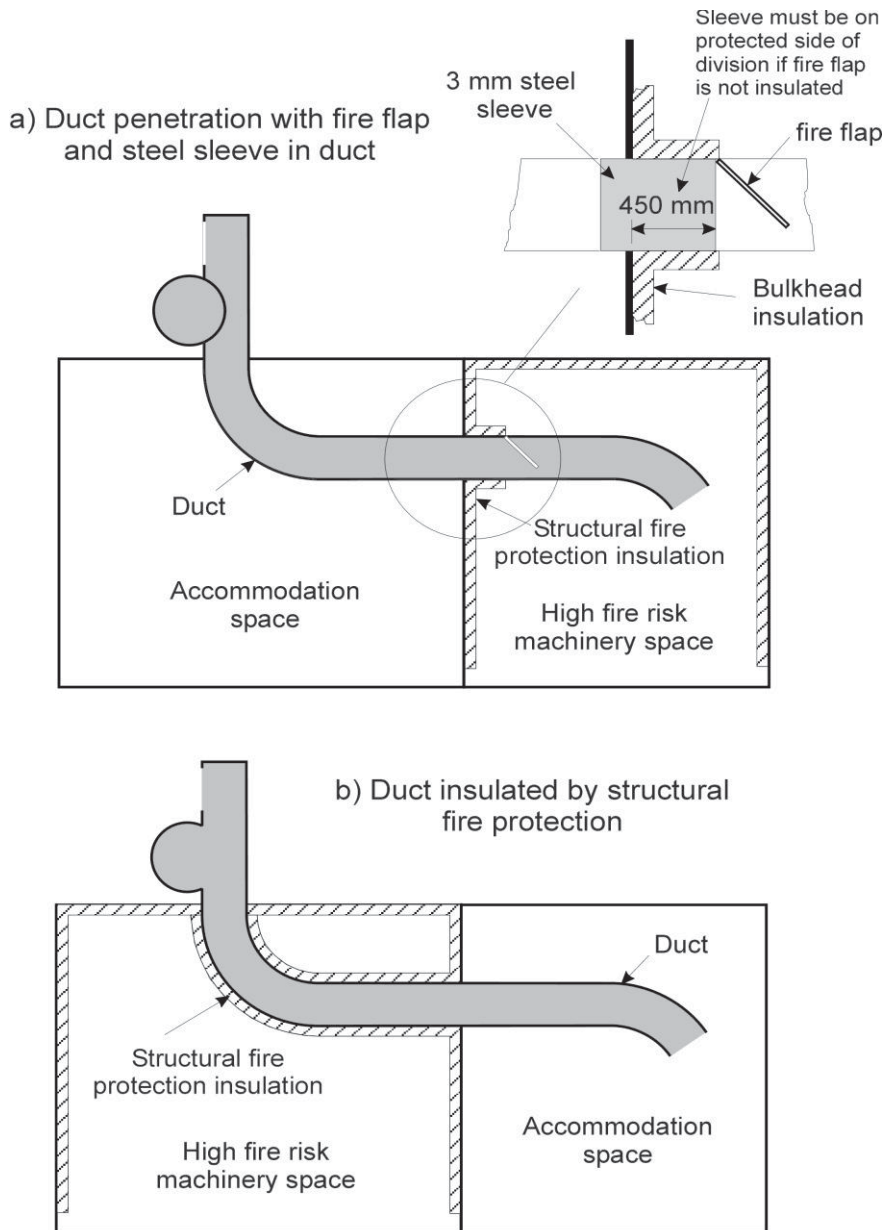


### 3.8.5.5 Ducts passing through High Fire Risk Spaces and Moderate Fire Risk Spaces

Ducts provided for ventilation to *Accommodation Spaces* or *Control Stations* shall not pass through *High Fire Risk Spaces* or *Moderate Fire Risk Spaces* unless the ducts are constructed and insulated such that a fire in the high or moderate risk space will have no adverse effect on these latter spaces for a period equivalent to the applicable *time rating* from Table 7, Table 8 or Table 9. Figure 4(b) illustrates the arrangement of insulation.

NOTE: Guidance on the construction and insulation of ducts is provided in SOLAS Chapter II-2.



**Figure 4 — Ducts, duct penetrations and fire flaps**

### **3.8.5.6 Dampers on ducts passing through fire-resisting divisions**

#### **3.8.5.6.1 Fire integrity of division to be maintained**

Where a ventilation duct passes through a *fire-resisting division*, a closing *fire damper* shall be fitted adjacent to the division [Figure 4(a)] unless the duct is completely protected by insulation. The duct between the division and the *fire damper* shall be of steel or other equivalent material and insulated to the same standard as required for the *fire-resisting division*. The *fire damper* may be omitted where ducts pass through spaces surrounded by *fire-resisting divisions* without serving those spaces providing that the duct has the same structural fire protection *time rating* as the divisions it penetrates.

NOTES:

1. Guidance on the design of duct sleeves is provided in SOLAS Chapter II-2 Regulation 9.7.3.1.
2. A proposal to incorporate intumescent *fire dampers* should address the need to reinstate ventilation within a space after a fire if that were required for the safety of persons or the vessel.

#### **3.8.5.6.2 Manual operation**

All *fire dampers* fitted on *fire-resisting divisions* shall be capable of being manually closed. *Fire dampers* fitted on ducts serving spaces not normally manned such as stores and toilets may be manually operated only from outside the served spaces. For other *fire dampers*, the arrangements for manual closure shall allow manual operation from each side of the division in which they are fitted.

On passenger vessels required to have centralised fire control functions under Clause 4.4, *fire dampers* on *fire-resisting divisions* shall also be capable of being remotely closed from a normally continuously manned central control station.

#### **3.8.5.6.3 Automatic operation**

For vessels of *Fire Risk Category IV*, the *fire damper* on *fire-resisting divisions* shall be of a fail-safe, automatic closing type that is also capable of manual closure.

### **3.8.5.7 Dampers on ducts passing through smoke-tight divisions**

Where a ventilation duct serves an *Accommodation Space*, *Escape or Evacuation Route*, or *Control Station*, and that ventilation duct passes through a *smoke-tight* division; a manually operated smoke damper shall be fitted at the penetration of the ventilation duct through the *smoke-tight* division. The smoke damper shall be operable from the space served by the ventilation duct.

## **3.8.6 Doors, hatches and other openings in fire-resisting divisions**

### **3.8.6.1 General**

Openings in *fire-resisting divisions* shall be provided with a permanently attached means of closing and shall be at least as effective for resisting fires as the divisions in which they are fitted.

### 3.8.6.2 **Performance of doors**

The construction of doors and door frames in *fire-resisting divisions*, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame equivalent to that of the bulkheads in which the doors are situated. Resistance shall be determined in accordance with Chapter 12. Steel sliding watertight doors penetrating bulkheads below the bulkhead deck need not be insulated.

### 3.8.6.3 **Operation of doors**

Each door shall be able to be opened and closed from each side of the bulkhead by one person only.

### 3.8.6.4 **Windows and sidescuttles**

Windows and sidescuttles in *fire-resisting divisions*, other than those to which the provisions of Clause 3.8.6.5 apply, shall be constructed to preserve the fire integrity requirements of the type of bulkheads in which they are fitted. Fire integrity shall be determined in accordance with Chapter 12.

### 3.8.6.5 **Penetrations through divisions on outer boundaries of a vessel**

For spaces other than *High Fire Risk Spaces* the requirements for *fire-resisting divisions* on the outer boundaries of a vessel need not apply to doors, glass partitions, windows and sidescuttles, except for those in superstructures and deckhouses facing lifesaving appliances, embarkation and external assembly station areas, external stairs and open decks used for escape routes, and windows situated below a survival craft or marine evacuation system (MES) embarkation area.

## STRUCTURAL INTEGRITY

### 3.9 MAINTENANCE OF STRUCTURAL INTEGRITY

#### 3.9.1 General requirement

A structure either bounding or within a space of *High Fire Risk* or *Moderate Fire Risk*; or supporting an adjacent *Control Station* or *Escape or Evacuation Route*, shall be constructed or protected so that, when exposed to fire for the time required for structural fire protection of the space in Table 7, Table 8 or Table 9, its structural integrity is maintained. This integrity shall be sufficient to avoid—

- a) a loss of watertight integrity of the vessel that could endanger persons on the vessel;
- b) a partial or total collapse of the vessel's structure that could endanger persons on the vessel; or

#### EXAMPLES:

Unprotected structural pillars supporting decks carrying survival craft above a space.

Unprotected side structure of an aluminium hull above the waterline within a space of *High Fire Risk* or *Moderate Fire Risk*.

NOTE: Unprotected structures of steel are taken to satisfy this Clause.

### 3.9.2 Structures of aluminium alloy

If the structures specified in Clause 3.9.1 are made of aluminium alloy their installation shall be such that the temperature of the core shall not rise more than 200°C above the ambient temperature during exposure to the standard fire test in Chapter 12. The time of exposure to the standard fire test shall be determined from Table 7, Table 8 or Table 9. See also Figure 3b).

### 3.9.3 Structures of combustible materials

If the structures specified in Clause 3.9.1 are made of *combustible material*, their construction or insulation shall be such that load-carrying capability will not deteriorate to the extent that structural failure of the member could occur when exposed to the standard fire test in Chapter 12. The time of exposure to the standard fire test shall be determined from Table 7, Table 8 or Table 9.

### 3.9.4 Structures in contact with water

Where for the purposes of Clause 3.9.1, the proximity of the structure to seawater is taken to provide sufficient protection against the effects of exposure of hull structure to the heat of a fire, the arrangement of structural fire protection shall—

- a) provide protection at all normal conditions of loading including the lightweight condition; and
- b) take into account the effect of temperature on the hull and hull stiffening in contact with water and heat transfer from any uninsulated structure in contact with water to insulated structure above the water.

NOTE: Insulation of hull sides to a level 300 mm below the design lightweight waterline provides a factor of safety should a discrepancy arise once the vessel is constructed, see Figure 3b).

