reg. II-2/4.4.1)

102 With the two pumps simultaneously delivering through nozzles specified in paragraph 8 (500) the quantity of water specified in paragraph 4.1 (101), through any adjacent hydrants, the following minimum pressures shall be maintained at all hydrants:

<table>
<thead>
<tr>
<th>Cargo ships:</th>
<th>6,000 gross tonnage and upwards</th>
<th>0.27 N/mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 gross tonnage and upwards but under 6,000 gross tonnage</td>
<td>0.25 N/mm²</td>
</tr>
<tr>
<td>Under 1,000 gross tonnage</td>
<td>To the satisfaction of the Administration</td>
<td></td>
</tr>
</tbody>
</table>

(SOLAS Reg. II-2/4.4.2)

For passenger ships, see Pt.5 Ch.2.

103 The maximum pressure at any hydrant shall not exceed that at which the effective control of a fire hose can be demonstrated.

(SOLAS Reg. II-2/4.4.3)

C 200 Number and position of hydrants

201 The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and any part of any cargo space when empty, any ro-ro cargo space or any special category space in which latter case the two jets shall reach any part of such space, each from a single length of hose. Furthermore, such hydrants shall be positioned near the accesses to the protected spaces.

(SOLAS Reg. II-2/4.5.1)

When calculating the number of hydrants, the length of the water jet is to be ignored.

202 In the accommodation, service and machinery spaces of passenger ships the number and position of hydrants shall be such that the requirements of paragraph 5.1 (201) may be complied with when all watertight decks and all doors in main vertical zone bulkheads are closed.

(SOLAS Reg. II-2/4.5.2)

203 Where, in a passenger ship, access is provided to a machinery space of category A at a low level from an adjacent shaft tunnel, two hydrants shall be provided external to, but near the entrance to that machinery space. Where such access is provided from other spaces, in one of those spaces two hydrants shall be provided near the entrance to the machinery space of category A. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route.

(SOLAS Reg. II-2/4.5.3)

C 300 Pipes and hydrants

301 Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants shall be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants shall be such as to avoid the possibility of freezing. In ships where deck cargo may be carried, the positions of the hydrants shall be such that they are always readily accessible and the pipes shall be arranged as far as practicable to avoid risk of damage by such cargo. Unless one hose and nozzle is provided for each hydrant in the ship, there shall be complete interchangeability of hose couplings and nozzles.

(SOLAS Reg. II-2/4.6.1)

302 A valve shall be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.

(SOLAS Reg. II-2/4.6.2)

303 Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. Exceptionally, the Administration may permit short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space if it is impracticable to route it externally provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

(SOLAS Reg. II-2/4.6.3)

304 Pipe wall thicknesses are to be in accordance with Ch.6 Sec.6 and material quality in accordance with Pt.2 Ch.1.

305 All water pipes for fire extinguishing are to be provided with means for draining to avoid damage due to frost.

C 400 Fire hoses

401 Fire hoses shall be of non-perishable material approved by the Administration and shall be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Fire hoses of non-perishable material shall be provided in ships constructed on or after 1 February 1992, and on ships constructed before 1 February 1992 when the existing fire hoses are replaced. Their maximum length shall be to the satisfaction of the Administration. Each hose shall be provided with a nozzle and the necessary couplings. Hoses specified in this Chapter as "fire hoses" shall together with any necessary fittings and tools be kept ready for use in conspicuous positions near the water service hydrants or connections. Additionally in interior locations in passenger ships carrying more than 36 passengers fire hoses shall be connected to the hydrants at all times.

(SOLAS Reg. II-2/4.7.1)

Fire hoses should have a length of:
- at least 10 m
- not more than 15 m in machinery spaces
- not more than 20 m for other spaces and open decks
- not more than 25 m for open decks on ships with a maximum breadth in excess of 30 m.

(MSC/Circ.847)

Guidance note:
Fire hoses should be of dimension 38 mm (1.5") in accommodation and 51 mm (2") in other areas.

---end of Guidance note---

402 Ships shall be provided with fire hoses the number and diameter of which shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/4.7.2)

403 In passenger ships there shall be at least one fire hose for each of the hydrants required by paragraph 5 (200) and these hoses shall be used only for the purposes of extinguishing fires or testing the fire-extinguishing apparatus at fire drills and surveys.

(SOLAS Reg. II-2/4.7.3)

404 In cargo ships of 1,000 gross tonnage and upwards the number of fire hoses to be provided shall be one for each 30 m length of the ship and one spare but in no case less than five in all. This number does not include any hoses required in any engine or boiler room. The Administration may increase the number of hoses required so as to ensure that hoses in suffi-
cient number are available and accessible at all times, having regard to the type of ship and the nature of trade in which the ship is employed.

(SOLAS Reg. II-2/4.7.4.1)

405 In cargo ships of less than 1,000 gross tonnage the number of fire hoses to be provided shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/4.7.4.2)

The number of fire hoses shall be one for each 30 m length of the ship and one spare but not less than 3 in all.

C 500 Nozzles

501 For the purposes of this chapter, standard nozzle sizes shall be 12 mm, 16 mm and 19 mm or as near thereto as possible. Larger diameter nozzles may be permitted at the discretion of the Administration.

(SOLAS Reg. II-2/4.8.1)

502 For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.

(SOLAS Reg. II-2/4.8.2)

503 For machinery spaces and exterior locations, the nozzle size shall be such as to obtain the maximum discharge possible from two jets at the pressure mentioned in paragraph 4 (100) from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.

(SOLAS Reg. II-2/4.8.3)

504 All nozzles shall be of an approved dual purpose type (i.e. spray/jet type) incorporating a shut-off.

(SOLAS Reg. II-2/4.8.4)

C 600 International shore connection

601 Ships of 500 gross tonnage and upwards shall be provided with at least one international shore connection, complying with provisions of paragraph 3 (603).

(SOLAS Reg. II-2/19.1)

602 Facilities shall be available enabling such a connection to be used on either side of the ship.

(SOLAS Reg. II-2/19.2)

603 Standard dimensions of flanges for the international shore connection shall be in accordance with the following table:

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>178 mm</td>
</tr>
<tr>
<td>Inside diameter</td>
<td>64 mm</td>
</tr>
<tr>
<td>Bolt circle diameter</td>
<td>132 mm</td>
</tr>
<tr>
<td>Slots in flange</td>
<td>4 holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery</td>
</tr>
<tr>
<td>Flange thickness</td>
<td>14.5 mm minimum</td>
</tr>
<tr>
<td>Bolts and nuts</td>
<td>4, each of 16 mm diameter, 50 mm in length.</td>
</tr>
</tbody>
</table>

(SOLAS Reg. II-2/19.3)

604 The connection shall be of steel or other suitable material and shall be designed for 1.0 N/mm² services. The flange shall have a flat face on one side and on the other shall be permanently attached to a coupling that will fit the ship's hydrant and hose. The connection shall be kept aboard the ship together with a gasket of any material suitable for 1.0 N/mm² services, together with four 16 mm bolts, 50 mm in length and eight washers.

(SOLAS Reg. II-2/19.4)

C 700 Pump arrangement for other fire systems

701 Pumps required for the provision of water for other fire-extinguishing systems required by this chapter, their sources of power and their controls shall be installed outside the space or spaces protected by such systems and shall be so arranged that a fire in the space or spaces protected will not put any such system out of action.

(SOLAS Reg. II-2/4.9)
SECTION 3
FIXED GAS FIRE EXTINGUISHING SYSTEM

A. General

A 100 Application

The requirements in this section applies to ships and spaces where fixed gas fire extinguishing systems are required or fitted.

A 200 General requirements

201 The use of a fire-extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons shall not be permitted.

(SOLAS Reg. II-2/5.1.1)

202 The necessary pipes for conveying fire-extinguishing medium into protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision shall be made to prevent inadvertent admission of the medium to any space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space the gas connection shall be blanked during such use.

(SOLAS Reg. II-2/5.1.2)

203 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.

(SOLAS Reg. II-2/5.1.3)

204 Means shall be provided to close all openings which may admit air to or allow gas to escape from a protected space.

(SOLAS Reg. II-2/5.1.4)

205 Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, the Administration shall require the provision of an additional quantity of fire-extinguishing medium.

(SOLAS Reg. II-2/5.1.5)

206 Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm shall operate for a suitable period before the medium is released.

(SOLAS Reg. II-2/5.1.6)

The alarm shall be automatically activated by opening of release cabinet door. The alarm is to operate as long as doors to release boxes or master valves are kept open. The alarm is to operate for a suitable period before the medium is released, and for this purpose an automatic time delay device is to be fitted to ensure that the alarm operates for a period of time necessary to evacuate the space but not less than 20 s.

The time delay unit to 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---

Ordinary cargo holds need not comply with this requirement. However, ro-ro cargo spaces and other spaces where personnel can be expected to enter and where the access is therefore facilitated by doors or manway hatches are to comply. Small spaces, such as small compressor rooms, paint lockers, lamp stores and similar spaces where release is situated immediately outside entrance to such space need not be provided with automatic audible warning.

(IACS UI SC25)

207 Alarms are to be pneumatically or electrically operated. If electrically operated, the alarm is to be supplied with power from the main and emergency source of electrical power. If pneumatically operated, the air supply is to be taken from the starting air receivers. Any stop valve fitted in the air supply line is to be sealed in open position.

(SOLAS Reg. II-2/5.1.7)

208 The means of control of any fixed gas fire-extinguishing system shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

(SOLAS Reg. II-2/5.1.8)

210 Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.

(SOLAS Reg. II-2/5.1.9)

211 Except as otherwise permitted by paragraphs 3.3, 3.4 or 3.5 pressure containers required for the storage of fire-extinguishing medium, other than steam, shall be located outside protected spaces in accordance with paragraph 1.13 (214).

(SOLAS Reg. II-2/5.1.10)

212 Means shall be provided for the crew to safely check the quantity of medium in the containers.

(SOLAS Reg. II-2/5.1.11)

For this purpose the arrangement of bottles is to be such as to provide access for the necessary checking.

213 Containers for the storage of fire-extinguishing medium and associated pressure components shall be designed to pressure codes of practice to the satisfaction of the Administration having regard to their locations and maximum ambient temperatures expected in service.

(SOLAS Reg. II-2/5.1.12)

Unless otherwise specified, the maximum ambient temperature is to be understood at 55°C. Certification of the bottles is to be carried out according to Ch.7 Sec.1 D as for CO2 bottles.

214 When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position and shall be effectively ventilated to the satisfaction of the Administration. Any entrance to such a storage room shall preferably be from the open deck and in any case shall be independent of the protected space. Access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces shall be gastight. For the purpose of the application of the integrity tables in Regulations 26 (Pt.5 Ch.2 Sec.2 E700), 27 (Pt.5 Ch.2 Sec.2 E800), 44 (Sec 15 B300) and 58 (Pt.5 Ch.3 Sec.7 B400), such storage rooms shall be treated as control stations.

(SOLAS Reg. II-2/5.1.13)
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.

215 **Spare parts for the system shall be stored on board and be to the satisfaction of the Administration.**

(SOLAS Reg. II-2/5.1.14)

216 On completion, the system is to be function tested. Systems of new design are to be function tested according to an approved test program.

**B. Carbon Dioxide Systems**

**B 100 General requirements for CO₂ fire extinguishing systems**

101 For cargo spaces the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space so protected in the ship.

(SOLAS Reg. II-2/5.2.1)

See Sec.15 and Pt.5 Ch.2 Sec.2 G for additional requirements for ro-ro cargo spaces and spaces carrying vehicles with fuel in their tanks for their own propulsion.

102 For machinery spaces the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

.1 40% of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40% of the largest horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or

.2 35% of the gross volume of the largest machinery space protected, including the casing; provided that the above-mentioned percentages may be reduced to 35% and 30% respectively for cargo ships of less than 2,000 gross tonnage; provided also that if two or more machinery spaces are not entirely separate they shall be considered as forming one space.

(SOLAS Reg. II-2/5.2.2)

103 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m³/kg.

(SOLAS Reg. II-2/5.2.3)

The necessary amount (kg) of CO₂ related to the protected volume (m³) is to be calculated as:

- 30% CO₂ = 0.54 kg CO₂ per m³
- 35% CO₂ = 0.63 kg CO₂ per m³
- 40% CO₂ = 0.71 kg CO₂ per m³
- 45% CO₂ = 0.80 kg CO₂ per m³.

