

Australian Transport Council

National Standard
for
Commercial Vessels

PART C
DESIGN AND CONSTRUCTION

SECTION 4
FIRE SAFETY

FOREWORD

This section of the National Standard for Commercial Vessels was prepared as part of the review of the Uniform Shipping Laws Code. It will replace Subsection 5F and Section 11 of the USL Code.

In reviewing the USL Code and preparing this Section, consideration was given to a number of factors including:

- a) Current designs, practices and materials.
- b) Relevant national and international standards.
- c) Provisions no longer used.
- d) Current survey practice, both formal and informal.
- e) Discretionary requirements that rely on authority approval.
- f) Current technical standards format and style.
- g) The Marine Safety Strategy including strategic action 4.4.1 'Adopt standards based on "world's best practice" for *dangerous goods*'.

This standard is based on the fire safety requirements of SOLAS that have been graded appropriate to the levels of risk applicable to vessels in the domestic fleet. For vessels having levels of risk similar to those of vessels in international trade, the full requirements of SOLAS are applied. For simple low risk vessels, a single fire extinguisher may be all that is required. Between these two extremes, the standard specifies compliance progressively by selectively picking up SOLAS requirements and/or modifying SOLAS requirements to provide an appropriate fire safety solution to the particular type of vessel.

This Section of the NSCV shall be read in conjunction with Part B—General Requirements of the NSCV. It should also be read in conjunction with Part A—Safety Obligations of the NSCV.

Prior to commencement of drafting this standard an issues paper was released for public comment in 2001 to assist in identifying deficiencies in the requirements of the USL Code. A reference group comprising representatives of industry and government developed a draft for public comment.

The draft Fire Safety Section and a draft Regulatory Impact Statement were released for public comment on 18 June 2004. The period for public comment closed on 31 August 2004. A reference group comprising industry and government representatives reviewed the public comment on 22 and 23 September 2004 and 13 October 2004, making recommendations for approval by NMSC.

ATC endorsed the document in November 2004, with NMSC approving the final draft on 1 March 2005, and ORR reporting that the final RIS was satisfactory on 15 February 2005.

The standard was first published in April 2005.

The first edition was later subject to a technical amendment. Amendment 1 was approved by the National Marine Safety Committee on 15 July 2008, and published on an interim basis on 24 October 2008, pending endorsement by ATC.

The amendment was consolidated into this edition (the second edition), without further technical change, and the second edition was published on 27 October 2008. The nature of the changes were such that a further public review and RIS process was not deemed necessary

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CHAPTER 1 PRELIMINARY

1.1 SCOPE

This Section of the NSCV specifies requirements for the design, construction and installation of *passive* and *active fire protection measures* in vessels and the maintenance of *fire equipment*.

It shall be read in conjunction with the following provisions of the NSCV: Part B—General Requirements, Part C Section 5: Engineering and Part E—Operational Practices.

1.2 APPLICATION

This Section applies to all vessels other than Special Vessels provided for in Part F of this standard, unless Part F specifies otherwise. See also Clause 2.9.

NOTES:

1. Gas carriers and chemical tankers are considered novel vessels under Part F Section 3.
2. Fast craft and hire and drive vessels are included in Special Vessels under Part F Section 1 and Part F Section 2 respectively.

1.3 OBJECTIVE

The objective of this Section is to control to acceptable levels or, where practicable, eliminate the risks to persons arising from—

- a) fire; and
- b) the fire control measures themselves.

NOTES:

1. Fire hazards on a vessel include: the collection of flammable vapours within enclosed spaces; rupture of high pressure fuel or hydraulic oil lines; spillage or escape of fuel oil or lubricating oil; normal sources of heat such as cooking and heating appliances; incinerators; engine turbochargers; exhaust piping and trunking; abnormal sources of heat such as short-circuiting or overloading of electrical systems; overheating of mechanical components; cigarette smoking; arson.
2. Consequences of fire may include: reduced visibility and disorientation caused by the presence of smoke; hindrance to safe egress; suffocation; toxic poisoning; excessive heat causing untenable conditions for humans; the spread of fire; structural failure; damage to essential systems including lifesaving equipment; loss of watertight integrity.
3. Examples of risks associated with fire control measures include: asphyxiation or poisoning caused by fire extinguishing agents; environmental damage caused by extinguishing agents; and electrocution associated with improper choice of portable fire extinguishing agents.

1.4 USE OF THE STANDARD

Flowcharts are provided to assist users applying the standard. Figure 1 illustrates the process for determining the application of this section and the source of the applicable deemed-to-satisfy solutions for a particular vessel.

Figure 2 shows the method of how the standard is used to provide deemed-to-satisfy solutions.