## 3.10 MATERIALS FOR OVERBOARD FITTINGS

Overboard scuppers, sanitary discharges, and other outlets within spaces of *High Fire Risk* or *Moderate Fire Risk* that are 230 mm or less above the deepest load waterline shall be constructed of materials resistant to exposure to heat where the failure of the material in the event of fire would give rise to unacceptable risks associated with flooding.

## CHAPTER 4 GENERAL REQUIREMENTS FOR ACTIVE FIRE PROTECTION MEASURES

### 4.1 SCOPE

This Chapter specifies requirements for *active fire protection measures*. Specific requirements applicable to particular spaces on a vessel are specified in later chapters, see Table 11.

**Table 11 — Chapters applicable to specific spaces or types of vessels**

Space	Chapter
High Fire Risk Spaces	Chapter 6
Moderate Fire Risk Spaces	Chapter 7
Accommodation Spaces	Chapter 8
Minor Fire Risk Spaces	Chapter 9
Control Stations	Chapter 10
Escape or Evacuation Routes	Chapter 11

### FIRE GROWTH POTENTIAL

#### 4.2 REMOTE STOPS FOR VENTILATION AND EXHAUST FANS

All vessels shall be provided with remote stops for ventilation and exhaust fans that supply *High Fire Risk Spaces*, *Moderate Fire Risk Spaces*, *Accommodation Spaces*, and cargo spaces. These remote stops shall be sited outside the spaces in which such fan machinery is located.

#### 4.3 VENTILATION CLOSING APPLIANCES

The main inlets and outlets of all ventilation systems shall be capable of being effectively sealed by fire flaps from outside the spaces being ventilated. The fire flaps shall be easily accessible as well as prominently and permanently marked, and shall indicate whether the fire flap is open or closed.

NOTE: Clause 3.8.5 specifies requirements for *fire dampers* in ventilation ducts.

#### 4.4 CENTRALISED FIRE CONTROL FUNCTIONS ON PASSENGER VESSELS

Vessels specified in Table 12 shall be arranged with a *central control station* in the *operating compartment* or another normally continuously manned *Control Station* having a safe access from the open deck. The *central control station* shall contain remote indicators and controls for monitoring and operating the equipment listed in Table 13, to the extent that such equipment is fitted on the particular vessel.

The control panel shall be continuously powered and shall have an automatic changeover to standby power supply in case of loss of normal power.

NOTE: IMO Resolution A.830(19) specifies types of alarms and indicators for various functions.

**Table 12 — Grouping of remote shut-downs and controls**

Category	Application
<i>Fire Risk Category I</i>	Not required
<i>Fire Risk Category II</i>	Not required
<i>Fire Risk Category III</i>	Applies to vessels carrying more than 450 day passengers.
<i>Fire Risk Category IV</i>	Applies

**Table 13 — Functions centralised in a *central control station***

Equipment	Functions
<i>Fixed fire detection and fire alarm systems</i>	Indicators and controls
<i>Fixed fire extinguishing systems</i>	Indicators and controls
General and evacuation alarms	Controls
Main fire pumps	Controls
Fire doors	Indicators and closures
Machinery space and other <i>High Fire Risk Space fire flaps and fire dampers</i>	Indicators and closures
Watertight doors	Indicators and closures
Ventilation fans	Indicators and controls
Fuel transfer pumps, fuel pumps, lubricating oil service pumps, thermal oil circulating pumps, oil separators	Remote stops
Communication systems including telephones	Operation and controls
Public address systems	Operation and controls

## FIRE DETECTION AND ALARM

### 4.5 FIRE DETECTION AND FIRE ALARM SYSTEM

#### 4.5.1 Application

A *fire detection and fire alarm system* shall be provided within spaces on vessels as specified in Chapter 6 to Chapter 11. Relevant clauses are listed in Table 14.

NOTE: Not all vessels are required to be fitted with *fire detection and fire alarm system*, for example, some dumb barges and other vessels of relatively low fire risk.

**Table 14 — Clauses for determining a requirement to fit *fire detection and fire alarm systems***

Location	Clause
High Fire Risk Machinery Spaces	6.4.12
Ro-Ro Spaces	6.5.6
Moderate Fire Risk Machinery Spaces	7.4.2
Accommodation Spaces	8.11, 8.15
Cargo Spaces	9.4.5
Control Stations	10.7
Escape and Evacuation	11.9

**4.5.2 System to be suited to application**

The *fire detection and fire alarm system* shall be suited to the nature of the space, the fire growth potential in the space and the potential generation of smoke and gases within the space.

**4.5.3 Standard**

The *fire detection and fire alarm system* shall comply with Chapter 12.

**4.5.4 Fixed fire detection and fire alarm system****4.5.4.1 Alarms**

A *fixed fire detection and fire alarm system* shall provide audible and visual alarms. These alarms shall be easily distinguished from other alarms that do not indicate fire. The alarms shall be located so that they can be monitored from the *operating compartment* and in such other places to ensure a responsible member of the crew hears them when the *operating compartment* is unmanned.

**4.5.4.2 Class 1 passenger vessels**

For Class 1 vessels of *Fire Risk Category* II, III or IV, the *fixed fire detection and fire alarm system* shall be of the self-monitored type.

NOTE: A self-monitored system is designed on the fail-safe principle to self-check for loss of system functionality (i.e. an open detector circuit triggers an alarm).

**MEANS OF ESCAPE****4.6 EMERGENCY ESCAPE BREATHING DEVICES****4.6.1 General**

Emergency escape breathing devices shall comply with Chapter 12.

**4.6.2 Number of emergency escape breathing devices**

Emergency escape breathing devices shall be provided on vessels in accordance with Table 15.

**Table 15 — Emergency escape breathing devices required**

Category	Vessels of less than 35 m measured length	Vessels of 35 m or more and less than 80 m measured length	Vessels of 80 m measured length & more	
		Each <i>High Fire Risk</i> machinery space: manned or with a machinery <i>Control Station</i>	Each <i>High Fire Risk</i> machinery space	Each <i>Accommodation Space</i> for berthed persons located below the bulkhead deck
<i>Fire Risk Category I</i>	Not required	2	2	2
<i>Fire Risk Category II</i>	Not required	2	2	2
<i>Fire Risk Category III</i>	Not required	2	2	2
<i>Fire Risk Category IV</i>	Not required	2	As per SOLAS	As per SOLAS

#### 4.6.3 Storage of emergency escape breathing devices

Where emergency escape breathing devices are provided they shall be situated ready for use at easily visible places so they can be reached quickly and easily at any time. Emergency escape breathing devices shall be located along the escape routes, at the foot of escape ladders or in control spaces or workshops located within the space, taking into account the layout of the space and the location of persons normally within the space.

NOTE: Guidelines for the performance, location, use and care of emergency escape breathing devices are published as MSC/Circ.849.

## FIRE FIGHTING

### 4.7 FIRE HOSE APPLIANCES

#### 4.7.1 Application

Table 16 specifies those vessels that shall be provided with fire hose appliances supplied by fire pumps. Vessels not required to be fitted with fire hose appliances shall carry fire buckets in accordance with Clause 4.8.

**Table 16 — Application of fire hose appliance requirements**

Category	Application
<i>Fire Risk Category I</i> (1)	Required if the Measured length x breadth $\geq 66 \text{ m}^2$
<i>Fire Risk Category II</i> (1)	Required if the Measured length x breadth $\geq 66 \text{ m}^2$
<i>Fire Risk Category III</i>	Required
<i>Fire Risk Category IV</i>	Required

KEY:

(1) Vessels of *Fire Risk Category I* or *II* that have no spaces of *High Fire Risk* or *Moderate Fire Risk* and no enclosed *Accommodation Spaces* need not be provided with fire hose appliances.

## 4.7.2 Performance

### 4.7.2.1 General

Each fire hose appliance shall consist of a hose complying with Clause 4.7.6.2 and a nozzle complying with Clause 4.7.6.3. When attached to any fire hydrant on a vessel, each fire hose appliance shall achieve and maintain a flow rate and inclined jet throw not less than the values specified in Table 17.

NOTE: Rigid cross-section hoses have improved flow and throw performance over lay flat hoses.

**Table 17 — Fire hose appliance performance**

Vessel measured length x breadth m <sup>2</sup>	Single orifice nozzle diameter (1) mm	Minimum throw of inclined water jet m	Assumed hydrant pressure kPa	Minimum fire hose nozzle flow rate m <sup>3</sup> /hr	Minimum pump capacity per fire hose appliance per fire pump m <sup>3</sup> /hr
< 100	10	6	Not specified	Not specified	5.5
≥ 100 and < 1900	12	11	150	6.5	7.0
≥ 1900 and < 3400	16	14	150	10.5	12.5
≥ 3400	19	19	200	17.0	20.4

KEY:

Clause 4.7.6.3.1 specifies equivalent minimum flow rates for nozzles other than single orifice type of 12 mm diameter or more.

### 4.7.2.2 Testing

The fire hose appliances, fire pumps and fire main piping shall be tested to verify—

- a) the operation of each fire pump;
- b) the integrity of fire main piping while under pressure;
- c) the supply of water to every hydrant; and
- d) the performance of the fire main appliances by either of the following tests:
  - i) For vessels with no more than two hydrants on the fire main, a practical test shall be undertaken to determine the throw of the fire hose jet. The test shall be in accordance with Annex C with the requisite number of fire hose jets operating using the nozzle and single length of hose stowed at the relevant hydrant or hydrants. The throw so determined shall not be less than the greater of required value in Table 17 or the throw corresponding specified by the nozzle manufacturer corresponding to the required minimum flow rate specified in Table 17. Practical tests shall be undertaken to verify the proper functioning of *fire appliances* on the vessel that are supplied with water by the fire main; e.g., dual function nozzles, fire hose reels and foam-making branch pipes.

- ii) A test to determine the pressure at the most hydraulically-disadvantaged hydrant with the requisite number of fire hose jets operating using the nozzle and single length of hose stowed at the relevant hydrant or hydrants. The pressure so determined shall not be less than the greater of the applicable assumed pressure in Table 17 and the minimum required value specified by the nozzle manufacturer for the nozzle to provide the flow rate specified in Table 17. Practical tests shall be undertaken to verify the proper functioning of *fire appliance* on the vessel that are supplied with water by the fire main; e.g., dual function nozzles, fire hose reels and foam-making branch pipes.