104 For machinery spaces the fixed piping system shall be such that 85% of the gas can be discharged into the space within 2 minutes. (SOLAS Reg. II-2/5.2.4)

With reference to Table B2, calculations according to a recognised standard (NFPA 12, ISO/DIS 6183 or equivalent) are to be performed.

105 Carbon dioxide systems installed on or after 1 October 1994 shall comply with the following requirements:

.1 Two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activities of the alarm. One control shall be used to discharge the gas from its storage containers. A second control shall be used for opening the valve of the piping which conveys the gas into the protected space.

.2 The two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass type enclosure conspicuously located adjacent to the box.

(SOLAS Reg. II-2/5.2.5)

3 There is to be a release box for each protected space in which personnel normally work or to which they have access. The space served is to be identified at the release box. These requirements apply for all CO₂-systems.

**Guidance note:**
Concerning application of requirement for CO₂ release alarm for cargo holds and small spaces, see A206.

---end of Guidance note---

**B 200 CO₂ fire extinguishing systems for cargo holds**

201 Requirements in 303 to 316 are to be complied with.

202 The internal diameter of the pipes is not to 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 is to have facilities for drainage and cleaning.

203 CO₂ pipes connected to the valve register are to be led such that they are as visible and accessible as possible. The pipeline is not to 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 are to be seamless. The number of joints is to be kept to a minimum. Joints are to be of welded design.

204 The pipelines to cargo spaces are as far as practicable to be fitted below the weather deck and are to be laid as straight as possible. Branch pipes leading to the various nozzles are to be symmetrically installed. All piping is to be properly clamped and, where necessary, protected against external damage.

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

**B 300 CO₂ high pressure fire extinguishing systems for machinery spaces**

301 The number of nozzles is to 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 is not to 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 are to be fitted in this room. For purifier rooms, see Ch.1 Sec.3 A400.

302 Approximately 90% of the total quantity of CO₂ for engine and boiler rooms is to 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 is to be fitted to the piping system of the Total Flooding System. The operation of those valves is to be controlled from the position where the CO₂ system is released. This is to 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 is to be manually operable even with maximum CO₂ pressure acting on it. For the release of the system, see 105.
304 The CO₂ bottle valves are to be of a type which makes it possible to close the bottles after testing the release system without emptying the CO₂ content.

305 Bottles are not to contain more than 45 kg of CO₂ and the ratio of charge is not to exceed 0.67 kg/litre. The company charging the bottles is to 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 are to 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 are to 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 is to be fitted to the manifold. If the non-return valve is fitted in the upper portion of the bottle valve, a notice is to be posted, which clearly states that the upper portion of the valve is to remain attached to the manifold, even if the appropriate bottle has been temporarily removed.

308 The CO₂ pipes connecting the manifold to the valves are to be steel pipes, the wall thickness of which is to be at least as given in Table B1. The pipes are to comply with the requirements specified in Pt.2 Ch.1 or other recognised standard, and are to be certified by the Society. Fittings used as pipe joints in this part of the CO₂ line are to be of steel or equivalent material.

309 Master valves are to be of steel or equivalent material and are to comply with PN 100 (nominal pressure). In systems where valve arrangements introduce sections of closed piping manifolds, such sections are to be equipped with pressure relief devices.

310 The wall thickness of CO₂ pipes fitted between valves and nozzles is at least to comply with Table B1. Fittings used to join this part of the CO₂ pipes may be of malleable cast iron or nodular cast iron.

### Table B2 Maximum quantity of CO₂ which may be carried through any pipeline

<table>
<thead>
<tr>
<th>Maximum quantity of CO₂</th>
<th>Internal diameter of pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 kg</td>
<td>13 mm</td>
</tr>
<tr>
<td>100 kg</td>
<td>19 mm</td>
</tr>
<tr>
<td>135 kg</td>
<td>25 mm</td>
</tr>
<tr>
<td>275 kg</td>
<td>32 mm</td>
</tr>
<tr>
<td>450 kg</td>
<td>38 mm</td>
</tr>
<tr>
<td>1100 kg</td>
<td>50 mm</td>
</tr>
<tr>
<td>2000 kg</td>
<td>76 mm</td>
</tr>
<tr>
<td>3250 kg</td>
<td>89 mm</td>
</tr>
<tr>
<td>4750 kg</td>
<td>101 mm</td>
</tr>
<tr>
<td>6800 kg</td>
<td>114 mm</td>
</tr>
<tr>
<td>9500 kg</td>
<td>127 mm</td>
</tr>
<tr>
<td>15250 kg</td>
<td>152 mm</td>
</tr>
</tbody>
</table>

311 The portion of the piping fitted outside the engine and boiler rooms is to be protected internally against corrosion.

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

313 The diameter of CO₂ pipes is to 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 B2. Deviations from the table may be accepted when documented by calculations, see 104.

314 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.

315 The distribution manifolds and the pipes between the cylinders and the manifolds are to 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 are to be pneumatically pressure tested to at least 50 bar. All piping from master valves to nozzles are to be tightness tested.

316 A function test of the system is to be carried out to verify correct operating of release gear and alarms. The part of the gas distribution piping that runs through accommodation spaces are to be designed and tested in accordance with IMO MSC/Circ.847, 5.1.2. All other piping is to be tested to ensure that it is free from obstructions. As far as practicable, the function testing is to be performed in the most realistic manner.

### C. Low Pressure CO₂ Systems

#### C 100 General

101 The rated amount of carbon dioxide, time of discharge into the protected space, location of nozzles in the protected spaces and signals warning that the smothering system is activated are to comply with the requirements relating to CO₂ high-pressure systems specified in B100.

102 Vessels, refrigerating plants, control devices and other equipment of the smothering system is to be located in CO₂ rooms which are to comply with the requirements for such rooms of CO₂ high-pressure systems.

#### C 200 Vessels and relevant devices

201 The rated amount of liquid carbon dioxide is to be stored in vessel(s) under the working pressure in the range of 18 to 22 bar.
The normal liquid charge in the container is to be limited to provide sufficient vapour space to allow for expansion of the liquid under the maximum storage temperatures that can be obtained corresponding to the setting of the pressure relief valves, but is not to exceed 95% of the volumetric capacity of the container.

202 The vessel(s) is to be designed, constructed and tested in accordance with the requirements of the Society for liquefied gas vessels under pressure, see Pt.5 Ch.5. For this purpose the design pressure is to be taken not less than the relief valve setting. Besides, provision is to be made for:

— pressure gauge
— high pressure alarm at 22 bar
— low pressure alarm at 18 bar
— diaphragm bleed valve
— branch pipes with stop valves for filling the vessel
— discharge pipes
— liquid CO₂ level indicator, fitted on the vessel(s), and remote level indicator located in the fire extinguishing station
— two safety relief valves arranged so that either valve can be shut off while the other is connected to the vessel.

The setting of the relief valves is to be not less than 22 bar. The capacity of each valve is to be such to discharge, with not more than 20% rising pressure above the setting pressure, the vapours generated under fire condition. The fire exposure factor «F» to be taken as 0.2 (see Pt.5 Ch.5 Sec.9 B216). The discharge from the safety valves is to be led to the open.

203 The vessel and outgoing pipes permanently filled with carbon dioxide are to have thermal insulation preventing the operation of the safety valve in 24 hours after de-energizing the plant, at ambient temperature of 45°C.

C 300 Refrigerating plant

301 The vessel(s) is to be serviced by two automated completely independent refrigerating units solely intended for this purpose, each comprising a compressor and the relevant prime mover, evaporator and condenser.

302 The refrigerating plant is to comply with the requirements given in Pt.5 Ch.10 to the extent these are applicable. The refrigerating capacity and the automatic control of each unit are to 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.

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

304 Each electric refrigerating unit is to be supplied from the main switchboard busbars by a separate feeder.

305 Cooling water supply to the refrigerating plant (where required) is to be provided from at least two circulating pumps, one of which being used as a standby. The standby pump may be used for other services as long as its use for cooling would not interfere with any other essential service of the ship.

C 400 Pipes and fittings

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

402 Safety relief devices are to 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 design pressure of any of the components.

403 The piping system is to be designed in such a way that the CO₂ flows through in liquid phase up to the discharge nozzles. To this end the pressure at the nozzles are not to be less than 10 bar.

C 500 Control of smothering system operation

501 The fire control station and the engineer’s quarters are to be equipped with audible and visual alarms activated when:

— the pressure in the vessel(s) reaches the low and high values as per 202
— any one of the refrigerating units fails to operate
— the lowest permissible level of the liquid in the vessel is reached
— the release of CO₂ has been activated.

C 600 Release control

601 The release of CO₂ is to be manually initiated.

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

C 700 Testing

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

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

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

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

705 At judgment of the Society, a discharge test may be required to check the fulfillment of the requirements of 403.

(IACS UR F34)

D. Halogenated Hydrocarbon Systems

D 100 Application

101 New installation of halogenated hydrocarbon systems shall be prohibited on all new ships.

(SOLAS Reg. II-2/5.3.1)

Guidance note:
Gas fire-extinguishing systems for replacing or as an alternative to Halon have been type approved by the Society, and tentative rules for such systems are available upon request.

---end--of--Guidance--note---

E. Steam Systems

E 100 General

101 In general, the Administration shall not permit the use of steam as a fire-extinguishing medium in fixed fire-extinguishing systems. Where the use of steam is permitted by the Administration it shall be used only in restricted areas as an addition to the required fire-extinguishing medium and with the proviso that the boiler or boilers available for supplying steam shall have an evaporation of at least 1.0 kg of steam per hour for each 0.75 m³ of the gross volume of the largest space so protected. In addition to complying with the foregoing requirements the systems in all respects shall be as determined by, and to the satisfaction of, the Administration.

(SOLAS Reg. II-2/5.4)
Superheated steam will not be accepted.
F. Other Gas Systems

F 100 General

101 Where gas other than carbon dioxide or halogenated hydrocarbons, or steam as permitted by paragraph 4 (E100) is produced on the ship and is used as a fire-extinguishing medium, it shall be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements have been reduced to a permissible minimum.

(SOLAS Reg. II-2/5.5.1)

102 Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces it shall afford protection equivalent to that provided by a fixed system using carbon dioxide as the medium.

(SOLAS Reg. II-2/5.5.2)

103 Where such gas is used as a fire-extinguishing medium in a fixed fire-extinguishing system for the protection of cargo spaces, a sufficient quantity of such gas shall be available to supply hourly a volume of free gas at least equal to 25% of the gross volume of the largest space protected in this way for a period of 72 hours.

(SOLAS Reg. II-2/5.5.3)
SECTION 4
FIRE EXTINGUISHERS

A. General

100 General requirements for all extinguishers

101 All fire extinguishers shall be of approved types and designs.
(SOLAS Reg. II-2/6.1)

102 The capacity of required portable fluid extinguishers shall be not more than 13.5 l and not less than 9 l. Other extinguishers shall be at least as portable as the 13.5 l fluid extinguisher and shall have a fire-extinguishing capability at least equivalent to that of a 9 l fluid extinguisher.
(SOLAS Reg. II-2/6.1.1)

103 The Administration shall determine the equivalents of fire extinguishers.
(SOLAS Reg. II-2/6.1.2)

Each powder or carbon dioxide extinguisher should have a capacity of at least 5 kg, and each foam extinguisher a capacity of at least 9 litre.
(MSC/Circ. 847)

104 Spare charges shall be provided in accordance with requirements to be specified by the Administration.
(SOLAS Reg. II-2/6.2)

A spare charge is to be provided for each required, portable fire extinguisher which can be readily charged on board. If this cannot be done, duplicate extinguishers are to be provided.

105 Fire extinguishers containing an extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons shall not be permitted.
(SOLAS Reg. II-2/6.3)

106 The fire extinguishing medium in the extinguishers are to be suitable for the potential fire hazards in the protected spaces.

107 Fire extinguishers shall be periodically examined and subjected to such tests as the Administration may require.
(SOLAS Reg. II-2/6.5)

Fire extinguishers are subject to periodical inspection in accordance with Pt.7 Ch.2 Sec.2.