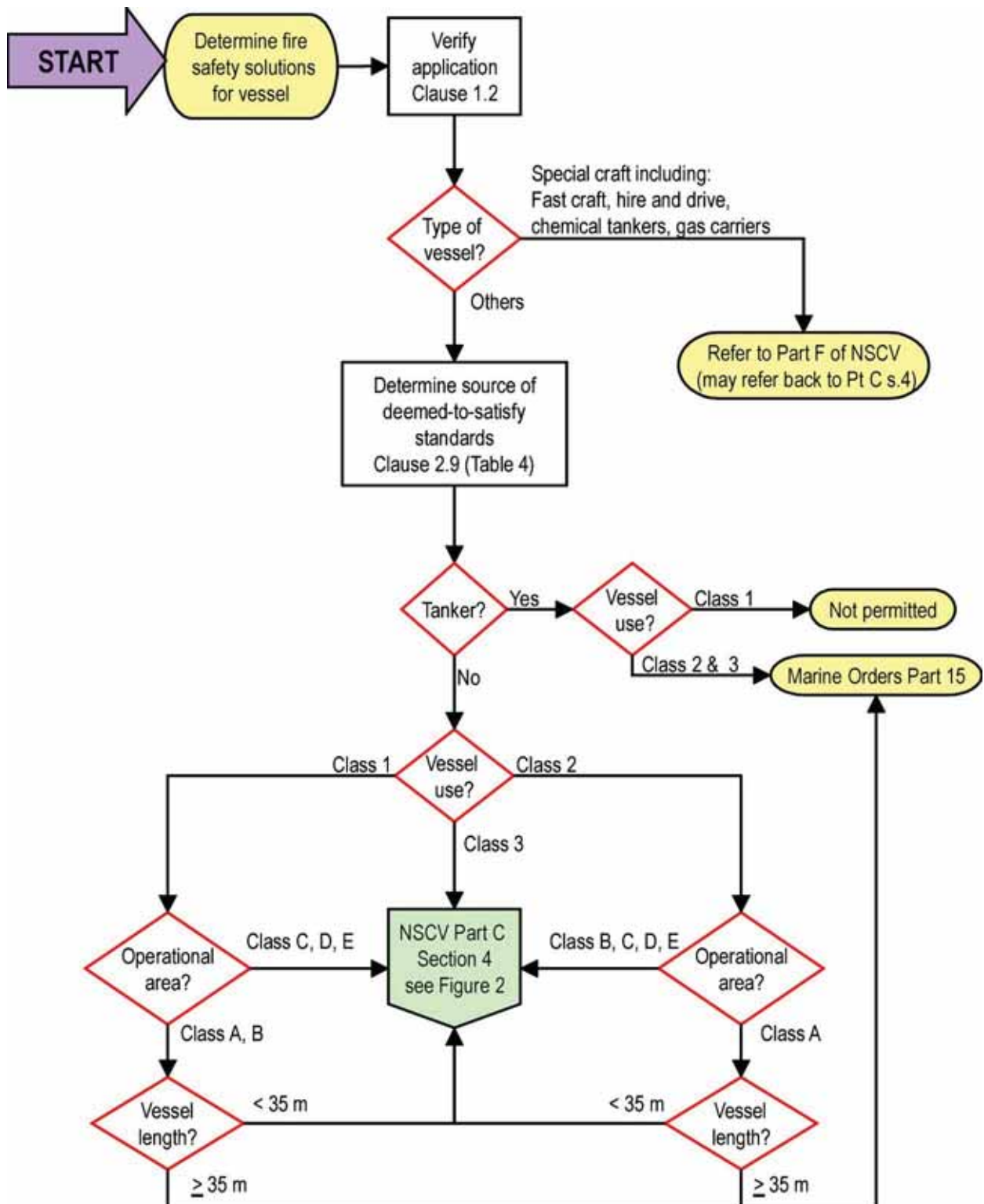


Figure 1 — Flowchart for determining the application of this Section and the source of applicable deemed-to-satisfy solutions