## NOTES:

1. A test that measures actual flow rate may provide an equivalent solution for testing the performance of fire hose appliances.
2. For small fire hose appliances having a single orifice nozzle of 10 mm diameter or equivalent, no minimum flow rate or hydrant pressure is specified. The fire hose appliance performance test need only measure throw and test the proper functioning of fire appliances that are supplied with water by the fire main.

### 4.7.3 Main fire pumps

#### 4.7.3.1 Power source

The source of power of main fire pumps shall be as specified in Table 18.

**Table 18 — Source of power of main fire pumps**

Vessel measured length x breadth m <sup>2</sup>	Fire Risk Category I or II	Fire Risk Category III or IV
< 100	Manually operated or power driven	Power driven
≥ 100 and < 1900	Power driven	Power driven
≥ 1900 and < 3400	Power driven	Power driven
≥ 3400	Power driven	Power driven

#### 4.7.3.2 Multiple operation of fire hose appliances

Each main fire pump shall be sized to simultaneously supply the number of fire hose appliance water jets specified in Table 19, while maintaining the performance of fire hose appliances as specified in Table 17.

#### 4.7.3.3 Capacity of each main fire pump

The capacity of each power driven main fire pump shall be determined by multiplying the number of water jets required in Table 19 by the required minimum pump capacity per fire hose appliance per main fire pump specified in Table 17; i.e.

$$\text{Capacity of each pump} = \frac{\text{Number of water jets} \times \text{Min. pump capacity}}{\text{(Table 19)} \quad \text{(Table 17)}}$$

**EXAMPLE**

For a vessel of Fire Risk Category IV having Length = 33 m and Breadth = 13 m

$$L \times B = 33 \text{ m} \times 13 \text{ m} = 429 \text{ m}^2$$

$$\text{Required capacity of each pump} = 2 \times 7 \text{ m}^3/\text{hr} = 14 \text{ m}^3/\text{hr}$$

NOTE: Bilge pumps should be sized with a capacity of not less than 1.5 times that of the largest fire pump on the vessel to prevent water accumulating within the vessel while fighting a fire with fire hose appliances.

**4.7.3.4 Number of pumps**

The number of main fire pumps provided on a vessel shall be as specified in Table 19. Where a single main fire pump is fitted the fire pump shall be operated by a means other than the vessel's propulsion engines.

NOTE: Multiple main fire pumps are intended to provide redundancy in the event of one pump failing. The capacity of each main fire pump is sized to fulfil the required performance for fire hose appliances.

**Table 19 — Jets and pumps for fire hose appliances**

Category	Number of water jets	Number of main fire pumps
Fire Risk Category I	1 (A)(D)	1 (B)
Fire Risk Category II	1 (A)(D)	1 (B)(C)
Fire Risk Category III	1 (A)(D)	2
Fire Risk Category IV	2 (D)	2

**KEY:**

- (A) The fire hose appliances shall be capable of supplying 2 water jets on vessels fitted with *Ro-Ro spaces* or *helidecks*.
- (B) *Fire Risk Category I* and *II* vessels that have no spaces of *High Fire Risk* or *Moderate Fire Risk* and no enclosed *Accommodation Spaces* need not be provided with fire hydrant appliances.
- (C) An emergency fire pump shall be fitted on vessels where the single main fire pump or its source of power is located in a machinery space of *High Fire Risk*, see Clause 4.7.4.
- (D) For vessels that carry *dangerous goods*, refer to Clause 6.6.4.

**4.7.3.5 Period of operation for main fire pumps**

The main fire pumps and their source of power shall be capable of continuous operation for a period not less than that specified for continuous operation of emergency electrical installations under NSCV Part C Subsection 5B. For vessels fitted with multiple main fire pumps, this requirement shall apply to any one of the main fire pumps that may be called upon to supply fire hydrant appliances.

**4.7.3.6 Non-dedicated main fire pumps**

Pumps used for other purposes may also serve as main fire pumps provided they are not—

- a) bilge pumps; or

- b) pumps normally used for pumping oil or other combustible or *flammable liquids*.

EXAMPLE:

Sanitary, ballast or general service pumps may also serve as main fire pumps.

#### **4.7.3.7 Multiple main fire pumps—requirements for redundancy**

Where two main fire pumps are specified in Table 19, they shall—

- a) be driven independently from one another so that a failure in the source of power for one main fire pump, including any switchboard, will not prevent the starting and use of the other;
- b) be arranged so that in the event of fire in any one space at least one main fire pump shall continue to be functional; i.e., they shall be located in different spaces;
- c) where one of the main fire pumps is located in a machinery space of *High Fire Risk*, be provided with valves that isolate the fire hose appliance piping from the machinery space and are operable from an easily accessible position outside the machinery space (see Clause 4.7.5.8); and
- d) each have a capacity sufficient to provide water of the quantity and pressure required in Clause 4.7.2.

#### **4.7.3.8 Sea suction**

The sea suction inlet to each main fire pump shall be—

- a) located to draw water without interruption under all conditions of loading and trim of the vessel, and under weather conditions liable to be encountered in service; and
- b) arranged to prevent the entry of objects that would block the pump.

#### **4.7.3.9 Priming of main fire pumps**

Unless otherwise specified in this section, main fire pumps shall be self-priming or capable of holding prime. Main fire pumps that are required in Table 19 to have automatic or remote starting shall be self-priming.

#### **4.7.3.10 Automatic or remote starting of main fire pumps**

Vessels of *Fire Risk Category III* carrying more than 36 berthed passengers, or 450 day passengers, and all vessels of *Fire Risk Category IV* shall have at least one main fire pump arranged so that it will start either—

- a) automatically; or
- b) remotely from a *central control station*.

#### **4.7.3.11 Manually operated fire pumps**

##### **4.7.3.11.1 Performance**

Where a manually operated fire pump is installed, it shall meet the requirements of Clause 4.7.2 when using the rate of pumping specified in Table 20.

NOTE: The application of manually operated fire pumps under Clauses 4.7.3.1 and 4.7.4.2 is limited to smaller vessels because of the difficulties likely to be encountered achieving the required performance on large vessels, especially where there is a significant head to the highest hydrant.

**Table 20 — Pumping rates for manually operated fire pumps**

Manual pump type	Pumping actions per minute
Full rotary	60 turns
Horizontal reciprocating or diaphragm—double acting	80 single strokes
Horizontal reciprocating or diaphragm—single acting	60 double strokes

#### 4.7.3.11.2 Priming of manually operated fire pumps

A manually operated fire pump need not be self-priming. However, if the manually operated fire pump will not self-prime from a dry suction, it shall be constructed so that it can be quickly and effectively primed.

### 4.7.4 Emergency fire pump

#### 4.7.4.1 Application

An emergency fire pump or fire buckets shall be provided in accordance with Table 21 on vessels of *Fire Risk Category II* where a fire in a *High Fire Risk Space* could render the main fire pump inoperative.

NOTE: For *Fire Risk Category III* and *IV* vessels, the two main fire pumps are arranged so that one is capable of acting as the emergency pump for the other.

**Table 21 — Emergency fire pump on vessels of *Fire Risk Category II***

Measured length x breadth m <sup>2</sup>	Source of power for emergency fire pump	Minimum emergency fire pump capacity per fire hose appliance m <sup>3</sup> /hr
< 100	Not required	2 fire buckets in lieu
≥ 100 and < 1900	Manual (A) or Power	5.5
≥ 1900 and < 3400	Power	7.5
≥ 3400	Power	12.0

KEY:

(A) Manually operated emergency fire pumps shall comply with Clause 4.7.3.11.

#### 4.7.4.2 Type

The emergency fire pump shall be independently driven. The pump may be of fixed or portable type. Where permitted in Table 21, the emergency fire pump may be manually operated provided—

- a) the vessel does not have a *Ro-Ro space* or *helideck* and does not carry *dangerous goods*; and

- b) the water jet from the fire hose appliance achieves a throw of not less than 6 m when supplied with water from the emergency fire pump at the most hydraulically disadvantaged location.

#### **4.7.4.3 Priming of emergency fire pumps**

An emergency fire pump need not be self-priming. However, if the emergency fire pump will not self-prime from a dry suction, it shall be constructed so that it can be quickly and effectively primed.

#### **4.7.4.4 Period of operation**

The emergency fire pump and its source of power shall be capable of continuous operation for a period not less than that specified for continuous operation of emergency electrical installations under NSCV Part C Subsection 5B.

#### **4.7.4.5 Location**

The location of the emergency fire pump and ancillary items associated with the pump, e.g. sea suctions, sources of power and fuel tanks, shall be in a place remote from the *High Fire Risk Space* containing the main fire pump.

Access to the emergency fire pump shall not be via the space containing the main fire pump.

#### **4.7.4.6 Emergency fire pump suction**

The sea suction of emergency fire pumps shall comply with Clause 4.7.3.8. Where a portable suction hose is used, the hose shall be—

- a) of length necessary to maintain immersion under all conditions of loading and trim of the vessel, and under weather conditions liable to be encountered in service;
- b) weighted to maintain immersion;
- c) provided with fittings sufficiently robust to withstand the rigours of emergency usage;
- d) provided with a foot valve; and
- e) constructed so that it will not collapse under the effect of the pump suction.

### **4.7.5 Fire main and hydrants for fire hose appliances**

#### **4.7.5.1 Dedicated purpose**

The fire main for fire hose appliances shall not be used for supplying water for any purpose other than extinguishing fire or testing fire hose appliances. The fire main shall have no connections other than those necessary for fire-fighting and washing decks.

NOTE: The above clause does not preclude the use of fire hose appliances for washing down anchors or decks on the basis that such activities serve as a periodic practical test of these appliances. However, procedures should be adopted that maintain the readiness of the fire hose appliances during and after such activities.

#### 4.7.5.2 **Materials**

Materials readily rendered ineffective by heat shall not be used for the fire main piping and hydrants unless protected or otherwise isolated to prevent failure of water supply for a period of not less than that specified—

- a) for the *time rating* of *High Fire Risk* machinery spaces under Table 7 to Table 9, as applicable, assuming the fire main is dry; and
- b) in Clause 4.7.3.5, assuming the fire main is filled with water.