108 One of the portable fire extinguishers intended for use in any space shall be stowed near the entrance to that space.
(SOLAS Reg. II-2/6.6)

B. Portable Foam Applicator

100 Definition

101 A portable foam applicator unit shall consist of an air-foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 l of foam-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 m³/minute.
(SOLAS Reg. II-2/6.4)

100 Requirement

201 Number of required foam applicators are regulated in Sec.5.

C. Portable Fire Extinguishers in Accommodation, Service Spaces and Control Stations

100 Requirement

101 Accommodation spaces, service spaces and control stations shall be provided with portable fire extinguishers of appropriate types and in sufficient number to the satisfaction of the Administration. Ships of 1,000 gross tonnage and upwards shall carry at least five portable fire extinguishers.
(SOLAS Reg. II-2/6.7)

In ships of less than 1000 gross tonnage, at least three portable fire extinguishers are to be provided.

D. Fire Extinguishers in Machinery Spaces

100 Requirement

101 Number of required extinguishers are regulated in Sec.5.
SECTION 5  
FIRE EXTINGUISHING ARRANGEMENT IN MACHINERY SPACES

A. Spaces Containing Oil-fired Boilers or Oil Fuel Units

A 100  General

101  Machinery spaces of category A containing oil-fired boilers or oil fuel units shall be provided with any one of the following fixed fire-extinguishing systems:

.1  a gas system complying with the provisions of Regulation 5 (Sec.3);
.2  a high expansion foam system complying with the provisions of Regulation 9 (Sec.6);
.3  a pressure water-spraying system complying with the provisions of Regulation 10 (Sec.6).

In each case if the engine and boiler rooms are not entirely separate, or if fuel oil can drain from the boiler room into the engine room, the combined engine and boiler rooms shall be considered as one compartment.

(SOLAS Reg. II-2/7.1.1)

Guidance note:
Alternatively a type approved system complying with IMO MSC/Circ.848 or IMO MSC/Circ.668 may be used.

102  There shall be in each boiler room at least one set of portable foam applicator unit complying with the provisions of Regulation 6.4 (Sec.4 B).

(SOLAS Reg. II-2/7.1.2)

103  There shall be at least two portable foam extinguishers or equivalent in each firing space in each boiler room and in each space in which a part of the oil fuel installation is situated. There shall be not less than one approved foam type extinguisher of at least 135 l capacity or equivalent in each boiler room. These extinguishers shall be provided with hoses on reels suitable for reaching any part of the boiler room. In the case of domestic boilers of less than 175 kW in cargo ships the Administration may consider relaxing the requirements of this paragraph.

(SOLAS Reg. II-2/7.1.3)

104  In each firing space there shall be a receptacle containing sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required by the Administration. An approved portable extinguisher may be substituted as an alternative.

(SOLAS Reg. II-2/7.1.4)

B. Spaces Containing Internal Combustion Machinery

B 100  General

101  Machinery spaces of category A containing internal combustion machinery shall be provided with:

.1  One of the fire-extinguishing systems required by paragraph 1.1 (A101).
.2  At least one set of portable air-foam equipment complying with the provisions of Regulation 6.4 (Sec.4 B).
.3  In each such space approved foam type fire extinguishers, each of at least 45 l capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there shall be provided a sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space. For smaller spaces of cargo ships the Administration may consider relaxing this requirement.

(SOLAS Reg. II-2/7.2)

105  25 kg dry powder or 20 kg CO₂ is considered as equivalent to 45 l foam liquid.

C. Spaces Containing Both Oil Fired Boilers and Internal Combustion Machinery

C 100  General

101  In the case of machinery spaces containing both boilers and internal combustion engines, both A100 and B100 must be complied with, except that one of the foam fire-extinguishers of at least 45 l capacity or equivalent (required in B101.3) may be omitted on the condition that the 135 l foam extinguisher (required in A103) can protect efficiently and readily the area covered by the 45 l extinguisher. Only one portable foam applicator is required.

D. Spaces Containing Steam Turbines or Other Enclosed Steam Engines

D 100  General

101  In spaces containing steam turbines or enclosed steam engines used either for main propulsion or for other purposes when such machinery has in the aggregate a total power output of not less than 375 kW there shall be provided:

.1  Approved foam fire extinguishers each of at least 45 l capacity or equivalent sufficient in number to enable foam or its equivalent to be directed on to any part of the pressure lubrication system, on to any part of the casings enclosing pressure lubricated parts of the turbines, engines or associated gearing, and any other fire hazards. However, such extinguishers shall not be required if protection at least equivalent to that required by this sub-paragraph is provided in such spaces by a fixed fire-extinguishing system fitted in compliance with paragraph 1.1 (A101).

.2  A sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space, except that such extinguishers shall not be required in addition to any provided in compliance with paragraph 1.3 (A103).

.3  One of the fire-extinguishing systems required by paragraph 1.1 (A101), where such spaces are periodically unattended.

(SOLAS Reg. II-2/7.3)

E. Fire-extinguishing Appliances in other Machinery Spaces

E 100  General

101  Where, in the opinion of the Administration, a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in paragraphs 1, 2 and 3 (A to D), there shall be provided in, or adjacent to, that space such a number of approved portable fire extinguish-

---end---of---Guidance---note---
ers or other means of fire extinction as the Administration may deem sufficient.

(SOLAS Reg. II-2/7.4).

F. Fixed Fire-extinguishing Systems not required by this Chapter

F 100 General

101 Where a fixed fire-extinguishing system not required by this Chapter is installed, such a system shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/7.5)

G. Machinery Spaces of Category A in Passenger Ships

G 100 Fixed fire-extinguishing systems

101 When systems (such as purifiers) for preparing flammable liquids for use in boilers and machinery and separate oil systems with working pressures above 15 bar and which are no part of the main engines, boilers or auxiliary engines etc. are placed in a separate room enclosed by steel bulkheads and self-closing door, a fixed fire-extinguishing system capable of being operated from outside that space is to be provided.

102 A local fixed fire-extinguishing unit is to be provided for:

a) Separated oil systems referred to in 101 which, for practical reasons, cannot be located in a separated room.

b) Fuel installations which are not promptly accessible (e.g. burners area of top-fired boilers, auxiliary boilers on platforms or decks, etc.).

G 200 Fire-extinguishing appliances

201 In passenger ships carrying more than 36 passengers each machinery space of category A is to be provided with at least two suitable water fog applicators.

(SOLAS Reg. II-2/7.6)

Guidance note:

A water fog applicator might consist of a metal L-shaped pipe, the long limb being about 2 m in length capable of being fitted to a fire hose and the short limb being about 250 mm in length fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---
SECTION 6
FIXED FOAM AND PRESSURE WATER SPRAYING FIRE EXTINGUISHING SYSTEMS

A. General

A 100 Application

101 The requirements in this section apply to ships where a fixed foam or pressure water spraying system is fitted in machinery spaces, special category spaces or in other spaces.

B. Fixed Low-Expansion Foam Fire - Extinguishing Systems in Machinery Spaces

B 100 General

101 Where in any machinery space a fixed low-expansion foam fire-extinguishing system is fitted in addition to the requirements of Regulation 7 (Sec.5), such system shall be capable of discharging through fixed discharge outlets in not more than five minutes a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread. The system shall be capable of generating foam suitable for extinguishing oil fires. Means shall be provided for effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The expansion ratio of the foam shall not exceed 12 to 1.

(SOLAS Reg. II-2/8.1)

102 The means of control of any such systems shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

(SOLAS Reg. II-2/8.2)

103 The foam-forming liquid is to be of approved type.

C. Fixed High-Expansion Foam Fire - Extinguishing Systems in Machinery Spaces

C 100 General

101 Any required fixed high-expansion foam system in machinery spaces is to consist of components which are permanently installed.

102 High-expansion foam generators are to be of approved types.

103 The Administration may permit alternative arrangements and discharge rates provided that it is satisfied that equivalent protection is achieved.

(SOLAS Reg. II-2/9.1.2)

104 The foam-forming liquid is to be of an approved type.

C 200 Arrangement

201 The foam generator, its sources of power supply, foam-forming liquid and means of controlling the system shall be readily accessible and simple to operate and shall be grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

(SOLAS Reg. II-2/9.4)

202 The foam generator with equipment is to be placed in a special room, safely separated from all the rooms to be protected in order to minimise the risk of damage to the generators and ducts in event of fire or explosion in the rooms to be protected.

203 The arrangement of the foam generator is to permit testing of the foam production without leading any foam to the rooms to be protected, e.g. by providing means that permit foam to pass overhead or to open deck.

204 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units shall in the opinion of the Administration be such as will provide effective foam production and distribution.

(SOLAS Reg. II-2/9.2)

205 The arrangement of the foam generator delivery ducting shall be such that a fire in the protected space will not affect the foam generating equipment.

(SOLAS Reg. II-2/9.3)

206 The high expansion foam is to be distributed to the respective rooms by means of ducts that are led to at least the lower edge of the casing. The ducts are to be dimensioned according to the size of the foam generator’s outlet, and are to be so located that an even distribution of foam is obtained throughout the room to be protected.

Where the engine room is divided into separate spaces (engine room, boiler room, auxiliary engine room, separator room, etc.) the foam is to be distributed to each separate space.

207 The ducts leading from the generators to the rooms to be protected, are to be made of steel. They are to be dimensioned, stiffened and fastened such that they can withstand the normal mechanical and thermal strain they may be exposed to.

208 To avoid damage to the foam generators, open duct connections from these to the rooms to be protected are not allowed. Where the ducts lead the generator room, they are to be provided with a closing appliance which is normally shut and cannot be opened until the foam production has started. If the closing appliance (the flap valve) is arranged for automatic release, a manual release is also to be arranged. The closing appliance is to be of non-combustible material.

209 The arrangement in the engine room is to be such that any possible overpressure in the room, caused by fire, can be relieved when the room is being filled with foam. If this is achieved by means of a Skylight or ventilating aperture, a notice plate stating that this is to be kept open whilst foam is being produced, is to be put up in the generator room. This will be considered by the Society in each case.

210 The foam-forming liquid is to be stored in a special tank and fed to the foam generator by a suitable system, which is to be permanently adjusted for seawater consumption. The tank is to be equipped with a level gauge of approved type. Foam-forming liquid tanks are to be protected against inside corrosion.

211 The water tank for the first action (see 305) is to be placed not lower than the foam generator. The arrangement is to allow filling of the water tank from the fire pumps in the engine room and also from the emergency fire pump. The water tank is to be fitted with a level gauge of approved type and is to be protected against inside corrosion.

212 For testing and drying purposes the piping system is to be fitted with connection for blowing through with compressed air.
C.300 Capacity

301 Any required fixed high-expansion foam system in machinery spaces shall be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 m in depth per minute. The quantity of foam-forming liquid available shall be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam shall not exceed 1,000 to 1.

(SOLAS Reg. II-2/9.1.1)

The largest space is to include casing if applicable, and the rate of at least 1 m in depth per minute shall be calculated with respect to maximum horizontal area of the room, without reduction for engines, boilers, loose tanks, etc.

The capacity is to be sufficient to fill the whole room to the level of the main deck in the course of maximum 10 minutes.

302 In engine rooms where air intakes for auxiliary engines are fitted with suitable filters enabling the engines to run whilst immersed in foam, the capacity mentioned in 301 is to be increased according to the air consumption of the respective engines.

303 Engine and boiler rooms not completely separated, or where fuel oil may pass from the boiler to the engine room, are to be regarded as one room.

304 The quantity of foam forming liquid available is to be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected including casing.

305 Sufficient water is to be stored to produce a foam depth of at least 7 m in the largest space to be protected.

306 The emergency fire pump is to have enough capacity to supply the foam generators with sufficient water for maximum foam production and, in addition, to supply 25 m³/h at the required pressure head to the fire main pipeline for ordinary fire hose purposes.

C.400 Foam generator

401 The generator engine is to be certified by the Society.

402 The sources of power supply for the foam generator including pumps, etc. are to be supplied independently of machinery or electrical installations located in the rooms to be protected.

403 Foam generators are to be so constructed and assembled that maintenance and replacement of essential parts can easily be effected. The system is to be so arranged that nozzles and pipes can easily be rinsed and drained.

404 All electrical components in connection with the foam generator are to be totally enclosed.

405 Foam generators are to be made of corrosion resistant materials. In this connection, stringent requirements will be made regarding nozzles, pipes, fittings and filters coming into direct contact with the foam-forming liquid.