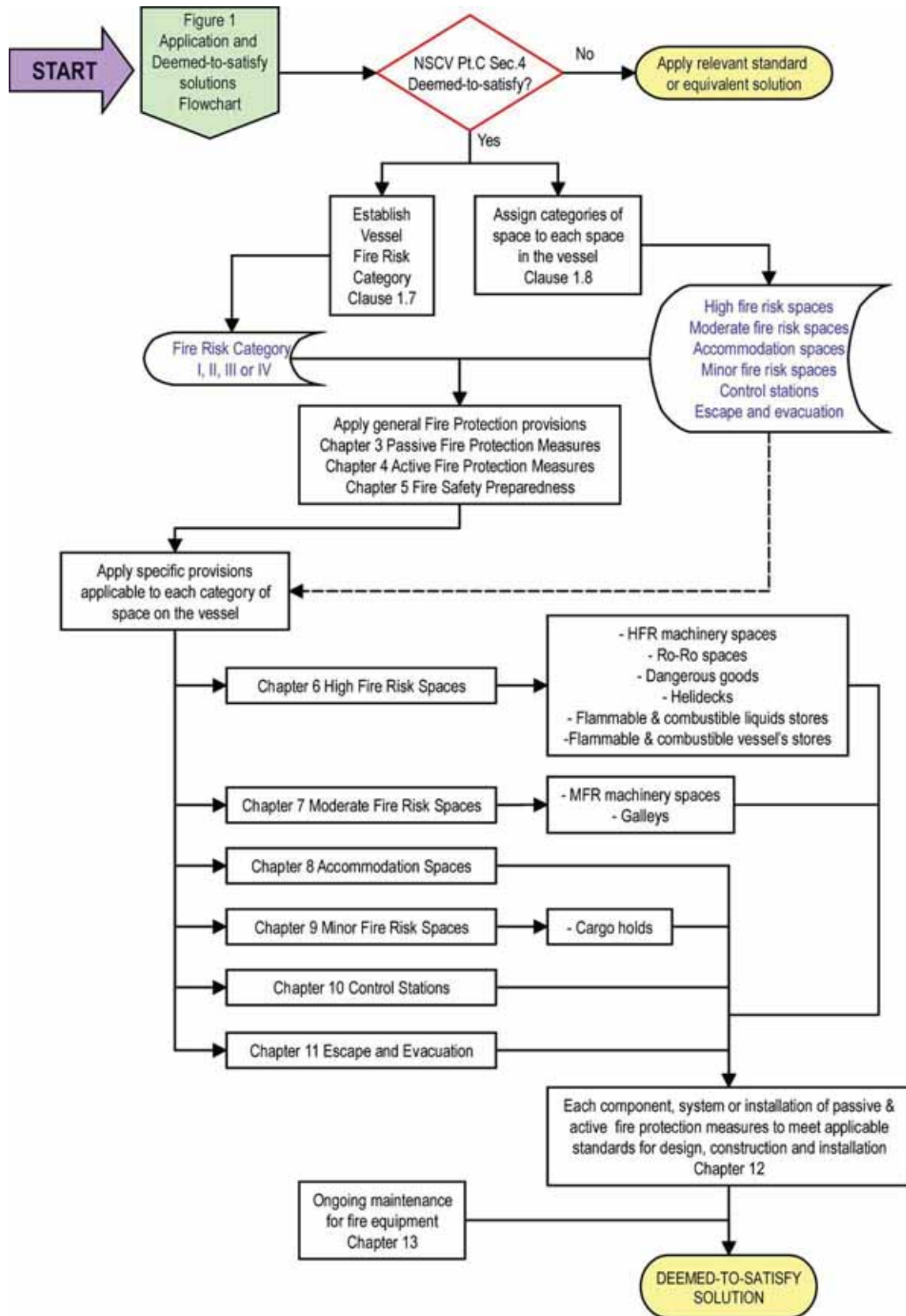


Figure 2 — Flowchart for determining the deemed-to-satisfy requirements contained in this Section

1.5 DEFINITIONS

For the purposes of this Section of the National Standard for Commercial Vessels—

- a) the definitions provided in Part B of the NSCV, in addition to those in this Clause, shall apply; and
- b) where there is any duplication in the terms defined between this Clause and Part B, the definition in this Clause shall apply.

Throughout this Section, terms defined in this Clause are indicated by italic text.

accommodation space—

a category of space defined in Table 3.

active fire protection measures—

those elements of the design, construction and *fire equipment* of the vessel and emergency procedures that eliminate or control the risk of fire by active means i.e. they must be activated at the time of fire to be effective.

EXAMPLES:

Fire detection and fire alarm systems,
fixed fire-extinguishing systems,
fire appliances,
fuel shut-offs and ventilation and electrical shutdowns.

atrium—

a public space spanning three or more decks having openings or access ways between decks that cannot be sealed thus allowing smoke to move freely from one deck to the others.

central control station—

a *Control Station* in which essential indicator and control functions are centralised.

NOTE: Refer to Clause 4.4.

closed Ro-Ro spaces—

Ro-Ro spaces that are neither *open Ro-Ro spaces* nor *weather decks*.

NOTES:

1. Refer also to the definitions of *Ro-Ro spaces*, *open Ro-Ro spaces* and *weather decks*.
2. A *special category space* is a type of *closed Ro-Ro space*.

closed vehicle spaces—

cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion that—

- a) are not *Ro-Ro spaces*; and
- b) are not provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead, or from above.