#### 4.7.5.3 **Hydrant arrangement**

Hydrants shall be arranged as follows:

- a) Where two water jets are specified in Table 19, the water jets from two fire hoses from two different hydrants shall reach any location on the vessel normally accessible to persons, one of the jets being from a single length of hose and the other from no more than two lengths of hose.
- b) Where a single water jet is specified in Table 19, the water jet from a hydrant using a single length of hose shall reach any location on the vessel normally accessible to persons.

The assumed length of hose for the purposes of this Clause shall not exceed the maximum length specified in Clause 4.7.6.2.1.

NOTE: Additional requirements for the arrangement of hydrants are specified in Clause 6.5.8 for *Ro-Ro spaces*, Clause 6.6.4 for spaces containing *dangerous goods* and Clause 6.7.6 for *helidecks*.

#### 4.7.5.4 **Hydrant accessibility**

Hydrants shall be placed so that the fire hoses may be easily and quickly coupled to them. Where deck cargo or vehicles may be carried—

- a) the positions of the hydrants shall be such that they are always readily accessible; and
- b) the fire main shall be arranged to avoid damage by the deck cargo or vehicles.

#### 4.7.5.5 **Valves and fittings at hydrants**

A valve shall be fitted to each fire hydrant so that the fire hose may be readily removed while the fire pump is in operation. Fire hydrants shall have the same end fitting so that hoses can be interchanged or used at all different hydrants on the vessel. Fire hydrant valves and fire main isolating valves shall not be one-way (non-return) valves.

#### 4.7.5.6 **Maximum permissible pressure**

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

NOTE: AS 2419 specifies a maximum pressure of 500 kPa for fire hoses 65 mm in diameter.

#### 4.7.5.7 **Prevention of over-pressure**

Relief valves shall be incorporated in the fire main to prevent excessive pressure in any part of the system. This Clause does not apply if the fire

pumps are incapable of developing a pressure exceeding the design pressure of the piping, hydrants and hoses.

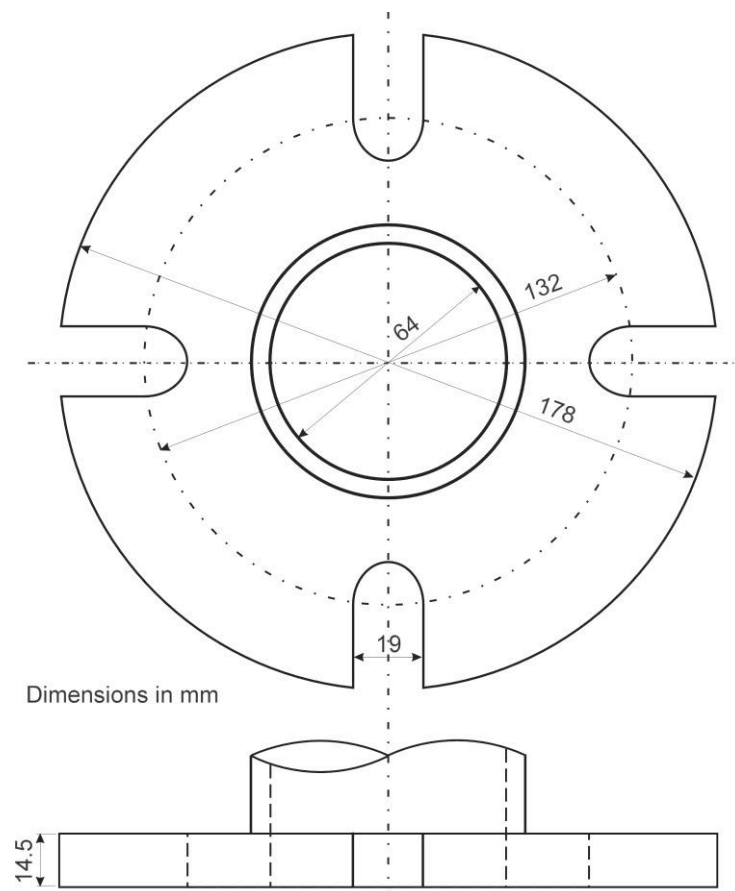
#### 4.7.5.8 **Isolating valves**

On vessels fitted with more than one fire pump (main or emergency) connected to the fire main, those portions of the fire main that pass through a machinery space of *High Fire Risk Space* containing a fire pump shall be capable of being isolated from the rest of the piping by a valve external to the machinery space. The piping shall be so arranged that when the isolating valves are shut, all the hydrants on the vessel, except those in the machinery space referred to above, can be supplied with water by the other main fire pump or the emergency fire pump. All isolating valves in the piping shall be clearly marked.

#### 4.7.5.9 **International shore connection**

The fire main on all vessels of 35 m or more in measured length shall be provided with at least one international shore connection complying with Figure 5. The shore connection facility shall be arranged to enable ready connection from either side of the vessel.

NOTE: The fitting may be of a portable type stowed in a location ready to use in time of emergency.



**Figure 5 — International shore connection**

## 4.7.6 Fire hoses and nozzles

### 4.7.6.1 General

The following items shall be kept ready for use and located in a conspicuous position near each hydrant:

- a) A fire hose that conforms with Clause 4.7.6.2.
- b) A nozzle that conforms with Clause 4.7.6.3.
- c) Any necessary fittings and tools.

Fire hoses and nozzles in interior locations should be arranged to enable them to remain connected to the hydrants at all times.

NOTE: See Clause 4.7.5.3 for the location of hydrants.

### 4.7.6.2 Fire hoses

#### 4.7.6.2.1 Length

Fire hoses shall have a length of at least 10 m, but not more than—

- a) 15 m in machinery spaces;
- b) 20 m in other spaces and open decks; and
- c) 25 m for open decks on vessels with a maximum breadth in excess of 30 m.

#### 4.7.6.2.2 Minimum diameter

The internal diameter of fire hoses shall not be less than—

- a) 19 mm for reinforced elastomeric fire hose; or
- b) 38 mm for lay-flat fire hose.

#### 4.7.6.2.3 Specification

Lay-flat fire hoses shall comply with Chapter 12.

### 4.7.6.3 Nozzles

#### 4.7.6.3.1 Nozzle size

Single orifice nozzles shall have an orifice diameter not less than that specified in Table 17. Other types of nozzles shall have a minimum flow rate not less than the minimum flow rate specified in Table 17.

NOTE: Some appliances such as dual-purpose nozzles or *foam making branch pipes* may require a specified minimum pressure higher than that assumed in the table to operate correctly.

#### 4.7.6.3.2 Nozzle type

Nozzles having a flow rate of 6.5 m<sup>3</sup>/hr or more shall be of dual-purpose type (i.e. spray / jet) incorporating a shutoff. The nozzle shall be suited to the application, taking into account the design pressure at the hydrant and the corrosive effects of long-term stowage in a maritime environment (i.e. robust, corrosion resistant).

## 4.8 FIRE BUCKETS

### 4.8.1 Application

Fire buckets shall be provided on a vessel that—

- a) is not required to be fitted with fire hose appliances under Clause 4.7.1; or
- b) is required to have fire buckets in lieu of an emergency fire pump under Clause 4.7.4.1.

### 4.8.2 Number of fire buckets

Where fire buckets are required on a vessel of *Fire Risk Category I* or *II* under Clause 4.8.1, the number of fire buckets shall be as specified in Table 22.

**Table 22 — Fire buckets on vessels of *Fire Risk Category I* or *II***

Measured length of vessel	Number of fire buckets
< 10 m	1 (A)
≥ 10 m	2

KEY:

(A) A fire bucket need not be provided on *Fire Risk Category I* or *II* vessels not having *High Fire Risk* or *Moderate Fire Risk* spaces or enclosed *Accommodation Spaces*.

### 4.8.3 Standard

A fire bucket shall be—

- a) of minimum 4 L capacity;
- b) fitted with a handle;
- c) manufactured from waterproof and robust material;
- d) designed so as not to collapse, distort or lose the handle when full of water; and
- e) fitted with a lanyard of sufficient length to allow the bucket to be cast over the side and retrieved full of water.

## 4.9 FIXED FIRE-EXTINGUISHING SYSTEMS

### 4.9.1 Application

*Fixed fire-extinguishing systems* shall be provided on vessels to the extent specified in Chapter 6, Chapter 7, Chapter 8 or Chapter 9. A list of the relevant clauses is listed in Table 23.

NOTE: Not all vessels need be fitted with a *fixed fire-extinguishing system*, refer to the relevant clauses within this Section.

**Table 23 — Clauses for determining a requirement to fit *fixed fire-extinguishing systems***

Location	Clause
High fire risk machinery spaces	6.4.13
Ro-Ro spaces	6.5
Cargo spaces containing dangerous goods	6.6.5
Store spaces containing flammable liquid	6.8.7
Vessel's stores lockers	6.9.5.3
Galleys	7.5.8
Accommodation spaces	8.20
Cargo spaces	9.4.6

#### 4.9.2 System to be suited to application

A *fixed fire-extinguishing system* fitted to protect a space or an item of equipment shall be suited to—

- a) the likely types of fire hazards within the space or associated with the item of equipment;
- b) the characteristics of the space including the dimensions of the space, movement of air within the space and whether the space can be effectively sealed; and
- c) special risks associated with the space or item of equipment such as the presence of—
  - i) essential equipment;
  - ii) electrical equipment; or
  - iii) persons that might be within the space including—
    - A) persons that could be exposed to an accidental discharge; and
    - B) fire-fighting personnel.

#### EXAMPLE:

A local fire-extinguishing system that is fitted to protect a galley range or deep-fat cooker is typically a wet chemical type.

#### 4.9.3 Standards for fixed fire-extinguishing systems

The *fixed fire-extinguishing system* shall be designed, manufactured, installed and tested in accordance with the requirements of Chapter 12.

NOTE: The relevant standard contains provisions for determining the quantity of extinguishing agent, arrangements for discharge, and the means for protecting personnel from accidental discharge.