406 The foam generator nozzles are to have as large openings as possible. The nozzles are to be so constructed that they have the least possible chance of getting choked.

407 The foam-forming net is to be made of a durable, non-shrinking material that is rot- and heat-resistant.

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

C.500 Foam generator room

501 Bulkheads and decks in the foam generator room adjacent to the rooms to be protected, are to have «A-60» class division.

502 The generator room is to have a heating system which can keep the room permanently free from frost.

D.503 The foam generator room is to have separate mechanical ventilation for overpressure.

D. Pressure Water-Spraying Systems in Machinery Spaces

D.100 General

101 Any required fixed pressure water-spraying fire-extinguishing system in machinery spaces shall be provided with spraying nozzles of an approved type.

(SOLAS Reg. II-2/10.1)

102 The number and arrangement of the nozzles shall be to the satisfaction of the Administration and shall be such as to ensure an effective average distribution of water of at least 5 l/m² per minute in the spaces to be protected. Where increased application rates are considered necessary, these shall be to the satisfaction of the Administration. Nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.

(SOLAS Reg. II-2/10.2)

103 The system may be divided into sections, the distribution valves of which shall be operated from easily accessible positions outside the spaces to be protected and will not be readily cut off by a fire in the protected space.

(SOLAS Reg. II-2/10.3)

104 The system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be put automatically into action by a pressure drop in the system.

(SOLAS Reg. II-2/10.4)

105 The pump shall be capable of simultaneously supplying at the necessary pressure all sections of the system in any one compartment to be protected. The pump and its controls shall be installed outside the space or spaces to be protected. It shall not be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.

(SOLAS Reg. II-2/10.5)

106 The pump may be driven by independent internal combustion machinery but, if it is dependent upon power being supplied from the emergency generator fitted in compliance with the provisions of Regulation II-1/44 (Ch.8 Sec.2 C) or Regulation II-1/45 (Pt.5 Ch.2 Sec.2 D), as appropriate, that generator shall be so arranged as to start automatically in case of main power failure so that power for the pump required by paragraph 5 (105) is immediately available. When the pump is driven by independent internal combustion machinery it shall be so situated that a fire in the protected space will not affect the air supply to the machinery.

(SOLAS Reg. II-2/10.6)

107 Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water or corrosion of piping, nozzles, valves and pump.

(SOLAS Reg. II-2/10.7)

E. Pressure Water Spraying Systems for Special Category Spaces in Passenger Ships

E.100 General

101 The nozzles are to be of an approved full bore type. They are to be arranged so as to secure an effective distribution of water in the spaces which are to be protected. For this purpose, the system is to be such as will provide water application at a rate of at least 3.5 litres/m²/minute for spaces with a deck height not exceeding 2.5 m and a capacity of at least 5 litres/m²/minute for spaces with a deck height of 2.5 m or more.
102 The water pressure is to be sufficient to secure an even distribution of water.

103 The system is normally to cover the full breadth of the vehicle deck and may be divided into sections provided they are of at least 20 m in length, except that in ships where the vehicle deck space is subdivided with longitudinal «A» Class divisions forming boundaries of staircases, etc., the breadth of the sections may be reduced accordingly.

104 The distribution valves for the system are to be situated in an easily accessible position adjacent to but outside the space to be protected which will not readily be cut off by a fire within the space. Direct access to the distribution valves from the vehicle deck space and from outside that space is to be provided. Adequate ventilation is to be fitted in the space containing the distribution valves.

105 The water supply to the system is to be provided by a pump or pumps other than the ship’s required fire pumps which are additionally to be connected to the system by a lockable non-return valve which will prevent a back-flow from the system into the fire main.

106 The principal pump or pumps are to be capable of providing simultaneously at all times a sufficient supply of water at the required pressure to all nozzles in the vehicle deck or in at least two sections thereof.

107 The principal pump or pumps are to be capable of being brought into operation by remote control (which may be manually actuated) from the position at which the distribution valves are situated.
SECTION 7
SPECIAL ARRANGEMENTS IN MACHINERY SPACES

A. General

A 100 Application

101 The provisions of this Regulation shall apply to machinery spaces of category A and, where the Administration considers it desirable, to other machinery spaces.

(SOLAS Reg. II-2/11.1)

A 200 General requirements

201 The number of skylights, doors, ventilators, openings in tunnels to permit exhaust ventilation and other openings to machinery spaces shall be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship.

(SOLAS Reg. II-2/11.2.1)

202 Skylights shall be of steel and shall not contain glass panels. Suitable arrangements shall be made to permit the release of smoke in the event of fire, from the space to be protected.

(SOLAS Reg. II-2/11.2.2)

Existing exhaust ventilation systems may be accepted as arrangements for permitting the release of smoke.

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

204 In passenger ships, doors other than power-operated watertight doors, are to be so arranged that positive closure is assured in case of fire in the space, by power-operated closing arrangements or by the provision of self-closing doors capable of closing against an inclination of 3,5° opposing closure and having a fail-safe hook-back facility, provided with a remotely operated release device.

(SOLAS Reg. II-2/11.2.3)

205 Windows shall not be fitted in machinery space boundaries. This does not preclude the use of glass in control rooms within the machinery spaces.

(SOLAS Reg. II-2/11.3)

206 Means of control shall be provided for:

.1 opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers;

.2 permitting the release of smoke;

.3 closing power-operated doors or acting release mechanism on doors other than power-operated watertight doors;

.4 stopping ventilating fans; and

.5 stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

(SOLAS Reg. II-2/11.4)

207 The controls required in paragraph 4 (206) and in Regulation 15.2.5 (Ch.6 Sec.5 D501) shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. In passenger ships such controls and the controls for any required fire-extinguishing system are to be situated at one control position or grouped in as few positions as possible. Such positions are to have a safe access from the open deck.

(SOLAS Reg. II-2/11.5)

208 When access to any machinery space of category A is provided at a low level from an adjacent shaft tunnel, there shall be provided in the shaft tunnel, near the watertight door, a light steel fire-screen door operable from each side.

(SOLAS Reg. II-2/11.6)

209 For periodically unattended machinery spaces in cargo ships, the Administration shall give special consideration to maintaining fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, the required shut-down arrangements (e.g. ventilation, fuel pumps, etc.) and may require additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus. In passenger ships these requirements are to be at least equivalent to those of machinery spaces normally attended.

(SOLAS Reg. II-2/11.7)

210 A fixed fire detection and alarm system complying with the provisions of Regulation 14 (Sec.9) shall be fitted in any machinery space:

.1 where the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

.2 where the main propulsion and associated machinery including sources of main electrical supply are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room.

(SOLAS Reg. II-2/11.8)

211 Materials used in machinery spaces are not normally to have properties increasing the fire potential of these rooms.

212 Neither combustible nor oil-absorbing materials are to be used as flooring, bulkhead lining, ceiling or deck in the control room, machinery spaces, shaft tunnel or rooms where oil tanks are located. Where penetration of oil products is possible, the surface of the insulation is to be impervious to oil or oil vapours.
SECTION 8
AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS

A. General

A 100 Application

101 The requirements in this section apply to ships where automatic sprinkler, fire detection and fire alarm systems are required to protect accommodation spaces, service spaces and control stations.

A 200 General

201 Any required automatic sprinkler, fire detection and fire alarm system shall be capable of immediate operation at all times and no action by the crew shall be necessary to set it in operation. It shall be of the wet pipe type but small exposed sections may be of the dry pipe type where in the opinion of the Administration this is a necessary precaution. Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing. It shall be kept charged at the necessary pressure and shall have provision for a continuous supply of water as required in this Regulation.

(SOLAS Reg. II-2/12.1.1)

202 Each section of sprinklers shall include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems shall be such as to indicate if any fault occurs in the system. Such units shall indicate in which section served by the system fire has occurred and shall be centralized on the navigation bridge and in addition, visible and audible alarms from the unit shall be located in a position other than on the navigation bridge, so as to ensure that the indication of fire is immediately received by the crew.

(SOLAS Reg. II-2/12.1.2)

A 300 Arrangement

301 Sprinklers shall be grouped into separate sections, each of which is to contain not more than 200 sprinklers. In passenger ships any section of sprinklers shall not serve more than two decks and shall not be situated in more than one main vertical zone. However, such a section of sprinklers may be permitted to serve more than two decks or be situated in more than one main vertical zone, if it is satisfied that the protection of the ship against fire will not thereby be reduced.

(SOLAS Reg. II-2/12.2.1)

302 Each section of sprinklers shall be capable of being isolated by one stop valve only. The stop valve in each section shall be readily accessible and its location shall be clearly and permanently indicated. Means shall be provided to prevent the operation of the stop valves by any unauthorized person.

(SOLAS Reg. II-2/12.2.2)

303 A gauge indicating the pressure in the system shall be provided at each section stop valve and at a central station.

(SOLAS Reg. II-2/12.2.3)

304 The sprinklers shall be resistant to corrosion by marine atmosphere. In accommodation and service spaces the sprinklers shall come into operation within the temperature range from 68° to 79°C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30°C above the maximum deckhead temperature.

(SOLAS Reg. II-2/12.2.4)

305 A list or plan shall be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance shall be available.

(SOLAS Reg. II-2/12.2.5)

A 400 Capacity

401 Sprinklers shall be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 l/m²/minute over the nominal area covered by the sprinklers. However, the Administration may permit the use of sprinklers providing such an alternative amount of water suitably distributed as has been shown to the satisfaction of the Administration to be not less effective.

(SOLAS Reg. II-2/12.3)

402 A pressure tank having a volume equal to at least twice that of the charge of water specified in this sub-paragraph shall be provided. The tank shall contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump referred to in paragraph 5.2 (502), and the arrangements shall provide for maintaining an air pressure in the tank such as to ensure that where the standing charge of fresh water in the tank has been used the pressure will not be less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank shall be provided. A glass gauge shall be provided to indicate the correct level of the water in the tank.

(SOLAS Reg. II-2/12.4.1)

403 Means shall be provided to prevent the passage of seawater into the tank.

(SOLAS Reg. II-2/12.4.2)

A 500 Pumps and piping system

501 An independent power pump shall be provided solely for the purpose of continuing automatically the discharge of water from the sprinklers. The pump shall be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.

(SOLAS Reg. II-2/12.5.1)

502 The pump and the piping system shall be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 m² at the application rate specified in paragraph 3 (401).

(SOLAS Reg. II-2/12.5.2)

503 The pump shall have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and pipe shall be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in paragraph 4.1 (402).

(SOLAS Reg. II-2/12.5.3)

504 The sea inlet to the pump shall wherever possible be in the space containing the pump and shall be so arranged that when the ship is afloat it will not be necessary to shut off the supply of sea-water to the pump for any purpose other than the inspection or repair of the pump.

(SOLAS Reg. II-2/12.5.4)

505 The sprinkler pump and tank shall be situated in a position reasonably remote from any machinery space of category A and shall not be situated in any space required to be protected by the sprinkler system.

(SOLAS Reg. II-2/12.6)

A 600 Power sources

601 In passenger ships there shall be not less than two sources of power supply for the seawater pump and automatic alarm and detection system. Where the sources of power for the
pump are electrical, these shall be a main generator and an emergency source of power. One supply for the pump shall be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards, and shall be run to an automatic change-over switch situated near the sprinkler pump. This switch shall permit the supply of power from the main switchboard so long as a supply is available therefrom, and be so designed that upon failure of that supply it will automatically change over to the supply from the emergency switchboard. The switches on the main switchboard and the emergency switchboard shall be clearly labelled and normally kept closed. No other switch shall be permitted in the feeders concerned. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine it shall, in addition to complying with the provisions of paragraph 6 (505), be so situated that a fire in any protected space will not affect the air supply to the machinery.

(SOLAS Reg. II-2/12.7.2)

603 The sprinkler system shall have a connection from the ship's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.

(SOLAS Reg. II-2/12.8)

A 700 Testing

701 A test valve shall be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section shall be situated near the stop valve for that section.

(SOLAS Reg. II-2/12.9.1)

702 Means shall be provided for testing the automatic operation of the pump on reduction of pressure in the system.

(SOLAS Reg. II-2/12.9.2)

703 Switches shall be provided at one of the indicating positions referred to in paragraph 1.2 (202) which will enable the alarm and the indicators for each section of sprinklers to be tested.