NOTES:

1. A *closed vehicle space* contains vehicles loaded by means other than being driven on board the vessel.

2. A vehicle space that would meet the ventilation characteristics specified for an *open Ro-Ro space* or a *Ro-Ro weather deck* is not a *closed vehicle space* for the purposes of this definition.

combustible liquid—

any liquid, other than a *flammable liquid*, that has—

- a) a flashpoint; and
- b) a firepoint less than its boiling point.

combustible material—

any material other than a *non-combustible* material.

control station—

a category of space defined in Table 3.

dangerous goods—

those packaged dangerous goods that fall within the application of Clause 4 of the National Standard for the Storage and Handling of Dangerous Goods (NOHSC:1015).

NOTES:

1. For the application of this standard, the definition of dangerous goods excludes fuels and oils used for the propulsion of the vessel.
2. Dangerous goods carried in bulk are subject to standards applicable to *tankers* (see definition below) or are subject to the International Bulk Chemical Code.

defence-in-depth—

a strategy for fire protection where multiple fire protection measures are employed at various stages in the development of a fire to reduce the likelihood of rapid transition from a potential ignition state to a fully developed catastrophic state, see Clause 1.6.2.

escape or evacuation route—

a category of space defined in Table 3.

fire appliance—

an item of *fire equipment* that requires an operator to deploy and control the item when manually fighting a fire.

EXAMPLES:

portable and wheeled fire extinguishers;
fire hoses;
fire buckets;
water fog applicators;
foam making branch pipes.

fire damper—

a device arranged to close a ventilation opening or ventilation duct for the purposes of maintaining the performance of the fire boundary through which the opening or duct passes.

NOTE: Fire dampers may be designed to also serve as *fire flaps*.

fire detection and fire alarm system—

those elements of the construction and equipment of the vessel, and any operational procedures, that detect the presence of fire or potential risk of fire and subsequently raise an alarm.

EXAMPLES:

fixed fire detection and fire alarm systems

smoke alarms

fire patrols

fire equipment—

consists of *fire detection and alarm systems, fire appliances, fixed fire-extinguishing systems* and fire personal protective equipment.

fire flap—

a device arranged to close off a ventilation opening or ventilation duct for the purposes of sealing a compartment to exclude oxygen and/or confine and contain extinguishing media.

NOTE: Fire flaps may be designed to also serve as *fire dampers*.

fire-resisting division—

a division formed by bulkheads and/or decks having insulation or inherent fire-resisting properties

NOTE: Chapter 12 specifies the performance requirements for fire resisting divisions.

fire-restricting material—

a material having properties that retard and/or reduce the hazardous effects of fire.

NOTE: Chapter 12 specifies the performance requirements for fire-restricting materials.

Fire Risk Category of vessel—

a measure of the risk of fire determined by the category of vessel, number of passengers on board and number of berthed passengers on board, refer to Clause 1.7.

fixed fire detection and fire alarm system—

an integrated system of detectors, manual call points and alarms that are monitored and controlled through one or more central control panels.

fixed fire-extinguishing system—

an arrangement of components forming a single system that when manually or automatically initiated, operates automatically to control, suppress or extinguish a fire without the need for further manual control.

EXAMPLES:

Total flooding systems;

Local fire-extinguishing systems.

flammable liquid—

any liquid that has a flashpoint of 60°C or less, except:

- a) Liquids having a flashpoint not less than 23°C nor greater than 60°C, but which have a firepoint greater than 104°C or which boil before the fire point is reached.

NOTE: This criterion exempts many flammable liquids, water mixtures and blends of petroleum products for which the flash point does not truly represent the flammability hazard.

- b) Aqueous solutions containing not more than 24 per cent ethanol by volume.

- c) Alcoholic beverages and other products for human consumption, in containers of not more than 5 L capacity.
- d) Substances otherwise classified as *dangerous goods* on account of their other more dangerous characteristics.

flammable and combustible vessel's stores—

includes paints, *flammable liquids* and other stores of *flammable* and/or *combustible liquids* that are used in the operation and maintenance of the vessel.

NOTE: Flammable or combustible vessel's stores include fuel stored for use in the outboard engines of tenders carried on the vessel.

foam making branch pipe—

a *fire appliance* that, when connected to the fire main water supply and inserted into a drum of foam concentrate, generates quantities of foam water mixture.

NOTE: This device is referred to as a portable foam applicator unit in SOLAS and Marine Orders 15.

galley—

an enclosed space containing—

- a) equipment used for cooking food at temperatures exceeding 120°C including cooking equipment for deep fat frying;
- b) equipment having an exposed flame or cooking element that might come into contact with and ignite fats or other *flammable liquids* during the course of normal or abnormal operation; or
- c) any appliance of power more than 5 kW used for the cooking or heating of food.