#### 4.9.4 Closing appliances for fixed gas, water mist or aerosol fire-extinguishing systems

Where a fixed gas, water mist or aerosol fire-extinguishing system is used, openings that may admit air to, or allow gas, aerosol or mist to escape from, a protected space shall be capable of being effectively sealed from outside the protected space.

NOTE: Other clauses within this Section may also require that a space be effectively sealed, see Clauses 3.8, 4.2 and 4.3. The closing down of a space also serves to suppress a fire by starving it of oxygen, independent of the presence or type of extinguishing system.

#### 4.9.5 Protection of components of the fixed fire-extinguishing system

Components of a *fixed fire-extinguishing system*, including pumps and storage containers, shall be located—

- a) in a space behind the collision bulkhead; and
- b) outside the space protected by the *fixed fire-extinguishing system*; to the extent necessary to isolate any components of the system that would be vulnerable to exposure to a fire within the protected space.

For the purposes of the application of Table 7, Table 8 and Table 9 to any bulkheads and decks adjacent to the space protected, the space containing components of a *fixed fire-extinguishing system* located outside the space protected by the system shall be designated a '*Control Station*'.

#### 4.9.6 Storage of gaseous fire-extinguishing agent

Where containers for gaseous extinguishing agent are located outside the protected space, the room for storage of these containers shall:

- a) not be used for any other purpose;
- b) be situated in a safe and readily accessible position;
- c) be effectively ventilated;
- d) have an entrance from the open deck that is independent from spaces that are protected by the system;
- e) have access doors that open inwards; and
- f) have gastight boundaries (bulkheads and decks).

Carbon dioxide storage shall be located at deck level to minimise the risks to persons in the event of leakage.

#### 4.9.7 Evacuation Alarms

An automatic audible and visual warning shall be given of the impending release of fire-extinguishing agent into any space in which personnel normally work, or to which they have access. The alarm permits the orderly evacuation of the space and provides time to shut down machinery and seal the space. The alarm shall operate for a suitable period before the agent is released, but not less than 20 seconds. The evacuation alarm shall be separate and distinct from any fire alarm, including a different sound, separate warning lights and wiring.

The time delay before release of agent shall be either engineered into the system or achieved by delaying the manual operation of the release in accordance with appropriate instructions posted adjacent to the release mechanism, see also Clause 4.9.10.

#### **4.9.8 Limitations on automatic activation**

*Fixed fire-extinguishing systems* shall be provided with a means of manual activation. Automatic release of fire-extinguishing media shall not occur, except for—

- a) aqueous fixed fire-extinguishing systems in Accommodation Spaces (see Clause 8.20);
- b) pressure water-spraying systems in *Ro-Ro spaces* (see Clause 6.5.7); or
- c) local-fire extinguishing systems in certain applications (see Clause 7.5.8).

NOTE: Water-mist systems in *Ro-Ro spaces* may require the space to be sealed before discharge of the fire-extinguishing agent.

#### **4.9.9 Controls**

Controls for the *fixed fire-extinguishing system* shall be readily accessible and simple to operate. Controls 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.

#### **4.9.10 Instructions**

At each control location there shall be clear instructions on the use and operation of the *fixed fire-extinguishing system*. The instructions shall include all prerequisite tasks and possible effects on the safety of personnel. Where appropriate, a warning should be displayed highlighting potential risks of premature release or re-entry such as toxicity, asphyxiation and/or reduced visibility.

#### **4.9.11 Systems that serve more than one space**

Where the extinguishing agent is required to protect more than one space, the quantity of agent available need not be more than the largest quantity required for protecting any one space.

#### **4.9.12 Over-pressure or under-pressure in space protected**

If the release of a fire-extinguishing agent produces significant over- or under-pressurisation in the protected space, means shall be provided to limit the induced pressures to acceptable limits to avoid structural damage.

### **4.10 PORTABLE AND WHEELED FIRE EXTINGUISHERS**

#### **4.10.1 Application**

Vessels shall be provided with portable fire extinguishers as specified in Chapter 6 to Chapter 10 of this Section.

**Table 24 — Extinguishing media for given hazards**

Nature of hazard	Fire class or capability rating of extinguisher	Suitable extinguishing media (in order of effectiveness)
Clothing fire—a fire in the clothes being worn by a person	A	Water Fire blanket
Small cellulose solids fire, plastics	A	Water Foam ABE powder (2) Wet chemical Vaporising liquid
Large cellulose solids fire, plastics	A	Water ABE powder (2)
Petroleum-based liquid	B	BE and ABE powder (2) Foam Vaporising liquid
Polar solvents	B	BE and ABE powder (2) Alcohol-resistant foam
Gas fires (5)	C	BE and ABE powder (2) Vaporising liquid
Metal fires	D	Special powder (2)
Energised electrical equipment of greater than 50 V (4) (6)	E	BE and ABE powder Carbon dioxide (1) Vaporising liquid
Cooking oils and fats (3)	F	Wet chemical BE powder (2) Fire blanket

**KEY:**

- (1) Carbon dioxide, used in sufficient concentration to extinguish a fire, will displace air. In a confined space, oxygen deficiency is life threatening.
- (2) Powder extinguishers, discharged in a confined space, can temporarily reduce visibility and may cause respiratory irritation.
- (3) ABE powders based on ammonium phosphate are not suited for the protection of appliances using cooking oils or fats.
- (4) Water-based extinguishers (water, wet chemical and foam) are electrically conductive and therefore are not suitable for fires involving electrically energised equipment.
- (5) Applicable to vessels carrying gas as *dangerous goods* cargoes or tanks for propulsion machinery propelled by gas fuel. Not required for conventional domestic gas installations on vessels.
- (6) An agent leaving minimal residue should be used in spaces containing electrical equipment essential to the safety of the vessel.

Even though no portable extinguishers may be specified in Chapter 6 to Chapter 10, the following vessels shall be provided with at least one portable fire extinguisher:

- a) Any mechanically powered vessel;
- b) Any non-mechanically powered vessel that has—
  - i) open flame devices, (e.g. cooking appliances and heaters, including those on an open deck); or
  - ii) deck mounted internal combustion machinery, enclosed petrol tanks or other potential sources of fire such as incinerators or boilers.

Wheeled fire extinguishers shall be provided on vessels for which Clauses 6.4.15 or 6.7.8 apply.

#### **4.10.2 Type**

##### **4.10.2.1 Extinguishers to be suited to hazard**

Portable and wheeled fire extinguishers shall be suited to the type of fire likely within the space to be protected and shall comply with Table 24 and Chapter 12.

Portable and wheeled fire extinguishers shall be fitted with a hose to enable access to awkward locations and facilitate the effective application of the extinguishing agent.

NOTE: On small vessels carrying a limited number of fire extinguishers that must be used for a range of hazards including electrical hazards, a combination of BE powder, ABE powder or carbon dioxide extinguishers provide the best compromise.

##### **4.10.2.2 Extinguishers for spaces containing essential equipment**

Portable fire extinguishers for spaces containing electrical or electronic equipment or appliances essential for the safety of the vessel (such as *Control Stations*) shall use an extinguishing agent that is not harmful to the equipment and appliances.

##### **4.10.2.3 Extinguishers for spaces containing electrical equipment**

Portable and wheeled fire extinguishers for spaces containing electrical equipment shall use an extinguishing agent that is not electrically conductive.

#### **4.10.3 Number of portable fire extinguishers**

The total number of portable fire extinguishers provided on a vessel shall be the sum of the number specified for individual spaces by the clauses listed in Table 25.

Where no extinguishers are specified in these clauses at least one may be required—see Clause 4.10.1.

**Table 25 — Clauses for determining number of portable fire extinguishers**

Location	Clause
High fire risk machinery spaces	6.4.14, 6.4.15, 6.4.16
Ro-Ro spaces	6.5.9
Cargo spaces containing dangerous goods	6.6.5
Helicopter facilities	6.7.8
Vessel's stores lockers	6.9.5.3
Spaces of moderate fire risk	7.3.3
Moderate fire risk machinery spaces	7.4.3
Galleys	7.5.7
Accommodation spaces	8.19
Control stations	10.9

**4.10.4 Size and rating**

The minimum size and rating (the latter in accordance with AS/NZS 1850) of portable fire extinguishers shall not be less than specified in Table 26. Where a single extinguisher is used for multiple classes of fire, the extinguisher shall be of a size and rating to satisfy the minimum requirements of each of the relevant classes of fire.

**4.10.5 Location**

Fire extinguishers shall be situated ready for use at easily visible places so they can be reached quickly and easily in the event of a fire. They shall be mounted so that their serviceability is not impaired by the weather, vibration or other external factors.

One of the portable fire extinguishers intended for use in a *High Fire Risk Space* or *Moderate Fire Risk Space* shall be stowed near the entrance to that space. Where a high or *Moderate Fire Risk Space* is unlikely to be manned, the portable extinguisher stowed near the entrance to that space shall be mounted externally and adjacent to the entrance of the space.

**4.10.6 Marking**

If an extinguisher is stowed within a locker or other enclosed space, the door to the locker or enclosed space shall carry a symbol or notice that gives a clear indication that the space contains a portable extinguisher.

**4.10.7 Indication of previous use**

Portable and wheeled fire extinguishers shall be provided with devices that indicate whether they have been used.

NOTE: The loss of the extinguisher taper seal is considered sufficient indication of use.