(SOLAS Reg. II-2/12.9.3)

704 Spare sprinkler heads shall be provided for each section of sprinklers to the satisfaction of the Administration.

(SOLAS Reg. II-2/12.10)
SECTION 9
FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS

A. Fire Detection and Fire Alarm Systems

A 100 General

101 For instrumentation and automation, including computer based control and monitoring, the requirements in this chapter are additional to those given in Ch.9.

102 Any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.

(SOLAS Reg. II-2/13.1.1)

103 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

(SOLAS Reg. II-2/13.1.2)

104 There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in or adjacent to the control panel for the fire detection system.

(SOLAS Reg. II-2/13.1.3)

The main (respective emergency) feeder shall run from the main (respective emergency) switchboard to the change-over switch without passing through any other distribution switchboard. (IACS UI SC/35)

105 Detectors and manually operated call points shall be grouped into sections. The activation of any detector or manually operated call point shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes an audible alarm shall be automatically sounded throughout the crew accommodation and machinery spaces, control stations and machinery spaces of category A. This alarm sounder system need not be an integral part of the detection system.

(SOLAS Reg. II-2/13.1.4)

The audible alarm is to be continuous and clearly distinguishable from other sound sources.

106 The control panel shall be located on the navigating bridge or in the main fire control station.

(SOLAS Reg. II-2/13.1.5)

107 Indicating units shall, as a minimum, denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times. When at sea or in port, except when the ship is out of service. One indicating unit shall be located on the navigating bridge if the control panel is located in the main fire control station.

(SOLAS Reg. II-2/13.1.6)

108 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

(SOLAS Reg. II-2/13.1.7)

109 Where the fire detection system does not include means of remotely identifying each detector individually, no section covering more than one deck within accommodation, service and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited as determined by the Administration. In no case shall more than fifty enclosed spaces be permitted in any section. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

(SOLAS Reg. II-2/13.1.8)

110 In passenger ships, if there is no fire detection system capable of remotely and individually identifying each detector, a section of detectors shall not serve spaces on both sides of the ship nor on more than one deck and neither shall it be situated in more than one main vertical zone except that the Administration, if it is satisfied that the protection of the ship against fire will not thereby be reduced, may permit such a section of detectors to serve both sides of the ship and more than one deck. In passenger ships fitted with individually identifiable fire detectors, a section may serve spaces on both sides of the ship and on several decks but may not be situated in more than one main vertical zone.

(SOLAS Reg. II-2/13.1.9)

111 A section of fire detectors which covers a control station, a service space or an accommodation space shall not include a machinery space of category A.

(SOLAS Reg. II-2/13.1.10)

112 Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Administration provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.

(SOLAS Reg. II-2/13.1.11)

113 Suitable instructions and components spares for testing and maintenance shall be provided.

(SOLAS Reg. II-2/13.1.12)

114 The function of the detection system shall be periodically tested to the satisfaction of the Administration by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond. All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

(SOLAS Reg. II-2/13.1.13)

115 The fire detection system shall not be used for any other purpose, except that opening of fire doors and similar functions may be permitted at the control panel.

(SOLAS Reg. II-2/13.1.14)

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

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

118 Fire detection systems with a zone address identification capability fitted on or after 1 October 1994 shall be so arranged that

- a loop cannot be damaged at more than one point by a fire;
- means are provided to ensure that any fault (e.g. power break, short circuit; earth) occurring in the loop will not render the whole loop ineffective;
- all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (electrical, electronic, informatic);
— the first initiated fire alarm will not prevent any other detector to initiate further fire alarms.

(SOLAS Reg. II-2/13.1.15)

A 200 Installation

201 Manually operated call points shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.

(SOLAS Reg. II-2/13.2.1)

202 Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration shall be given to the installation of special purpose smoke detectors within ventilation ducting.

(SOLAS Reg. II-2/13.2.2)

203 Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in paragraph 2.2 (202), at least one detector complying with paragraph 1.1 (112) shall be installed in each such space.

(SOLAS Reg. II-2/13.2.3)

204 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. In general, detectors which are located on the overhead shall be a minimum distance of 0.5 m away from bulkheads.

(SOLAS Reg. II-2/13.2.4)

205 The maximum spacing of detectors shall be in accordance with the table (Table A1) below:

<table>
<thead>
<tr>
<th>Type of detector</th>
<th>Maximum floor area per detector (m²)</th>
<th>Maximum distance between centres (m)</th>
<th>Maximum distance away from bulkheads (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat</td>
<td>37</td>
<td>9</td>
<td>4.5</td>
</tr>
<tr>
<td>Smoke</td>
<td>74</td>
<td>11</td>
<td>5.5</td>
</tr>
</tbody>
</table>

The Administration may require or permit other spacings based upon test data which demonstrate the characteristics of the detectors.

(SOLAS Reg. II-2/13.2.5)

206 Electrical wiring which forms part of the system shall be so arranged as to avoid galleys, machinery spaces of category A, and other enclosed spaces of high fire risk except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

(SOLAS Reg. II-2/13.2.6)

A 300 Design

301 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.

(SOLAS Reg. II-2/13.3.1)

302 Smoke detectors required by paragraph 2.2 (202) shall be certified to operate before the smoke density exceeds 12.5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or over sensitivity.

(SOLAS Reg. II-2/13.3.2)

303 Heat detectors shall be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector shall operate within temperature limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or over sensitivity.

(SOLAS Reg. II-2/13.3.3)

304 At the discretion of the Administration, the permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

(SOLAS Reg. II-2/13.3.4)

B. Sample Extraction Smoke Detection Systems

B 100 General

101 Wherever in the text of this regulation the word "system" appears, it shall mean "sample extraction smoke detection system".

(SOLAS Reg. II-2/13-1.1.1)

102 Any required system shall be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives an overall response time to the satisfaction of the Administration.

(SOLAS Reg. II-2/13-1.1.2)

103 Power supplies necessary for the operation of the system shall be monitored for loss of power. Any loss of power shall initiate a visual and audible signal at the control panel and the navigating bridge which shall be distinct from a signal indicating smoke detection.

(SOLAS Reg. II-2/13-1.1.3)

104 An alternative power supply for the electrical equipment used in the operation of the system shall be provided.

(SOLAS Reg. II-2/13-1.1.4)

105 The control panel shall be located on the navigating bridge or in the main fire control station.

(SOLAS Reg. II-2/13-1.1.5)

106 The detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and the navigating bridge.

(SOLAS Reg. II-2/13-1.1.6)

107 Clear information shall be displayed on or adjacent to the control panel designating the spaces covered.

(SOLAS Reg. II-2/13-1.1.7)

108 The sampling pipe arrangements shall be such that the location of the fire can be readily identified.

(SOLAS Reg. II-2/13-1.1.8)

109 Suitable instructions and component spares shall be provided for the testing and maintenance of the system.

(SOLAS Reg. II-2/13-1.1.9)

110 The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component. The functioning of the system shall be periodically tested to the satisfaction of the Administration.

(SOLAS Reg. II-2/13-1.1.10)

(See also Pt.7 Ch.2.)

111 The system shall be designed, constructed and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation and service space, control station or machinery space.

(SOLAS Reg. II-2/13-1.1.11)

B 200 Installation

201 At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. Howev-
er, where a space is designed to carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system. Such means shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/13-1.2.1)

202 Smoke accumulators shall be located for optimum performance and shall be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation.

(SOLAS Reg. II-2/13-1.2.2)

203 Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

(SOLAS Reg. II-2/13-1.2.3)

204 Not more than four accumulators shall be connected to each sampling point.

(SOLAS Reg. II-2/13-1.2.4)

205 Smoke accumulators from more than one enclosed space shall not be connected to the same sampling point.

(SOLAS Reg. II-2/13-1.2.5)

206 Sampling pipes shall be self-draining and suitably protected from impact or damage from cargo working.

(SOLAS Reg. II-2/13-1.2.6)

B 300 Design

301 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships and to avoid the possibility of ignition of flammable gas air mixture.

(SOLAS Reg. II-2/13-1.3.1)

302 The sensing unit shall be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.

(SOLAS Reg. II-2/13-1.3.2)

303 Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate with the normal conditions or ventilation in the protected area and shall give an overall response time to the satisfaction of the Administration.

(SOLAS Reg. II-2/13-1.3.3)

304 The control panel shall permit observation of smoke in the individual sampling pipe.

(SOLAS Reg. II-2/13-1.3.4)

305 Means shall be provided to monitor the airflow through the sampling pipes so designed as to ensure that as far as practicable equal quantities are extracted from each interconnected accumulator.

(SOLAS Reg. II-2/13-1.3.5)

306 Sampling pipes shall be a minimum of 12 mm internal diameter except when used in conjunction with fixed gas fire extinguishing systems when the minimum size of pipe should be sufficient to permit the fire-extinguishing gas to be discharged within the appropriate time.

(SOLAS Reg. II-2/13-1.3.6)

307 Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

(SOLAS Reg. II-2/13-1.3.7)
SECTION 10
VENTILATION SYSTEMS

A. General

104 Ducts provided for ventilation to accommodation spaces, machinery spaces or control stations shall not pass through machinery spaces of category A, galley, car deck spaces, ro-ro cargo spaces or special category spaces unless either:

.1 the ducts where they pass through a machinery space of category A, galley, car deck space, ro-ro cargo space or special category space are constructed of steel in accordance with paragraphs 3.1.1 (103.1) and 3.1.2 (103.2); and
.2 automatic fire dampers are fitted close to the boundaries penetrated; and
.3 the integrity of the machinery space, galley, car deck space, ro-ro cargo space or special category space boundaries is maintained at the penetrations; or
.4 the ducts where they pass through a machinery space of category A, galley, car deck space, ro-ro cargo space or special category space are constructed of steel in accordance with paragraphs 3.1.1 (103.1) and 3.1.2 (103.2); and
.5 are insulated to "A-60" standard within the machinery space, galley, car deck space, ro-ro cargo space or special category space; except that penetrations of main zone divisions shall also comply with the requirements of paragraph 8 (109).

(SOLAS Reg. II-2/16.4)

105 Ventilation ducts with a free cross-sectional area exceeding 0.02 m² passing through "B" class bulkheads shall be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkhead unless the duct is of steel for this length.

(SOLAS Reg. II-2/16.5)

106 Such measures as are practicable shall be taken in respect of control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained, so that in the event of fire the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply shall be provided; air inlets of the two sources of supply shall be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. At the discretion of the Administration, such requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.

(SOLAS Reg. II-2/16.6)

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

107 Galley ventilation systems are to be separate from the ventilation systems serving other spaces. When passing through accommodation spaces, service spaces and control stations, galley ventilation ducts are to be constructed of steel having a thickness as in 103.1 for the entire length passing through such spaces. (IACS UI SC65)

108 Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges shall be constructed of "A" class divisions. Each exhaust duct shall be fitted with:

.1 a grease trap readily removable for cleaning;
.2 a fire damper located in the lower end of the duct;
.3 arrangements, operable from within the galley, for shutting off the exhaust fans; and
.4 fixed means for extinguishing a fire within the duct.

(SOLAS Reg. II-2/16.7)

109 Where in a passenger ship it is necessary that a ventilation duct passes through a main vertical zone division, a failsafe automatic closing fire damper shall be fitted adjacent to the...
division. The damper shall also be capable of being manually closed from each side of the division. The operating position shall be readily accessible and be marked in red light-reflecting colour. The duct between the division and the damper shall be of steel or other equivalent material and, if necessary, insulated to comply with the requirements of regulation 18.1.1 (Sec.12 A101). The damper shall be fitted on at least one side of the division with a visible indicator showing whether the damper is in the open position.

(SOLAS Reg. II-2/16.8)

110 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated.

(SOLAS Reg. II-2/16.9)

111 Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces shall be capable of being stopped from an easily accessible position outside the space being served. This position should not be readily cut off in the event of a fire in the spaces served. The means provided for stopping the power ventilation of the machinery spaces shall be entirely separate from the means provided for stopping ventilation of other spaces.