NOTE: Refer also to the definitions of *large galley* and *small galley*.

helideck—

a purpose-built helicopter landing area located on a vessel. It includes all structures, fire-fighting appliances and other equipment necessary for the safe operation of helicopters.

high fire risk space—

a category of space defined in Table 3.

hob—

that part of a cooking appliance that supports the *trivet*. Usually constructed of enamelled steel, stainless steel or toughened glass.

large galley—

a *galley* that is not a *small galley*.

limited quantities of dangerous goods—

small quantities of packaged *dangerous goods* specified in the current IMDG Code or the current IDG Code for which the Dangerous Goods Code provisions do not apply.

NOTE: Limited quantities of *dangerous goods* amount to quite small quantities, for example, 1 litre of petrol.

low risk cargo space—

cargo spaces on Class 2 or Class 3 vessels constructed and solely intended for the carriage of ore, grain, unseasoned timber, fish, *non-combustible* cargoes or cargoes that constitute a low fire risk.

low flame spread—

a surface having properties that restrict the spread of flame.

NOTE: Chapter 12 specifies the performance requirements for low flame spread surfaces.

minor fire risk space—

a category of space defined in Table 3.

minor quantity of dangerous goods—

packaged *dangerous goods* of quantity less than the placarding quantity specified under Schedule 1 of the National Standard for the Storage and Handling of Workplace Dangerous Goods (NOHSC:1015).

EXAMPLES:

For paints and kerosene, the placarding quantity is 1000 L.

For petrol and aviation fuel, the placarding quantity is 250 L.

moderate fire risk space—

a category of space defined in Table 3.

non-combustible material—

a material that neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C.

NOTE: Chapter 12 specifies the performance requirements for non-combustible materials.

oil fuel unit—

the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation of heated oil for delivery to an internal combustion engine. Includes any oil pressure pumps, filters, heaters and piping dealing with oil at a pressure of more than 180 kPa.

NOTE: The definition does not apply to equipment used for the preparation or delivery of diesel fuel that is not heated for use in an internal combustion engine.

open Ro-Ro spaces—

Ro-Ro spaces arranged to allow effective natural ventilation while underway, not being *weather decks*.

NOTE: Refer to Clause 6.5.2.2.

operating compartment—

the enclosed area from which the navigation and control of the vessel is exercised.

pantry—

a space, not being a *galley*, used for the preparation or distribution of food and beverages.

NOTE: Refer to the definition of *galley* above.

EXAMPLES:

Spaces containing:

1. Microwave ovens for heating of food;
2. Bain-marie appliances, each of 5 kW or less, for keeping food warm; or
3. Appliances, each of 5 kW or less, used solely for boiling water or water-based beverages.

passive fire protection measures—

features of the design and construction of the vessel and fire-safe operational procedures that eliminate or control the risks of fire by passive means: i.e., they do not require activation at the time of fire to be effective.

EXAMPLES:

- Fuel system design and installation requirements;
- electrical installation requirements;
- fire-resisting divisions*;
- the use of *non-combustible* or *fire-restricting materials*;
- escape and evacuation requirements that limit the consequences of fire.

public spaces—

those portions of the *Accommodation Space* that are public halls, dining rooms, lounges and similar enclosed spaces where persons are able to congregate.

Ro-Ro spaces—

spaces intended primarily for carrying motor vehicles with fuel in their tanks for their own propulsion that are loaded and unloaded in a horizontal direction. Ro-Ro spaces extend either a substantial length or the entire length of the vessel, are not normally subdivided and may also contain goods that are loaded and unloaded by motor vehicles.

NOTES:

1. *Ro-Ro spaces* are classified as *open Ro-Ro spaces*, *closed Ro-Ro spaces* or *weather decks*.
2. Goods in *Ro-Ro spaces* may be 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.

small galley—

a *galley* containing a single compact domestic range (no more than 4 burners or hotplates, and oven) of total gas consumption less than 65 mJ/hr or total electricity consumption less than 9 kW.

small machinery space—

a machinery space of *Moderate Fire Risk* that—

- a) is not capable of being occupied;
- b) has a volume of 10 m³ or less; and
- c) for which access to the space to extinguish a fire would prove hazardous.

smoke alarm—

a device that independently detects the presence of smoke, sounds an alarm and tests function status from the location of installation.

smoke-tight—

a division made of *non-combustible* or *fire-restricting materials* capable of preventing the passage of smoke.

special category space—

a *closed Ro-Ro space* to which passengers may have access.

tanker—

a Class 2 or Class 3 vessel carrying—

- a) crude oil or petroleum products in bulk with—
 - i) a flashpoint of 60°C or less (closed cup test), as determined by an approved flashpoint apparatus; and
 - ii) a Reid vapour pressure which is below the atmospheric pressure; or
- b) other liquid products having a similar fire hazard.