Table 26 — Minimum size and rating of portable fire extinguishers

Fire Class	Risk criterion	Extinguisher Characteristic	Type of portable extinguisher				
			Water	Foam	Dry Powder	Wet Chemical	CO2
Class A	Vessel ≥ 10 m	Min. size (1)	9 L	9 L	4.5 kg	7 L	NDTS
		Min. rating (6)	3A	3A	3A	3A	NDTS
	Vessel < 10 m	Min. size (1)	4.5 L	4.5 L	2 kg	7 L	NDTS
		Min. rating (6)	2A	2A	2A	2A	NDTS
Class B	Machinery (5) ≥ 750 kW	Min. size (1)	NDTS	2 x 9 L (3)	4.5 kg	NDTS	NDTS
		Min. rating (6)	NDTS	30B ea	60B	NDTS	NDTS
	Machinery (5) ≥ 25 kW & < 750 kW, Ro-Ro spaces, helidecks	Min. size (1)	NDTS	9 L	4.5 kg	NDTS	NDTS
		Min. rating (6)	NDTS	20B	20B	NDTS	NDTS
	Machinery (5) < 25 kW	Min. size (1)	NDTS	4.5 L	2 kg	NDTS	5 kg
		Min. rating (6)	NDTS	10B	10B	NDTS	10B
Class E	Electrical system ≥ 25 kW electrical power	Min. size (1)	NDTS	NDTS	4.5 kg	NDTS	5 kg
		Min. rating (6)	NDTS	NDTS	E	NDTS	E
	Electrical system < 25 kW electrical power	Min. size (1)	NDTS	NDTS	2 kg	NDTS	3 kg
		Min. rating (6)	NDTS	NDTS	E	NDTS	E
Class F	Large galleys	Min. size (1)	NDTS	NDTS	4.5 kg	3.5 L	NDTS
		Min. rating (6)	NDTS	NDTS	30B (4)	4F	NDTS
	Small galleys (2)	Min. size (1)	NDTS	NDTS	2 kg	2 L	NDTS
		Min. rating (6)	NDTS	NDTS	2F (4)	2F	NDTS

## KEY:

- (1) While some fire extinguishers of lesser size may achieve the required fire rating, a minimum size has been specified to allow for conditions of use and the possible inexperience of the user.
- (2) For fire extinguishers for *small galleys*, refer to Clause 7.5.7.
- (3) Two 9 L 30B foam extinguishers may be substituted for one 4.5 kg 60B dry powder extinguisher.
- (4) To be BE type dry powder.
- (5) Machinery includes internal combustion machinery, steam boilers using oil fuel, pumps and other equipment for pumping or processing *flammable* or *combustible liquids*, or containing lubricating or hydraulic oil.
- (6) The rating shall be in accordance with AS 1850.

NDTS: denotes 'not deemed-to-satisfy' the requirements of this Standard.

## NOTES:

1. An extinguisher matching the exact combination of minimum size and minimum rating listed in the table may not be commercially available, in which case a larger size or higher rating may have to be used.
2. There are benefits associated with carrying a combination of both dry powder and foam extinguishers for Class B fires. Dry powder extinguishers are suited to fires originating from liquids under pressure or on non-horizontal surfaces, foam extinguishers are more suited to fires in bilge spaces and to prevent re-flash.

#### 4.10.8 Replenishment in the event of use

Vessels in Class A service shall have provision to replenish discharged portable extinguishers at sea. Replenishment may be by replacement of discharged extinguishers with extinguishers of the same quantity, type and capacity, or by recharging discharged extinguishers.

Replacement extinguishers or spare charges shall be provided for the first 10 and half of the remaining extinguishers. Not more than 60 spare extinguishers and charges are required. Where replenishment is by recharging, instructions for recharging shall be carried on board.

NOTE: For the obligations of crew that undertake the recharging of portable fire extinguishers, refer to Part E—Operational practices.

#### 4.11 FIRE-FIGHTERS' OUTFITS

##### 4.11.1 Applicable standard

Fire-fighters' outfits shall comply with Chapter 12.

##### 4.11.2 Number of fire-fighters' outfits

Fire-fighters' outfits shall be provided on seagoing (Class A, B, C) vessels in accordance with Table 27.

**Table 27 — Fire-fighters' outfits for sea-going vessels**

Category	Class A, B and C vessels	
	Minimum number of outfits	Minimum number of spare charges
<i>Fire Risk Category I</i>	Not required	Not required
<i>Fire Risk Category II</i>	Not required	Not required
<i>Fire Risk Category III</i>	Not required	Not required
<i>Fire Risk Category IV</i>	4 (A)	2

KEY:

(A) Two sets are for the use of a rescue or fire-fighting party. The other two are available for a backup team should the rescue or fire-fighting party get into difficulties.

NOTE: It is assumed that vessels operating in sheltered waters will have reasonable access to shore-based fire-fighting personnel, see Part A of this standard for guidance on safety obligations and Part E for emergency preparedness.

##### 4.11.3 Storage of fire-fighters' outfits

Each set of fire-fighters' outfits and spare charges shall be kept—

- a) ready for use;
- b) in an easily accessible location that is permanently and clearly marked; and
- c) in widely separated positions from other sets.

## CHAPTER 5 FIRE SAFETY PREPAREDNESS

### 5.1 APPLICATION

Where specified in Table 28, a vessel shall be provided with a fire control plan, a fire training manual, and a fire safety operational booklet.

NOTES:

1. The fire control plan, fire training manual and fire safety operational booklet provide vital information needed for an operator to comply with NSCV Part E—Operating Practices.
2. Notwithstanding the requirements of this standard, a vessel may be obliged to carry information pertaining to fire safety to comply with OH&S and other legislation.

**Table 28 — Fire control plan, fire training manual and fire safety operational booklet**

Category	Application
<i>Fire Risk Category I</i>	Required if measured length $\geq$ 25 m (1)
<i>Fire Risk Category II</i>	Required if measured length $\geq$ 25 m (1)
<i>Fire Risk Category III</i>	Required for all vessels
<i>Fire Risk Category IV</i>	Required for all vessels

KEY:

- (1) Vessels of any length that carry *dangerous goods* in cargo spaces of the type described in Clause 6.6 shall be provided with a fire control plan, fire training manual and fire safety operational booklet.

### 5.2 OBJECTIVE

The objective of this Chapter is to ensure that information relevant to the effective and safe operation of *fire equipment* on a vessel is readily available to persons on the vessel for emergency planning and training; maintenance; and ready reference in the event of a fire.

### 5.3 FIRE CONTROL PLAN

#### 5.3.1 Content of the fire control plan

The fire control plan shall show clearly<sup>3</sup> for each deck the following positions as applicable—

- a) *Control Stations*;
- b) sections of the craft which are enclosed by *fire-resisting divisions*;
- c) smoke zones;
- d) evacuation alarms;
- e) *fixed fire detection and fire alarm systems*;
- f) *fixed fire-extinguishing systems*;

<sup>3</sup> Refer to ISO 17631:2002 CE Ships and marine technology CE Shipboard plans for fire protection, life-saving appliances and means of escape.

- g) *fire appliances*;
- h) personal protective equipment including fire-fighters' outfits and emergency escape breathing devices;
- i) the means of access to the various compartments and decks in the vessel;
- j) the ventilating system (including particulars of the master fan controls, the positions of *fire flaps*, smoke flaps and *fire dampers* and identification numbers of the ventilating fans serving each section of the vessel);
- k) the location of the international shore connection, if fitted; and
- l) the position of all means to control the fuel shut-off valves, ventilation fan shutdown, *fixed fire detection and fire alarm systems* and *fixed fire-extinguishing systems*.

### 5.3.2 Location

The vessel shall have a fire control plan permanently exhibited in a location suitable for ready reference by the crew.

### 5.3.3 Duplicate set of fire control plans

Vessels of measured length 35 m or more shall have a duplicate set of fire control plans or a booklet containing such plans permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel<sup>4</sup>.

## 5.4 TRAINING MANUAL

### 5.4.1 Content

The training manual shall explain the following in detail, using easily understood terms and illustrated wherever possible:

- a) General fire safety practice and precautions related to the dangers of smoking, electrical hazards, *flammable liquids*, *dangerous goods* and similar common shipboard hazards.
- b) General instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points.
- c) Meanings of the vessel's alarms.
- d) Operation and use of *fire equipment*.
- e) Operation and use of fire doors.
- f) Operation and use of ventilation shutdowns, *fire flaps*, smoke flaps and *fire dampers*.
- g) Escape systems and appliances.

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<sup>4</sup> Refer to the Guidance concerning the location of fire control plans for assistance of shore-side fire-fighting personnel (MSC/Circ.451).

**5.4.2 Location**

A training manual shall be located in each crew mess room or in each crew cabin.

**5.5 FIRE SAFETY OPERATIONAL BOOKLET****5.5.1 Content**

The fire safety operational booklet shall contain the necessary information and instructions for the safe operation of the vessel and cargo handling operations with respect to fire safety. The booklet shall include information concerning:

- a) The crew's responsibilities for the general fire safety of the vessel while loading and discharging cargo and while underway.
- b) An explanation of necessary fire safety precautions for handling general cargoes.
- c) For vessels carrying *dangerous goods*, relevant stowage and segregation information for the *dangerous goods* to be carried.
- d) For vessels carrying *dangerous goods*, the applicable references to the pertinent fire-fighting and emergency cargo handling instructions contained in—
  - i) the Code of Safe Practice for Solid Bulk Cargoes; and
  - ii) the International Maritime Dangerous Goods Code, as appropriate.

The fire safety operational booklet may be combined with the training manual.

**5.5.2 Location**

A fire safety operational booklet shall be located in each crew mess room or in each crew cabin.

## CHAPTER 6 HIGH FIRE RISK SPACES

### 6.1 SCOPE

This Chapter lists requirements from Chapter 3 and Chapter 4 that are applicable to *High Fire Risk Spaces* and specifies particular requirements that are additional to or modify the general requirements in Chapter 3 and Chapter 4.

### 6.2 APPLICATION

This Chapter applies to spaces defined by Clause 1.8 as High Fire Risk Spaces. Specific clauses within this Chapter that apply are listed in Table 29.

**Table 29 — Application of Chapter 6**

Clause	Subject
Clause 6.3	General requirements applicable to High Fire Risk Spaces
Clause 6.4	Machinery spaces of high fire risk
Clause 6.5	Ro-Ro spaces
Clause 6.6	Cargo spaces containing dangerous goods
Clause 6.7	Helidecks
Clause 6.8	Store spaces containing packaged flammable or combustible liquids
Clause 6.9	Flammable and combustible vessel's stores

### 6.3 GENERAL REQUIREMENTS APPLICABLE TO HIGH FIRE RISK SPACES

#### 6.3.1 General

*High Fire Risk Spaces* shall comply with the clauses in Chapter 3 and Chapter 4 specified in Table 30.