(SOLAS Reg. II-2/16.10)

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

112 The following arrangements shall be tested in accordance with the Fire Test Procedures Code:

.1 fire dampers, including relevant means of operation; and
.2 duct penetrations through "A" class divisions. Where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed flanges or by welding, the test is not required.

(SOLAS Reg II-2/16.11)

113 High risk spaces such as purifier rooms separated from machinery spaces with steel bulkheads and self-closing doors are to have independent mechanical ventilation (see Ch.1 Sec.3 A400 ).
SECTION 11
FIREMAN’S OUTFIT

A. General

A 100 Extent of outfit

101 A fireman’s outfit shall consist of:

.1 Personal equipment comprising:

.1.1 Protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water-resistant.

.1.2 Boots and gloves of rubber or other electrically non-conducting material.

.1.3 A rigid helmet providing effective protection against impact.

.1.4 An electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours.

.1.5 An axe to the satisfaction of the Administration.

.2 A breathing apparatus of an approved type which may be:

.2.1 a smoke helmet or smoke mask which shall be provided with a suitable air pump and a length of air hose sufficient to reach from the open deck, well clear of hatch or doorway, to any part of the holds or machinery spaces. If, in order to comply with this sub-paragraph, an air hose exceeding 36 m in length would be necessary, a self-contained breathing apparatus shall be substituted or provided in addition as determined by the Administration; or

.2.2 a self-contained compressed air-operated breathing apparatus, the volume of air contained in the cylinders of which shall be at least 1,200 l, or other self-contained breathing apparatus which shall be capable of functioning for at least 30 minutes. A number of spare charges, suitable for use with the apparatus provided, shall be available on board to the satisfaction of the Administration.

(SOLAS Reg. II-2/17.1)

Only self-contained compressed-air-operated breathing apparatus will be accepted onboard ships classed with the Society, unless otherwise enforced by the Flag Administration. At least two refills are to be available for each compressed air breathing apparatus.

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

102 For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided capable of being attached by means of a snap hook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

(SOLAS Reg. II-2/17.2)

A 200 Number of outfits

201 All ships shall carry at least two fireman’s outfits complying with the requirements of paragraph 1 (100).

(SOLAS Reg. II-2/17.3)

202 In addition, there shall be provided:

.1 in passenger ships for every 80 m, or part thereof, of the aggregate of the lengths of all passenger spaces and service spaces on the deck which carries such spaces or, if there is more than one such deck, on the deck which has the largest aggregate of such lengths, two fireman’s outfits and two sets of personal equipment, each set comprising the items stipulated in paragraphs 1.1.1 (101.1.1), 1.1.2 (101.1.2) and 1.1.3 (101.1.3);

In passenger ships carrying more than 36 passengers, two additional fireman’s outfits shall be provided for each main vertical zone; however, for stairway enclosures which constitute individual main vertical zones and for the main vertical zones in the fore or aft end of a ship which do not contain spaces of categories 26.2.2 (6), (7), (8) or (12) (Pt.5 Ch.2 Sec.2 E 702.2 (6), (7), (8) or (12), respectively), no additional fireman’s outfits are required.

.2 in tankers, two fireman’s outfits.

(SOLAS Reg. II-2/17.3.1)

203 In passenger ships carrying more than 36 passengers for each pair of breathing apparatus there shall be provided one water fog applicator which shall be stored adjacent to such apparatus.

(SOLAS Reg. II-2/17.3.2)

204 The Administration may require additional sets of personal equipment and breathing apparatus, having due regard to the size and type of the ship.

(SOLAS Reg. II-2/17.3.3)

205 The fireman’s outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and, where more than one fireman’s outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions. In passenger ships at least two fireman’s outfits and one set of personal equipment shall be available at any one position.

(SOLAS Reg. II-2/17.4)
SECTION 12
MISCELLANEOUS ITEMS

A. General

A 100 Division penetrations

101 Where "A" class divisions are penetrated for the passage of electric cables, pipes, trunkes, ducts, etc., or for girders, beams or other structural members, arrangements shall be made to ensure that the fire resistance is not impaired, subject to the provisions of Reg. 30.5 (Pt.5 Ch.2 Sec.2 E1105).

(SOLAS Reg. II-2/18.1.1)

102 Where "B" class divisions are penetrated for the passage of electric cables, pipes, trunkes, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall be made to ensure that the fire resistance is not impaired.

(SOLAS Reg. II-2/18.1.2)

A 200 Pipe materials

201 Pipes penetrating "A" or "B" class divisions shall be of materials approved by the Administration having regard to the temperature such divisions are required to withstand.

(SOLAS Reg. II-2/18.2.1)

202 Where the Administration may permit the conveying of oil and combustible liquids through accommodation and service spaces, the pipes conveying oil or combustible liquids shall be of a material approved by the Administration having regard to the fire risk.

(SOLAS Reg. II-2/18.2.2)

203 Materials readily rendered ineffective by heat shall not be used for overhead scuppers, sanitary discharges, and other outlets which are close to the water-line and where the failure of the materials in the event of fire would give rise to danger of flooding.

(SOLAS Reg. II-2/18.2.3)

204 For the protection of cargo tanks carrying crude oil and petroleum products having a flashpoint not exceeding 60°C, materials readily rendered ineffective by heat shall not be used for valves, fittings, tank opening covers, cargo vent piping, and cargo piping so as to prevent the spread of fire to the cargo.

(SOLAS Reg. II-2/18.2.4)

A 300 Electric radiators

301 Electric radiators, if used, shall be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators shall be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

(SOLAS Reg. II-2/18.3)

A 400 Cellulose-nitrate based films

401 Cellulose-nitrate based films shall not be used for cinemograph installations.

(SOLAS Reg. II-2/18.4)

A 500 Waste-receptacles

501 All waste-receptacles shall be constructed of non-combustible materials with no openings in the sides or bottom.

(SOLAS Reg. II-2/18.5)

A 600 Insulation surface

601 In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours.

(SOLAS Reg. II-2/18.6)

A 700 Paint lockers and flammable liquid lockers

701 Paint lockers and flammable liquid lockers shall be protected by an appropriate fire-extinguishing arrangement approved by the Administration.

(SOLAS Reg. II-2/18.7)

Paint lockers and flammable liquid lockers of deck area 4 m² and more shall be provided with a fire-extinguishing system enabling the crew to extinguish a fire without entering the space. Fixed arrangements as specified below may be provided.

1) CO₂ - system, designed for 40% of the gross volume of the space.
2) Dry-powder-system, designed for at least 0.5 kg powder/m³.
3) Water spraying system, designed for 5 l/m², minimum.
4) Water spraying systems may be connected to the ship's main system.
5) Other systems than those mentioned above may be accepted.
6) For lockers of deck area less than 4 m² CO₂ or dry-powder fire extinguisher(s) may be accepted.

(IACS UI SC80)

A 800 Seismic cables containing flammable liquids

801 Storage space for seismic cables, gun deck and other areas where equipment containing flammable liquids are handled or stored, are to be protected by a fixed fire extinguishing system.

Special attention is to be given to seismic vessels with a wooden gun deck above the steel deck, allowing for flammable liquid to collect in the closed space. In such cases the fixed fire extinguishing is also to protect the space below the wooden deck.

Guidance note:

One suitable fixed fire extinguishing system is a low expansion foam system with the following capacity:
1. 3 litre/minute/m² of streamer deck area
2. 10 litre/minute/m² of cable reels area

Sufficient foam concentrate to ensure at least 20 minutes of foam generation.

---end---of---Guidance---note---

A 900 Use of asbestos

901 Concerning the use of asbestos, see Ch.1 Sec.2 A200.
SECTION 13
ARRANGEMENT FOR HELICOPTER DECKS

A. General

A 100 Arrangement

101 Provisions for helicopter facilities shall be in accordance with the standards developed by the Organization*.

(SOLAS Reg. II-2/18.8)

* Refer to the standards developed by the Organization by res. A.855(20).

Guidance note:
For offshore support vessels the requirements of Ch. 9.11.1 in the MODU Code may be applied.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---
SECTION 14  
FIRE CONTROL PLANS AND DRILLS

A. General

A 100  Fire control plans

101  In all ships 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, etc. and 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 Administration, 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 being recorded thereon as soon as practicable. Description in such plans and booklets shall be in the official language of the flag state. If the language is neither English nor French, a translation into one of those languages shall be included. In addition, instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire are to be kept under one cover, readily available in an accessible position.

(SOLAS Reg. II-2/20.1)

A 200  Maintenance and operation instructions

201  Instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire are to be kept under one cover, readily available in an accessible position.

A 300  Plans outside deckhouse

301  In all ships a duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weather tight enclosure outside the deckhouse for the assistance of shoreside fire-fighting personnel.

(SOLAS Reg. II-2/20.2)

A 400  Fire drills

401  Fire drills shall be conducted in accordance with the provisions of regulation III/19 (Pt.7 Ch.3 Sec.2 C100).

(SOLAS Reg. II-2/20.3)
SECTION 15
FIRE SAFETY MEASURES FOR CARGO SHIPS

A. General

A 100 Application

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

A 200 Rule references

201 Special requirements for ships carrying dangerous goods are given in Pt.5 Ch.11.

B. Fire Protection and Means of Escape

B 100 Structure

101 Subject to the provisions of paragraph 4 (104), the hull, superstructure, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material.

(SOLAS Reg. II-2/42.1)

102 The insulation of aluminium alloy components of "A" or "B" class divisions, except structure which in the opinion of the Administration is non-load-bearing, shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable exposure to the standard fire test.

(SOLAS Reg. II-2/42.2)

103 Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft structures, launching and embarkation areas, and "A" and "B" class divisions, to ensure:

.1 that for each member supporting lifeboat and liferaft areas and "A" class divisions, the temperature rise limitation specified in paragraph 2 (102) shall apply at the end of one hour; and

.2 that for each member required to support "B" class divisions, the temperature rise limitation specified in paragraph 2 (102) shall apply at the end of half an hour.

(SOLAS Reg. II-2/42.3)

104 Crowns and casings of machinery spaces of category A shall be of steel construction adequately insulated and openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

(SOLAS Reg. II-2/42.4)

Crowns and casings exposed to the open air need not be insulated. (IACS UI SC44)

105 One of the following methods of protection shall be adopted in accommodation and service areas:

.1 Method IC - The construction of all internal divisional bulkhead of non-combustible "B" or "C" class divisions generally without the installation of an automatic sprinkler, fire detection and fire alarm system in the accommodation and service spaces, except as required by Regulation 52.1 (D101); or

.2 Method IIC - The fitting of an automatic sprinkler, fire detection and fire alarm system as required by Regulation 52.2 (D102) for the detection and extinguishment of fire in all spaces in which fire might be expected to originate, generally with no restriction on the type of internal divisional bulkhead; or

.3 Method IIC - The fitting of a fixed fire detection and fire alarm system, as required by Regulation 52.3 (D103), in all spaces in which a fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheading, except that in no case must the area of any accommodation space or spaces bounded by an "A" or "B" class division exceed 50 m². Consideration may be given by the Administration to increasing this area for public spaces.

(SOLAS Reg. II-2/42.5)

106 The requirements for the use of non-combustible materials in construction and insulation of the boundary bulkheads of machinery spaces, control stations, service spaces, etc., and the protection of stairway enclosures and corridors will be common to all three methods outlined in paragraph 5 (105).

(SOLAS Reg. II-2/42.6)

B 200 bulkheads within the accommodation and service spaces

201 All bulkheads required to be "B" class divisions shall extend from deck to deck and to the shell or other boundaries, unless continuous "B" class ceilings or linings are fitted on both sides of the bulkhead in which case the bulkhead may terminate at the continuous ceiling or lining.

(SOLAS Reg. II-2/43.1)

202 Method IC - All bulkheads not required by this or other Regulations of this Part to be "A" or "B" class divisions, shall be of at least "C" class construction.

(SOLAS Reg. II-2/43.2)

203 Method IIC - There shall be no restriction on the construction of bulkheads not required by this or other regulations of this Part to be "A" or "B" class divisions except in individual cases where "C" class bulkheads are required in accordance with table 44.1 (Table B1).

(SOLAS Reg. II-2/43.3)

204 Method IIIC - There shall be no restriction on the construction of bulkheads not required by this Part to be "A" or "B" class divisions except that the area of any accommodation space or spaces bounded by a contiguous "A" or "B" class division must in no case exceed 50 m² except in individual cases where "C" class bulkheads are required in accordance with table 44.1 (Table B1). Consideration may be given by the Administration to increasing this area for public space.