NOTES:

1. Liquid cargoes with a flashpoint exceeding 60°C, other than oil products or liquid cargoes subject to the requirements of the International Bulk Chemical Code, are considered to constitute a low fire risk.
2. As a deemed-to-satisfy solution, *tankers* are prohibited from operating as Class 1 vessels, see Clause 2.9.

time rating—

the minimum time period needed to ensure that a bulkhead; deckhead; closing appliance; penetration; or other fixture meets the requirements for a *fire-resisting division*.

trivet—

a grid located over the open burners of a cooking range to support vessels being heated.

water fog applicator—

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.

weather deck—

a deck that is completely exposed to the weather from above and from at least two boundaries to the space.

1.6 ASSUMPTIONS AND APPROACH

1.6.1 Risk-based approach to solutions

SOLAS Chapter II-2 has been used as the basis for the requirements contained in this Section. However, Chapter II-2 of SOLAS is intended for vessels that operate independently on international voyages. SOLAS does not apply to vessels that operate in sheltered waters, or to cargo vessels less than 500 GT, nor does it apply to fishing vessels. SOLAS provides for modification of requirements for vessels that do not proceed more than 20 nautical miles from the nearest land.

The risks associated with those vessels for which SOLAS does not apply may differ significantly from those applicable to vessels under SOLAS. Hence, to apply SOLAS without modification to all vessels would be inappropriate.

Clause 2.9 of this section applies SOLAS to tankers and certain larger seagoing vessels in the domestic fleet by specifying Marine Orders 15 as the deemed-to-satisfy solution. For other vessels, Clause 2.9 specifies compliance with the deemed-to-satisfy solutions contained within this section.

These employ a risk-based approach to match appropriate risk control solutions to the needs of individual vessels.

The risk-based approach has two levels. The first applies to the vessel as a whole; the second applies to individual spaces within a vessel.

The fire risk level applicable to a vessel is assumed to be a function of key risk parameters that are major determinants in the likelihood and consequence of a fire on a vessel. Risk matrices are applied which determine fire safety solutions based on the *Fire Risk Category*, see Clause 1.7.

The fire risk associated with a space is assumed to be a function of the use of the space in normal and emergency conditions and the contents of the space. The nature of the space is significant both in terms of the likelihood of fire and the consequences of fire, see Clause 1.8.

NOTE: AS/NZS 4360 and Part B of the NSCV provide further information on the application of risk management techniques.

1.6.2 Fire safety measures provide defence-in-depth

This Section prescribes a combination of fire safety measures which, taken as a whole, provides the minimum required standard for controlling the risks associated with fire. A *defence-in-depth* strategy is adopted, broadly based on a series of measures applicable to different states of a fire as it progresses from ignition to fully developed state. These are illustrated in Table 1¹.

Table 1 — Stages of *defence-in-depth* strategy

| Fire state | Fire protection features | Examples of solutions |
|-----------------------------|--|--|
| Ignition and incipient fire | Control of heat sources, fuels, interactions | Insulation, tank and fuel system design, dangerous goods stowage |
| | Very early detection | Fire patrols, gas detectors, oil pressure monitoring |
| First item development | Material properties | Non-combustible materials, fire-restricting materials, low flame spread surfaces |
| | Fire detection | Heat and smoke detectors, fire patrols |
| Spread to secondary items | Fire detection | Heat and smoke detectors, fire patrols |
| | Fire suppression | Portable extinguishers, fire blankets |
| Full space involvement | Fire suppression | Fixed fire-extinguishing systems, fire hose appliances |
| | Ventilation control | Fire flaps and fan shutdowns |
| Spread to other spaces | Fire resistance | Separation of spaces, fire-resisting divisions, ventilation design |
| | Manual suppression | |
| Spread to essential systems | Fire resistance | Separation of spaces, <i>fire-resisting divisions</i> |
| | Manual suppression | Fire hoses |
| | Redundancy | Duplication of generators, fire pumps, etc |

¹ Adapted from Mowrer, Frederick W., Brannigan, Vince. A Probabilistic Approach to Tenability Criteria. Proceedings of the 4th International Conference on Performance-Based Codes and Fire Safety Design Methods. Melbourne. 2002.

1.6.3 Early detection and extinction

Notwithstanding the presence of *defence-in-depth*, priority is given to measures that provide for the avoidance of fire, early detection of conditions that could give rise to fire, early detection of the occurrence of fire and the early extinction of fire.

1.6.4 Key hazards

Annex A summarises the key fire hazards addressed by the provisions of this Section and other sections of the NSCV. The table forms the basis for the requirements contained in this Section.