**Table 30 — General deemed-to-satisfy provisions applicable to High Fire Risk Spaces**

Clause	Subject
Clause 3.2	Storage of combustible or flammable oils
Clause 3.3	Engine exhausts, boiler and galley uptakes
Clause 3.4	Certain highly flammable materials prohibited
Clause 3.5	Insulation
Clause 3.6	Paints, varnishes & other finishes on passenger vessels
Clause 3.7	Structural fire protection
Clause 3.7.4	Combustible veneers
Clause 3.9	Maintenance of structural integrity
Clause 3.10	Materials for overboard fittings
Clause 4.2	Remote stops for ventilation and exhaust fans
Clause 4.3	Ventilation closing appliances
Clause 4.4	Centralised fire control functions on passenger vessels
Clause 4.5	Fire detection and fire alarm system
Clause 4.6	Emergency escape breathing devices
Clause 4.7.3	Main fire pumps
Clause 4.7.4	Emergency fire pump
Clause 4.7.5	Fire main and hydrants for fire hose appliances
Clause 4.7.6	Fire hoses and nozzles
Clause 4.9	Fixed
Clause 4.10	Portable and wheeled fire extinguishers

## PREVENTION OF FIRE AND EXPLOSION

### 6.3.2 Signage to prevent inadvertent ignition

“No smoking” or “No naked light” notices shall be displayed in a prominent position at points of entry into and, where appropriate, within *High Fire Risk Spaces*.

## FIRE GROWTH POTENTIAL

### 6.3.3 Primary deck materials and coverings

Primary deck materials, floor plates, floor plate supporting structures and deck coverings within *High Fire Risk Spaces* shall—

- a) be of non-combustible material unless, in the case of deck materials or floor plate supporting structures, they form part of the primary hull structure of a vessel constructed of *combustible materials*; and

- b) not absorb oil or other *combustible* or *flammable liquids*.

## 6.4 MACHINERY SPACES OF HIGH FIRE RISK

### PREVENTION OF FIRE AND EXPLOSION

#### 6.4.1 Fuel and lubricating oil tanks

##### 6.4.1.1 Location

The following fuel tanks shall not be situated within machinery spaces of *High Fire Risk*:

- a) Fuel tanks not complying with Clause 6.4.1.2.
- b) Fuel tanks containing fuel of flashpoint less than 60°C.

Fuel and lubricating oil tanks shall be located to ensure that any spillage or leakage cannot constitute a fire or explosion hazard by falling on heated surfaces.

##### 6.4.1.2 Fire-resistance of tanks

Fuel tanks situated within a machinery space of *High Fire Risk* shall be constructed of a material, or suitably insulated, so that when exposed to the standard fire test given in Chapter 12, the tank remains structurally intact. The time period for exposure to the standard fire test shall be no less than the *time rating* of the *fire-resisting division* required for the machinery space specified in Table 7, Table 8 or Table 9.

##### 6.4.1.3 Freestanding fuel tanks

Freestanding fuel tanks shall not be fitted in machinery spaces of *High Fire Risk* on vessels of *Fire Risk Category III* or *IV*.

Where freestanding fuel tanks are fitted in machinery spaces of *High Fire Risk* on vessels of *Fire Risk Category I* or *II*, they shall be placed in an oil-tight spill tray designed to catch any fuel that may leak from the tank when the vessel is rolling, to a quantity not less than 5 per cent of volume of the freestanding tank. The spill tray shall—

- a) be of sufficient dimensions to retain the required volume of oil when subject to normal motions when the vessel is operating; or
- b) be provided with a drainpipe leading to a spill oil tank of the required volume.

The spill tray and spill oil tank, if fitted, shall be provided with means to enable safe removal of accumulated oil.

NOTE: Additional requirements for fuel tanks are given in NSCV Part C Subsection 5A.

#### 6.4.2 Fuel piping

Fuel piping shall not be located immediately above or near units of high temperature including boilers, steam pipelines, exhaust manifolds, turbochargers or silencers. As far as practicable, fuel piping shall be located away from hot surfaces, electrical installations or other sources of ignition. Fuel piping shall be screened or otherwise suitably protected to avoid oil spray or oil leakage onto possible sources of ignition.

The number of joints in fuel oil piping systems shall be kept to the necessary minimum.

#### **6.4.3 Provision for inspection**

To facilitate the early observation of defects and leakage, components of an *oil fuel unit* containing heated oil under pressure exceeding 180 kPa shall not be placed in a concealed position. Such components within a machinery space shall be adequately illuminated.

#### **6.4.4 Containment of spillage**

Precautions shall be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.

#### **6.4.5 Insulation**

Surfaces with temperatures above 220°C that may come into contact with fuel because of a fuel system failure shall be effectively protected to prevent ignition, see also Clause 3.5.

#### **6.4.6 Jacketing of high-pressure fuel delivery lines**

For vessels of *Fire Risk Category* III or IV, external high-pressure fuel delivery lines between the high-pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high-pressure line failure. The jacketed piping system shall include a means for collecting leaked fuel. An alarm shall be provided to indicate a fuel line failure.

##### NOTES:

1. A jacketed pipe incorporates an outer pipe into which the high-pressure fuel pipe is placed, forming a permanent assembly.
2. Jacketing may also apply to machinery on vessels of *Fire Risk Category* I or II if required by relevant Classification Society rules for vessels 35 m or more in length, see Part C Subsection 5A.

#### **6.4.7 Prevention of accumulated oil vapours**

The ventilation of machinery spaces shall be sufficient under normal conditions to prevent accumulation of oil vapour.

### **FIRE GROWTH POTENTIAL**

#### **6.4.8 Separation from other spaces**

Machinery spaces of *High Fire Risk* shall be separated from other spaces on the vessel by gas-tight bulkheads or enclosures to enable the space to be sealed in the event of a fire.

#### **6.4.9 Control of ventilation in machinery spaces**

##### **6.4.9.1 Number of openings**

The number of skylights, doors, ventilators, openings in funnels for 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 vessel.

#### **6.4.9.2 Means of controlling openings and ventilation**

The means provided for stopping the power ventilation of the machinery spaces in Clause 4.2 shall be entirely separate from the means provided for stopping ventilation of other spaces.

#### **6.4.9.3 Release of smoke from machinery spaces**

Means shall be provided to permit the release of smoke after a fire in the machinery space. Controls shall be located outside the space concerned so that, in the event of fire, they will not be cut off from the space they serve.

NOTE: The normal ventilation system may be acceptable for this purpose provided the *fire flaps* are arranged for reopening after closure.

### **MEANS OF ESCAPE**

#### **6.4.10 Protected escape from machinery spaces of High Fire Risk**

Machinery spaces below the *weather deck* on vessels of 45 m measured length or more shall be fitted with one of the following:

- a) Two sets of steel ladders as widely separated as possible, leading to similarly separated doors in the upper part of the space. Each of the doors shall provide access to an appropriate survival craft embarkation location. One of these ladders shall be located within a protected enclosure from the lower part of the space it serves to a safe position outside the space. The enclosure shall satisfy the fire protection requirements of Clause 3.7. Self-closing fire doors of the same fire integrity standards shall be fitted in the lower end of the enclosure. The ladder shall be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The protected enclosure shall have minimum internal dimensions of 800 mm x 800 mm, and shall be provided with emergency lighting.
- b) One steel ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and a separate door in the lower part of the space well separated from the ladder. This lower door shall be of fire-resisting construction, capable of being operated from each side, and shall provide access to a safe escape route from the lower part of the space to the embarkation deck.

### **CONTAINMENT OF FIRE**

#### **6.4.11 Fire integrity between machinery spaces of High Fire Risk and adjacent spaces**

For certain Class 2 and Class 3 vessels of *Fire Risk Category 1*, the requirements for *fire-resisting divisions* in machinery spaces of *High Fire Risk* specified in Table 7 may be modified in accordance with Table 31.

**Table 31 — Variations to the requirements for machinery space fire-resisting divisions specified in Table 7 (Fire Risk Category I)**

Category		Application
Class 2 or 3 without accommodation for berthed persons	Seagoing < 12.5 m length	<i>Smoke-tight</i> in lieu of <i>fire-resisting division</i> (1)
	Sheltered waters < 25 m length	<i>Smoke-tight</i> in lieu of <i>fire-resisting division</i> (1)

KEY:

(1) Space shall have a *fixed fire-extinguishing system* in accordance with Clause 6.4.13.

## DETECTION AND ALARM

### 6.4.12 Fixed fire detection and fire alarm system

#### 6.4.12.1 Requirement

A *fixed fire detection and fire alarm system* shall be installed in—

- unmanned machinery spaces of *High Fire Risk*; or
- machinery spaces of *High Fire Risk* where the main propulsion or auxiliary machinery, including the main sources of electrical power, are provided with automatic or remote control. This applies even if the machinery is under continuous manned supervision from a control station within the machinery space.

#### 6.4.12.2 Design

The *fixed fire detection and fire alarm system* required in Clause 6.4.12.1 shall be designed, and the detectors positioned so as to detect rapidly the onset of fire in any part of the machinery space. Detection shall operate correctly over the normal ranges of machinery operation, variations of ventilation and anticipated ambient temperature.

NOTE: The NSCV assumes that vessels may operate in ambient outside temperatures that range between 0°C and 50°C. The ambient temperature within machinery, *galley* and other spaces on the vessel will likely exceed these levels. This can affect the correct operation of some detectors.

#### 6.4.12.3 Limitations on the use of thermal detectors

Detection systems using only thermal detectors shall not be used in spaces 5 m or more in height.

NOTE: Dual spectrum smoke and flame detectors are more effective than thermal detectors in spaces of restricted height of less than 5 m.

## FIRE FIGHTING

### 6.4.13 Fixed fire-extinguishing system

Machinery spaces of *High Fire Risk* shall be fitted with a total flooding *fixed fire-extinguishing system* complying with Clause 4.9.

The *fixed fire-extinguishing system* shall be one of the following:

- A gaseous *fixed fire-extinguishing system*;

- b) A high-expansion foam *fixed fire-extinguishing system*;
- c) An aerosol *fixed fire-extinguishing system*; or
- d) An aqueous *fixed fire-extinguishing system*.