(SOLAS Reg. II-2/43.4)

B 300 fire integrity of bulkheads and decks

301 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this Part, the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 44.1 and 44.2 (Table B1 and B2).

(SOLAS Reg. II-2/44.1)

302 The following requirements shall govern application of the tables:

.1 Tables 44.1 and 44.2 (Table B1 and B2) shall apply respectively to the bulkheads and decks separating adjacent spaces.

.2 For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.

1) Control stations Spaces containing emergency sources of power and lighting, wheelhouse and chartroom. Spaces containing the ship's radio equipment. Fire-extinguishing rooms, fire control rooms and fire-recording stations.
Control room for propulsion machinery when located outside the machinery space. Spaces containing centralized fire alarm equipment.

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).

2) Corridors
   Corridors and lobbies.

3) Accommodation spaces
   Spaces as defined in Reg. 3.10 (Sec.1 C302), excluding corridors.

4) Stairways
   Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto. In this connection, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.

5) Service spaces (low risk)
   Lockers and store-rooms not having provisions for the storage of flammable liquids and having areas less than 4 m² and drying rooms and laundries.

   Provision chambers are to be treated as store rooms. Refrigerated provision chambers are considered as category (5) Service spaces if thermally insulated with non-combustible materials.

6) Machinery spaces of category A
   Spaces as defined in Regulation 3.19 (Sec.1 C311).

7) Other machinery spaces
   Spaces as defined in Regulation 3.20 (Sec.1 C312) excluding machinery spaces of category A;

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

8) Cargo spaces
   All spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces.

9) Service spaces (high risk)
   Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having areas of 4 m² or more, spaces for the storage of flammable liquids, and workshops other than those forming part of the machinery spaces.

   Provision chambers are to be treated as store rooms. Refrigerated provision chambers are considered as category (9) service spaces if thermally insulated with combustible materials.

10) Open decks
   Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deck-houses).

11) Ro-ro cargo spaces
   Spaces as defined in Regulation 3.14 (Sec.1 C306). Cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion.

(SOLAS Reg. II-2/44.2, IACS UI SC45)

303 Continuous "B" class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

(SOLAS Reg. II-2/44.3)

304 External boundaries which are required in Regulation 42.1 (101) to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have "A" class integrity elsewhere in this Part. Similarly, in such boundaries which are not required to have "A" class integrity, doors may be of materials to the satisfaction of the Administration.

(SOLAS Reg. II-2/44.4)

305 The required division of steel between control stations and open decks may in the case of an emergency generator be provided 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 needed 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)

Table B1 Fire integrity of bulkheads separating adjacent spaces

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See notes under Table B2.
Table B2  Fire integrity of decks separating adjacent spaces

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</table>

To be applied to both Tables B1 and B2, as appropriate.

1) No special requirements are imposed upon bulkheads in methods IIC and IIC fire protection.
2) In case of method IIC «B» class bulkheads of «B»-0» rating shall be provided between spaces or groups of spaces of 50 m² and over in area.
3) For clarification as to which applies, see 200 and 500.
4) Where spaces are of the same numerical category and superscript 4) appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room may require a «A»-0 bulkhead.
5) Bulkheads separating the wheelhouse, chartroom and radio room from each other may be «B»-0» rating.
6) «A»-0» rating may be used if no dangerous goods are intended to be carried or if such goods are stowed not less than 3 m horizontally from such bulkhead.
7) Cargo spaces in which dangerous goods are intended to be carried will be specially considered.
8) Bulkheads and decks separating ro-ro cargo spaces shall be capable of being closed reasonably gastight and such divisions shall have «A» class integrity in so far as is reasonable and practicable.
9) Fire insulation need not be fitted if the machinery space in category (7) has little or no fire risk.

* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of «A» class standard.

B 400  Means of escape

401  Stairways and ladders shall be so arranged as to provide, from all accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces, ready means of escape to the open deck and thence to the life-boats and liferafts. In particular the following general provisions shall be complied with:

.1  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.
.2  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.
.3  Above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof.
.4  Exceptionally the Administration may dispense with one of the means of escape, due regard being paid to the nature and location of spaces and to the numbers of persons who normally might be quartered or employed there.
.5  No dead-end corridors having a length of more than 7 m shall be accepted. A dead-end corridor is a corridor or part of a corridor from which there is only one escape route.
.6  The width and continuity of the means of escape shall be to the satisfaction of the Administration.
.7  If a radiotelegraph station has no direct access to the open deck, two means of access or egress from such station shall be provided, one of which may be a porthole or window of sufficient size or other means to the satisfaction of the Administration, to provide an emergency escape.

(SOLAS Reg. II-2/45.1)

402  In all ro-ro cargo spaces where the crew is normally employed the number and locations of escape routes to the open deck shall be to the satisfaction of the Administration, but shall in no case be less than two and shall be widely separated.

(SOLAS Reg. II-2/45.2)

403  Except as provided in paragraph 4 (404), 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. In general, one of these ladders shall provide continuous fire shelter from the lower part of the space to a safe position outside the space. However, the Administration may not require the shelter if, due to the special arrangement or dimensions of the machinery space, a safe escape route from the lower part of this space is provided. This shelter shall be of steel, insulated, where necessary, to the satisfaction of the Administration and be provided with a self-closing steel door at the lower end; or
.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.

(SOLAS Reg. II-2/45.3)

404  In a ship of less than 1,000 gross tonnage, the Administration may dispense with one of the means of escape required under paragraph 3 (403), due regard being paid to the dimension and disposition of the upper part of the space.

(SOLAS Reg. II-2/45.4)

405  From machinery spaces other than those of category A, escape routes shall be provided to the satisfaction of the Administration having regard to the nature and location of the space and whether persons are normally employed in that space.

(SOLAS Reg. II-2/45.5)

406  Lifts shall not be considered as forming one of the required means of escape required by this Regulation.

(SOLAS Reg. II-2/45.6)
B 500 Protection of stairways and lift trunks in accommodation spaces, service spaces and control stations

501 Stairways which penetrate only a single deck shall be protected at least at one level by at least "B-0" class divisions and self-closing doors. Lifts which penetrate only a single deck shall be surrounded by "A-0" class divisions with steel doors at both levels. Stairways and lift trunks which penetrate more than a single deck shall be surrounded by at least "A-0" class divisions and be protected by self-closing doors at all levels.

(SOLAS Reg. II-2/46.1)

Dumb waiters are to be regarded as lifts. (IACS UI SC46)

502 On ships having accommodation for 12 persons or less, where stairways penetrate more than a single deck and where there are at least two escape routes direct to the open deck at every accommodation level, consideration may be given by the Administration to reducing the "A-0" requirements of paragraph 1 (501) to "B-0".

(SOLAS Reg. II-2/46.2)

503 All stairways shall be of steel frame construction except where the Administration sanctions the use of other equivalent material.

(SOLAS Reg. II-2/46.3)

B 600 Doors in fire resisting divisions

601 The fire resistance of doors shall, as far as practicable, be equivalent to that of the division in which they are fitted. Doors and door frames in "A" class divisions shall be constructed of steel. Doors in "B" class divisions shall be non-combustible. Doors fitted in boundary bulkheads of machinery spaces of category A shall be reasonably gastight and self-closing. In ships constructed according to method IC, an Administration may permit the use of combustible materials in doors separating cabins from individual interior sanitary accommodation such as showers.

(SOLAS Reg. II-2/47.1)

602 Doors required to be self-closing shall not be fitted with hold-back hooks. However, hold-back arrangements fitted with remote release devices of the fail-safe type may be utilized.

(SOLAS Reg. II-2/47.2)

603 In corridor bulkheads ventilation openings may be permitted only in and under the doors of cabins and public spaces. The openings shall be provided only in the lower half of a door. Where such opening is in or under a door the total net area of any such opening or openings shall not exceed 0.05 m². When such opening is cut in a door it shall be fitted with a grille made of non-combustible material.

(SOLAS Reg. II-2/47.3)

Ventilation openings may also be permitted in "B" class doors leading to lavatories, offices, pantries, lockers, store rooms etc.

(IACS UI SC67)

604 Watertight doors need not be insulated.

(SOLAS Reg. II-2/47.4)

Watertight doors in fire resisting divisions are to be made from steel.

B 700 Ventilation systems

701 The ventilation systems of cargo ships shall be in compliance with the provisions of Regulation 16, except paragraph 8 (Sec.10 except A109).

(SOLAS Reg. II-2/48.1)

B 800 Restricted use of combustible materials

801 All exposed surfaces in corridors and stairway enclosures and surfaces including grounds in concealed or inaccess-
sible spaces in accommodation and service spaces and control stations shall have low flame-spread characteristics. Exposed surfaces of ceilings in accommodation and service spaces and control stations shall have low flame-spread characteristics.

(SOLAS Reg. II-2/49.1)

- Refer to the Guidelines on the evaluation of fire hazard properties of materials adopted by IMO by resolution A.166(ES.4) and to the Recommendation on improved fire test procedures for surface flammability of bulkhead, ceiling and deck finish materials adopted by IMO by resolution A.683(16).

802 Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the Fire Test Procedures Code.

(SOLAS Reg II-2/49.2)

These regulations only apply to accommodation spaces, service spaces and control stations.

(IACS UI SC127)

803 Primary deck coverings, if applied within accommodation and service spaces and control stations, shall be of approved material which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures, this being determined in accordance with the Fire Test Procedures Code.

(SOLAS Reg II-2/49.3)

804 Bulkheads, ceiling and linings are to comply with 801 and 802 regardless of the type of materials used. 800 applies regardless of the type of materials. Other finishes used in exposed interior surfaces other than decks are to comply with 802. Finishes such as plastic tile and latex as primary deck covering are to comply with 803 and IMO Res. A.687(17).

(IACS UI SC47)

B 900 Details of construction

901 Method IC - In accommodation and service spaces and control stations all linings, draught stops, ceilings and their associated grounds shall be of non-combustible materials.

(SOLAS Reg. II-2/50.1)

902 Methods IIC and IIIC - In corridors and stairway enclosures serving accommodation and service spaces and control stations ceilings, linings, draught stops and their associated grounds shall be of non-combustible materials.

(SOLAS Reg. II-2/50.2)

903 Methods IC, IIC and IIIC

1. Except in cargo spaces or refrigerated compartments of service spaces, insulating materials shall be non-combustible. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings, for cold service systems, need not be of non-combustible materials, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

2. Where non-combustible bulkheads, linings and ceilings are fitted in accommodation and service spaces they may have a combustible veneer with a calorific* value not exceeding 45 MJ/m² of the area for the thickness used.

3. The total volume of combustible facings, mouldings, decorations and veneers in any accommodation and service space bounded by non-combustible bulkheads, ceilings and linings shall not exceed a volume equivalent to a 2.5 mm veneer on the combined area of the walls and ceilings.

4. Air spaces enclosed behind ceilings, panelings, or linings, shall be divided by close-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such air spaces, including those behind linings of stairways, trunks, etc., shall be closed at each deck.

(SOLAS Reg. II-2/50.3)
* The gross calorific value measured in accordance with ISO 1716 - "Building Materials - Determination of Calorific Potential", should be quoted.