1.6.5 Functional requirements of deemed-to-satisfy solutions

The following functional requirements are embodied in the deemed-to-satisfy solutions of this Section as appropriate:

- a) Avoidance of fire hazards.
- b) Restricted use of *combustible materials*.
- c) Minimal possibility of ignition of *flammable liquids* or vapour.
- d) Early detection of any fire in the zone of origin.
- e) Containment and extinction of any fire in the space of origin.
- f) Separation of spaces of varying fire risk by smoke, thermal and structural boundaries.
- g) Protection of means of escape, evacuation and access for fire-fighting.
- h) Ready availability of *fire appliances*.

1.7 FIRE RISK CATEGORIES OF VESSELS

The Fire Risk Category of a vessel shall be determined from Table 2.

Four fire risk categories are defined as follows:

- a) Fire Risk Category I (lowest risk).
- b) Fire Risk Category II (moderate risk).
- c) Fire Risk Category III (high risk).
- d) Fire Risk Category IV (highest risk).

Table 2 — Fire Risk Category

| Vessel use category (see Part B) | Operational area category (see Part B) | | | | |
|--|--|--------------------------------|---|------------------------------------|--------------------------|
| | Class A Unlimited domestic operations | Class B Offshore operations | Class C Restricted offshore operations | Class D Partially smooth waters | Class E Smooth waters |
| Class 1— Length of vessel | < 35 m (1) | <35 m (1) | All lengths | All lengths | All lengths |
| Class 1: 13 to 36 day passengers | III | II | II | I | I |
| Class 1: 37 to 200 day passengers | IV | III | II | II | II |
| Class 1: 201 to 450 day passengers | IV | IV | III | II | II |
| Class 1: 451 or more day passengers | Not applicable (2) | Not applicable (2) | IV | IV | III |
| Class 1: 13 to 36 berthed passengers | IV | III | II | II | II |
| Class 1: 37 or more berthed passengers | Not applicable (2) | Not applicable (2) | IV | IV | IV |
| Class 2— Length of vessel | < 35 m (1) | All lengths | All lengths | All lengths | All lengths |
| Class 2 Fire Risk Category | II | II | I | I | I |
| Class 3— Length of vessel | All lengths | All lengths | All lengths | All lengths | All lengths |
| Class 3 Fire risk category | II | II | I | I | I |

KEY:

- (1) No Fire Risk Category is specified for Class 1A, 2A and 1B vessels 35 m and more in measured length since these vessels are required to comply with the requirements specified in Marine Orders 15 for SOLAS vessels, refer to Clause 2.9.
- (2) No Fire Risk Category is specified for Class 1A and 1B vessels carrying more than 450 day passengers or more than 36 berthed passengers since these vessels are required to comply with the requirements specified in Marine Orders 15 for SOLAS vessels, refer to Clause 2.9.

NOTE: Excludes *tankers* and special vessels including fast craft and novel vessels, see Clauses 1.2 & 2.9.

1.8 CATEGORIES OF SPACES

1.8.1 Determination

Spaces shall be assigned a space category in accordance with Table 3. Where there is doubt as to the category of a space, the space shall satisfy the most stringent fire safety requirement.

1.8.2 Spaces of multiple classification

Where it is possible to assign two or more classifications to a space, it shall be provided with *active and passive fire protection measures* that satisfy the more stringent of the requirements specified for each applicable classification.

Table 3 — Categories of spaces

| Space category | Description | Examples |
|---------------------------|--|--|
| High Fire Risk Spaces | <p>Spaces where, without appropriate controls, the likelihood and consequence of fire are high.</p> <p>Within such spaces, there is:</p> <ul style="list-style-type: none"> potential for the spillage or escape of potentially dangerous quantities of <i>flammable liquid</i> or explosive vapour, and the presence of one or more sources of heat or other sources of ignition. | <p>a) Enclosed machinery spaces containing—</p> <ul style="list-style-type: none"> internal combustion machinery for main propulsion where the aggregate power output of internal combustion machinery for all purposes within the space is 120 kW or more; internal combustion machinery for purposes other than propulsion where the aggregate total power output of the machinery within the space is: <ul style="list-style-type: none"> 375 kW or more; or 120 kW or more where the machinery is not intended only for emergency or very occasional use²; any oil-fired boiler; or any <i>oil fuel unit</i>. <p>b) <i>Ro-Ro spaces</i>.</p> <p>c) Store spaces containing <i>flammable liquids</i>, including paint lockers.</p> <p>d) Spaces containing <i>dangerous goods</i>.</p> <p>e) Sales shops of deck area 50 m² or more containing packaged <i>flammable liquids</i> for sale and where no dedicated store is provided separately.</p> <p>f) Trunks in direct communication with the above spaces.</p> |
| Moderate Fire Risk Spaces | <p>Spaces that:</p> <ul style="list-style-type: none"> contain potentially dangerous quantities of <i>flammable liquids</i> but where the sources of ignition have relatively low frequency; or contain heat sources or other sources of ignition but where the quantity or nature of material within the space to fuel a fire is such that the risk is significantly reduced. | <p>a) Enclosed machinery spaces containing:</p> <ul style="list-style-type: none"> Internal combustion machinery where the aggregate power output of internal combustion machinery for all purposes within the space is less than 120 kW; Internal combustion machinery for purposes other than propulsion where the aggregate total power output of the machinery within the space is less than: <ul style="list-style-type: none"> 375 kW where the machinery is intended only for emergency or very occasional use²; or 120 kW otherwise. switchboards, electrically powered main propulsion or auxiliary motors or transformers when such equipment within the space has a total aggregate power of 30 kVA or more. an oil fuel pump, oil fuel filter or oil fuel separator, not being an <i>oil fuel unit</i>. any solid fuel fired boiler. <p>b) <i>Galleys</i>.</p> <p>c) Sales shops of deck area less than 50 m² containing packaged <i>flammable liquids</i> for sale and where no dedicated store is provided separately.</p> |