#### 6.4.14 Portable fire extinguishers

Portable extinguishers suitable for Class B fires shall be provided for each *High Fire Risk* machinery space in accordance with Table 32. Additional portable fire extinguishers shall be provided for large machinery spaces, sufficient in number and located to ensure that an extinguisher is not more than 10 m walking distance from any point within the space. Where the machinery space is of a size or configuration that would not normally be occupied by persons while the vessel is underway, up to two of the fire extinguishers may be located immediately outside the machinery space entrance.

Portable fire extinguishers shall comply with Clause 4.10 and Chapter 12.

**Table 32 — Minimum number of portable fire extinguishers for *High Fire Risk* machinery spaces**

Category	Vessel < 10 m measured length	Vessel ≥ 10 m measured length
<i>Fire Risk Category I</i>	1	1 (A)
<i>Fire Risk Category II</i>	1	2 (A)
<i>Fire Risk Category III</i>	1	2 (A)
<i>Fire Risk Category IV</i>	No application	2 (A)

KEY:

(A) Additional extinguishers as required to provide an extinguisher within 10 m walking distance from any point within the space.

#### 6.4.15 Additional fire appliances

A *High Fire Risk* machinery space containing internal combustion machinery of aggregate power greater than 750 kW or an oil-fired boiler shall be provided with wheeled fire extinguishers, *foam making branch pipes* or portable fire extinguishers in accordance with Table 33. The wheeled and portable fire extinguishers and *foam making branch pipes* shall comply with relevant provisions in Clause 4.10, Chapter 12 and Annex J of this Section.

**Table 33 — Wheeled fire extinguishers, foam making branch pipes or additional portable fire extinguishers for High Fire Risk machinery spaces**

Space containing	Internal combustion machinery ≥ 750 kW in aggregate	Oil-fired boiler ≥ 175 kW	Oil-fired boiler < 175 kW
Fire Risk Category I	Not required	Not required	Not required
Fire Risk Category II	Two additional 9 L foam portable fire extinguishers for Class B fires (1)	One additional 9 L foam portable fire extinguisher for Class B fires (1)	Not required
Fire Risk Category III	Two additional 9 L foam portable fire extinguishers for Class B fires (1)	Two additional 9 L foam portable fire extinguishers for Class B fires (1)	One additional 9 L foam portable fire extinguisher for Class B fires (1)
Fire Risk Category IV	One 90 L foam-type wheeled extinguisher (2) or one foam making branch pipe with foam concentrate (3)	One 90 L foam-type wheeled extinguisher (2) or one foam making branch pipe with foam concentrate (3)	One additional 9 L foam portable fire extinguisher for Class B fires (1)

## KEY:

- (1) Rating to be as specified in Table 26.
- (2) With hose or hoses on reel suitable for reaching any part of the space.
- (3) The foam making branch pipe shall comply with Annex J.

#### 6.4.16 Sand

Spaces that contain an oil-fired boiler shall be provided with 0.1 m<sup>3</sup> of sand or sawdust impregnated with soda. The sand or soda impregnated sawdust shall be stored in a suitable receptacle with a scoop. An additional portable extinguisher suitable for Class B fires, complying with Clause 4.10, may be substituted as an alternative.

### 6.5 RO-RO SPACES

#### 6.5.1 Application

##### 6.5.1.1 Closed Ro-Ro spaces

Closed Ro-Ro spaces including special category spaces shall comply with Clauses 6.5.2 to 6.5.10.

##### 6.5.1.2 Open Ro-Ro spaces

Open Ro-Ro spaces having a deck above shall comply with Clauses 6.5.2, 6.5.3.1, 6.5.4, 6.5.5, 6.5.6, 6.5.7, 6.5.8 and 6.5.10. Those parts of an open Ro-Ro space that are completely open from above need not comply with Clauses 6.5.2, 6.5.3.1, 6.5.4.3, 6.5.7 and 6.5.10.

##### 6.5.1.3 Ro-Ro spaces on weather decks

Ro-Ro spaces on weather decks shall comply with Clauses 6.5.4.1, 6.5.6 and 6.5.8.

## PREVENTION OF FIRE AND EXPLOSION

### 6.5.2 Ventilation system

#### 6.5.2.1 Ventilation design and construction

The ventilation system shall be designed and constructed to—

- a) give at least 10 air changes per hour while underway and 20 air changes per hour when stationary at the quayside during vehicle loading and unloading operations;
- b) operate at all times when vehicles are in such spaces;
- c) prevent air stratification and the formation of air pockets;
- d) be entirely separated from other ventilation systems;
- e) have ventilation ducts separated for each such space, where the *Ro-Ro space* is capable of being effectively sealed;
- f) locate the outlet from any exhaust duct in a safe position, having regard to other possible sources of ignition; and
- g) have ventilation ducts, including *fire flaps* and *fire dampers* made of steel, *non-combustible* or *fire-restricting materials*.

#### 6.5.2.2 Open Ro-Ro spaces

##### 6.5.2.2.1 Minimum area of ventilation openings

The minimum area of permanent ventilation openings to an *open Ro-Ro space* shall not be less than:

$$A_V = H_{RR} (0.8 W_{RR} + 0.2 L_{RR})$$

where

$A_V$  = total required area of ventilation openings, in square metres

$H_{RR}$  = mean height of the *open Ro-Ro space*, in metres

$W_{RR}$  = mean width of the *open Ro-Ro space*, in metres

$L_{RR}$  = mean length of the *open Ro-Ro space*, in metres

##### 6.5.2.2.2 Distribution of openings

Ventilation openings shall be arranged to promote natural ventilation throughout the open vehicle space without leaving pockets of uncirculating air where explosive fumes could form. The required area of permanent openings specified in Clause 6.5.2.2.1 above shall be provided by:

- a) arranging the space to be open at both ends; or
- b) providing the space with an opening at one end and openings distributed in the side plating, deckhead or from above.

NOTE: Arrangements for power ventilation may be required to supplement natural ventilation of an *open Ro-Ro space* if the air flow is inadequate to clear the accumulation of explosive gases or fumes that arise while loading or unloading vehicles in port.

#### 6.5.2.3 Power ventilation

*Closed Ro-Ro spaces* shall be provided with an effective power ventilation system.

#### **6.5.2.4 Ventilation monitoring and control**

A power ventilation system shall be—

- a) provided with means to indicate in the *operating compartment* any loss or reduction of the required ventilating capacity;
- b) provided with arrangements to permit a rapid shutdown and effective closure of the ventilation system in case of fire; and
- c) capable of being controlled from a position outside the space served by the ventilation system.

#### **6.5.3 Electrical equipment**

##### **6.5.3.1 Electrical equipment suited for hazardous conditions**

Electrical equipment located in the following positions shall be designed, manufactured and installed for operation in hazardous mixtures of petrol vapour and air:

- a) On any *closed* or *open Ro-Ro* deck, or vehicle platform if fitted, on which such explosive vapours might be expected to accumulate. This requirement does not apply to vehicle platforms having openings of sufficient size and distribution to permit the downward escape of petrol gases.
- b) In an exhaust ventilation duct that serves a *closed* or *open Ro-Ro space*.

NOTE: Refer to NSCV Part C Section 7B for the requirements applicable to electrical installations in hazardous conditions. Guidance on the installation of electrical equipment in hazardous areas is available in Standards Australia Handbook HB13 Electrical equipment for hazardous areas.

##### **6.5.3.2 Location of electrical equipment**

Electrical equipment and wiring that may constitute a source of ignition of flammable vapours shall be installed at least 450 mm above the deck or platform, unless the installation of electrical equipment and wiring at less than 450 mm above the deck or platform is necessary and unavoidable for the safe operation of the vessel.

### **CONTAINMENT OF FIRE**

#### **6.5.4 Structural protection**

##### **6.5.4.1 Insulation**

Boundaries of *Ro-Ro spaces* shall be insulated in accordance with Clause 3.7. However, the standing deck of a *Ro-Ro space* need only be insulated on the underside if the space is protected by an aqueous *fixed fire-extinguishing system*.

##### **6.5.4.2 Limitations on height of special category spaces**

The height of a *special category space* may extend more than one deck provided the total overall clear height does not exceed 10 m.

### **6.5.4.3 Fire doors in boundaries**

#### **6.5.4.3.1 Coamings**

Fire doors in boundaries of *Ro-Ro spaces* leading to spaces below the deck shall be arranged with coamings of a height of at least 100 mm.

#### **6.5.4.3.2 Indicators**

In Class 1 vessels, indicators shall be provided in the *operating compartment* to indicate when any fire door leading to or from a *Ro-Ro space* is closed.

## **MEANS OF ESCAPE**

### **6.5.5 Means of escape**

At least two means of escape shall be provided from *Ro-Ro spaces*. The escape routes shall provide a safe route to the survival craft embarkation deck and shall be located at the fore and aft ends of the space.

## **DETECTION AND ALARM**

### **6.5.6 Fixed fire detection and fire alarm system**

#### **6.5.6.1 Remote indicators**

A *fixed fire detection and fire alarm system*, complying with the requirements of Clause 4.5 and Chapter 12, shall be provided. Detectors shall be located and spaced so that the ventilation system does not affect their operation or reduce their effectiveness.

#### **6.5.6.2 Manually operated call points**

Manually operated call points shall be provided in the *Ro-Ro space*, located so that no part of the space is more than 20 m walking distance from a call point. A point shall also be placed close to each escape exit from such spaces.

#### **6.5.6.3 Television surveillance**

A television surveillance system shall be provided in *special category spaces*. Alternatively, a fire patrol may be substituted where the vessel has sufficient crew and a documented Safety Management System.

NOTE: Part E of this National Standard specifies requirements for operational procedures and Safety Management Systems.

#### **6.5.6.4 Open Ro-Ro spaces and Ro-Ro spaces on weather decks**

The fire detectors specified in Clause 6.5.6.1 may be omitted in *open Ro-Ro spaces* and *Ro-Ro spaces on weather decks* provided a television surveillance system is fitted and maintained.

## **FIRE FIGHTING**

### **6.5.7 Fixed fire-extinguishing system**

Each *closed Ro-Ro space* and each *open Ro-Ro space* having a deck above shall be fitted with a fixed manual or automatic pressure water-spraying