C. Arrangements for Gaseous Fuel for Domestic Purposes

C 100 General

101 Where gaseous fuel is used for domestic purposes the arrangements for the storage, distribution and utilization of the fuel shall be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the ship and the persons on board is preserved. (SOLAS Reg. II-2/51)


D 100 General

101 In ships in which method IC is adopted, a fixed fire detection and fire alarm system of an approved type complying with the requirements of regulation 13 (Sec.9 A) shall be so installed and arranged as to provide smoke detection and manually operated call points in all corridors, stairways and escape routes within accommodation spaces. (SOLAS Reg. II-2/52.1)

102 In ships in which method IIC is adopted, an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the relevant requirements of regulation 12 (Sec.8) shall be so installed and arranged as to protect accommodation spaces, galleys and other service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system of an approved type complying with the requirements of regulation 13 (Sec.9 A) shall be so installed and arranged as to provide smoke detection and manually operated call points in all corridors, stairways and escape routes within accommodation spaces. (SOLAS Reg. II-2/52.2)

103 In ships in which method IIC is adopted, a fixed fire detection and fire alarm system of an approved type complying with the requirements of regulation 13 (Sec.9 A) shall be so installed and arranged as to detect the presence of fire in all accommodation spaces and service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. (SOLAS Reg. II-2/52.3)

E. Fire Protection Arrangements in Cargo Spaces

E 100 General

101 Except for cargo spaces covered in paragraphs 2 and 3 (200 and 300), cargo spaces of ships of 2,000 gross tonnage and upwards shall be protected by a fixed gas fire-extinguishing system complying with the provisions of Regulation 5 (Sec.3) or by a fire-extinguishing system which gives equivalent protection. (SOLAS Reg. II-2/53.1.1)

102 Notwithstanding the provisions of paragraph 1.1 (101), any ship engaged in the carriage of dangerous goods on deck or in cargo spaces shall be provided with a fixed gas fire-extinguishing system complying with the provisions of Regulation 5 (Sec.3) or with a fire-extinguishing system which, in the opinion of the Administration, gives equivalent protection for the cargoes carried. (SOLAS Reg. II-2/53.1.2)

103 The Administration may exempt from the requirements of paragraphs 1.1 (101) and 1.2 (102) cargo spaces of any ship if constructed and solely intended for the carriage of ore, coal, grain, unseasoned timber, non-combustible cargoes or cargoes which, in the opinion of the Administration, constitute a low fire risk.*

Such exemptions may be granted only if the ship is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces*. When such exemptions are granted, the Administration shall issue an Exemption Certificate, irrespective of the dated of construction of the ship concerned, in accordance with regulation 12(a)(vi), and shall ensure that the list of cargoes the ship is permitted to carry is attached to the Exemption Certificate. (SOLAS Reg. II-2/53.1.3)

104 a carbon dioxide system is fitted, the quantity of gas available shall be at least sufficient to give a minimum volume of free gas equal to 45% of the gross volume of the largest such cargo space which is capable of being sealed, and the arrangements shall be such as to ensure that at least two thirds of the gas required for the relevant space shall be introduced during 10 min; a halogenated hydrocarbon system may be used only for spaces designated only for vehicles which are not carrying any cargo; other fixed gas fire-extinguishing system or fixed high expansion foam fire-extinguishing system may be fitted provided the Administration is satisfied that an equivalent protection is achieved; as an alternative, a system meeting the requirements of regulation 37.1.3 (Sec.6 E) may be fitted. However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information. Such information shall be included in the stability information supplied to the master as required by regulation II-1/22 (Pt.3 Ch.4). (SOLAS Reg. II-2/53.2.2.1)
203 Ro-ro cargo spaces not capable of being sealed shall be fitted with a system meeting the requirements of regulation 37.1.3 (Sec.6 E). However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information. Such information shall be included in the stability information supplied to the master as required by regulation II-1/22. (Pt.3 Ch.4)

(SOLAS Reg. II-2/53.2.2.2)

204 There shall be provided for use in any ro-ro cargo space such number of portable fire extinguishers as the Administration may deem sufficient. At least one of these portable fire extinguishers shall be located at each access to such a cargo space.

(SOLAS Reg. II-2/53.2.2.3)

There is to be provided for use in any ro-ro cargo space at each level portable fire extinguishers spaced not more than 20 m apart on both sides of the ship.

(IACS UI SC73)

205 Each ro-ro cargo space intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion shall be provided with:

.1 at least three water fog applicators;

.2 one portable foam applicator unit complying with the provisions of regulation 6.4 (Sec.4 B) provided that at least two such units are available in the ship for use in such ro-ro cargo spaces.

(SOLAS Reg. II-2/53.2.2.4)

206 Closed ro-ro cargo spaces shall be provided with an effective power ventilation system sufficient to provide at least six air changes per hour based on an empty hold. Ventilation fans shall normally to be run continuously whenever vehicles are on board. Where this is impracticable, they shall be operated for a limited period daily as weather permits and in any case for a reasonable period prior to discharge, after which period the ro-ro cargo space shall be proved gas-free. One or more portable combustible gas detecting instruments shall be carried for this purpose. The system shall be entirely separate from other ventilating systems. Ventilation ducts serving ro-ro cargo spaces capable of being effectively sealed shall be separated for each cargo space. The Administration may require an increased number of air changes when vehicles are being loaded or unloaded. The system shall be capable of being controlled from a position outside such spaces.

(SOLAS Reg. II-2/53.2.3.1)

207 The ventilation shall be so arranged as to prevent air stratification and the formation of air pockets.

(SOLAS Reg. II-2/53.2.3.2)

208 Means shall be provided to indicate any loss of the required ventilating capacity on the navigating bridge.

(SOLAS Reg. II-2/53.2.3.3)

The requirement 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 SC75)

209 Arrangements shall be provided to permit a rapid shut-down and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

(SOLAS Reg. II-2/53.2.3.4)

210 Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration.

(SOLAS Reg. II-2/53.2.3.5)

211 Closed ro-ro cargo spaces carrying motor vehicles with fuel in their tanks for their own propulsion shall comply with the following additional provisions:

.1 Except as provided in paragraph 2.4.2 (211.2), electrical equipment and wiring shall be of a type suitable for use in explosive petrol and air mixtures. The electrical equipment shall be of certified safe type suitable for use in Zone 1 as defined in Gas Group II A and Temperature class T3.

.2 Above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, electrical equipment with enclosure of a type so enclosed and protected as to prevent the escape of sparks shall be permitted as an alternative on condition that the ventilating system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board.

The enclosure for electrical equipment shall be of at least type IP 55.

.3 Other equipment which may constitute a source of ignition of flammable vapours shall not to be permitted.

.4 Electrical equipment and wiring in an exhaust ventilation duct shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

The electrical equipment shall be of certified safe type according to 211.1.

.5 Scuppers shall not be led to the machinery or other spaces where sources of ignition may be present.

.6 All electrical circuits terminating in the cargo holds 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. However, this requirement does not apply in respect of safety devices such as fire, smoke or gas detectors.

.7 If electrical circuits of the gas detection system are located in the cargo hold, the system is to be of the certified safe type (see Ch.8).

.8 No smoking notices are to be posted in way of all accesses to these compartments.

(SOLAS Reg. II-2/53.2.4, IACS UI SC42 and SC43)

212 Permanent openings in the side plating, the ends or deckhead of open and closed ro-ro cargo spaces shall be so situated that a fire in the cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces.

(SOLAS Reg. II-2/53.2.5)

E 300 Cargo spaces, other than ro-ro cargo spaces, intended for the carriage of motor vehicles

301 Cargo spaces, other than ro-ro cargo spaces, intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, shall comply with the requirements of paragraph 2 (200) except that in lieu of the requirements of paragraph 2.1 (201) a sample extraction smoke detection system complying with the requirements of regulation 13-1 (Sec.9 B) may be permitted and paragraph 2.2.4 (205) need not be complied with.

(SOLAS Reg. II-2/53.3)

302 For vessels other than ro-ro carriers and car carriers, intended for the carriage of motor vehicles with fuel in their tanks, class notation PET will be given.
SECTION 16
FIRE SAFETY MEASURES FOR CARGO SHIPS LESS THAN 500 GROSS TONNAGE

A. General

A 100 Application

101 The requirements in this section apply to cargo ships below 500 gross tonnage assigned main class. See also Sec.1 A, B, C and D.

B. Fire Extinction

B 100 Fire pumps

101 Cargo ships above 150 but below 500 gross tonnage are to be provided with at least one independent driven fire pump.

102 Cargo ships of less than 150 gross tonnage are to have at least one fire pump which may be driven by the main engine.

103 The main fire pumps referred to in 101 and 102 are to have capacities according to Sec.2 B101.2.

104 In every such ship provided with machinery space of category A there is to be provided in a position outside this space a power or hand operated pump in addition to the pumps required in 101 and 102. The pump is to have sufficient capacity and pressure to provide a 6 m jet throw with nozzles not less than 10 mm diameter. The jet throw is to be capable of being directed on to any part of the ship.

105 In cargo ships of less than 50 gross tonnage the pumps referred to above may be substituted by other approved equipment.

B 200 Water distribution system

201 Every such ship is to have fire hydrants of sufficient numbers and so located that at least one powerful jet of water can reach any part of the vessel accessible to persons on board. At least one hydrant is to be provided in machinery space.

202 The fire main is to have a diameter of sufficient size to maintain a steady distribution and pressure.

203 Materials used for the fire main are to be steel or equivalent material.

204 Pipe wall thicknesses are to be in accordance with Ch.6 and material quality to be in accordance with Pt.2 Ch.1.

205 Such ships are to be provided with one fire hose complete with coupling and nozzle for each 30 m of the ship, but in no case less than three in all. The hose length is not to exceed 15 m.

206 The nozzles are to be of an approved dual purpose type (spray/jet) with 12 mm diameter and an integrated shut-off valve. Other diameters may be considered.

207 For smaller vessels the water distribution system may be substituted by other approved equipment.

B 300 Portable fire extinguishers

301 Every such ship is to be provided with at least three approved portable fire extinguishers so situated as to be readily available for use in the accommodation and service spaces.

302 In each boiler room and in each space which contains any part of any oil fuel installation there is to be provided at least two approved portable fire extinguishers suitable for extinguishing oil fires.

303 In each machinery space of category A containing internal combustion type machinery there is to be provided one approved foam or powder type extinguisher suitable for oil fires for each 750 kW or part thereof of such machinery. Not less than two such extinguishers are to be provided.

304 Smaller ships will be subjected to special consideration.

B 400 Non-portable fire extinguishers

401 In cargo ships above 150 but below 500 gross tonnage for unrestricted service there is to be provided in machinery spaces of category A one approved foam type extinguisher of at least 45 litre capacity or equivalent. CO₂ extinguisher of at least 16 kg is considered equivalent. Alternatively, a fixed fire extinguishing system may be provided for machinery spaces of category A, in lieu of the foam type extinguisher.

B 500 Fireman's outfit

501 Cargo ships of above 150 but below 500 gross tonnage for unrestricted service are to be provided with at least two sets of fireman's outfit complying with Sec.11.
SECTION 17
FIRE SAFETY MEASURES FOR FISHING VESSELS

A. General

A 100 Application

101 The requirements in this section apply to fishing vessels assigned main class. See also Sec.1 A, B, C and D.

102 Fishing vessels of less than 500 gross tonnage or less than 45 m length (L) are to comply with the requirements for cargo ships in Sec.16 and to B402 and B403.

103 Fishing vessels of 500 gross tonnage and above, or 45 m length (L) and above are to comply with the requirements specified below.

Guidance note:
For fishing vessels - which are to comply with the applicable parts concerning fire safety as laid down in the Torremolinos International Convention for the Safety of Fishing Vessels, 1977, as modified by the Torremolinos Protocol of 1993 - these recommendations may be accepted as equivalent to the rule requirements as given in 102 and 103. Inquiry regarding use of the Torremolinos 1993 as an alternative to classification rules should be indicated on the request for classification.

---end-of---Guidance---note---

B. Fire Safety Measures

B 100 Fire pumps and water distribution system

101 Fire pumps and water distribution system are to comply with the requirements of Sec.2 as applicable to cargo ships.

B 200 Fire safety arrangements in machinery spaces

201 The arrangement of fire protection and fire-extinguishing appliances in machinery spaces are to comply with the requirements of Sec.5, Sec.7 and Sec.9 as applicable to cargo ships.

B 300 Fireman's outfit

301 Fishing vessels above 150 gross tonnage are to be provided with at least two sets of fireman's outfit complying with Sec.11.

B 400 Fire protection of bulkheads and decks

401 Structural fire protection is to comply with Sec.12 and Sec.15 as applicable to cargo ships.

402 Combustible insulation materials are accepted in compartments for stowage of fish provided low ignitability and low flame spread properties are documented. Testing is to be carried out in accordance with a recognised standard, e.g. DIN 4102.1 B2 or equivalent. The test method chosen is to be suitable for the type of foam in question.

403 Combustible insulation as accepted by 402 is to be protected by close-fitting cladding. Acceptable cladding is steel sheet and marine plywood. Surface coatings are to have low flame spread properties.

B 500 Portable fire extinguishers

501 Portable fire extinguishers are to be provided in accordance with Sec.4.