(Continued...)

² Very occasional use is taken to mean less than 1 per cent of total vessel operating time.

Table 3 cont.

| Space category | Description | Examples |
|-----------------------------|--|---|
| Accommodation Space | Spaces that are likely to contain persons who: <ul style="list-style-type: none"> are unfamiliar with the vessel, may be asleep or disoriented at the time of an emergency, or may inadvertently or deliberately initiate a fire. | <ul style="list-style-type: none"> a) Sleeping rooms. b) Mess rooms. c) <i>Pantries</i>. d) <i>Public spaces</i>. e) Toilets and washrooms. f) Sales shops not containing <i>flammable liquids</i> for sale. g) Storerooms of floor area less than 4 m² incorporated within or adjacent to other types of <i>Accommodation Spaces</i> and which are not used for the storage of <i>combustible</i> or <i>flammable liquids</i> or <i>dangerous goods</i>. |
| Minor Fire Risk Spaces | Spaces where the likelihood and/or consequence of fire is low. | <ul style="list-style-type: none"> a) Spaces used for the carriage of cargo that is not <i>dangerous goods</i>. b) <i>Closed vehicle spaces</i>. c) Void spaces. d) Fuel tanks and spaces containing fuel tanks for fuel of flashpoint above 60 °C. e) Storerooms including baggage or mail rooms not used for the storage of <i>combustible</i> or <i>flammable liquids</i> or <i>dangerous goods</i>. |
| Control Stations | Spaces containing systems essential to the safety of persons, which, if destroyed or rendered unusable by fire, would substantially increase the risks to those on board. | <ul style="list-style-type: none"> a) <i>Operating compartment</i>. b) Radio room. c) Central fire <i>Control Station</i>. d) Damage <i>Control Station</i>. e) The emergency source of electrical power or the emergency switchboard. f) Fixed fire extinguishing <i>Control Station</i>, agent storage or machinery room. |
| Escape or Evacuation Routes | Spaces essential for escape from spaces on board the vessel and for evacuation from the vessel, which if destroyed or rendered unusable by fire, would substantially increase the risks to those on board. | <ul style="list-style-type: none"> a) Corridors of length 14 m and over in <i>Accommodation Spaces</i> and corridors for escape and evacuation elsewhere. b) Enclosed stairways and stairway towers. c) Assembly stations. d) Survival craft stowage locations. e) Ship's side in way of survival craft stowage or embarkation point. |

NOTE: The title of each category is intended to be typical rather than restrictive.

1.9 REFERENCED DOCUMENTS

The following documents are referred to in this Section of the NSCV. Any documents referenced in this Section shall be considered the latest revision of the document, including amendments and supplements.

NATIONAL MARINE SAFETY COMMITTEE

National Standard for Commercial Vessels

Part B—General Requirements

Part C—Design and Construction

Section 1: Arrangement, Accommodation and Personal Safety

Section 2: Watertight and Weathertight Integrity

Section 5: Engineering

Subsection 5A—Machinery

Subsection 5B—Electrical

Section 7: Safety Equipment

Part E—Operational Practices

STANDARDS AUSTRALIA

AS/NZS 1221—*Fire hose reels*

AS 1530—*Part 1 – Methods for fire tests on building materials, component and structures – combustibility tests for materials*

AS/NZS 1530—*Part 3 – Methods for fire tests on building materials, component and structures – simultaneous determination of ignitability, flame propagation, heat release and smoke release*

AS 1603—*Automatic fire detection and alarm systems*

AS 1670—*Fire detection, warning, control and intercom systems—Systems design, installation and commissioning*

AS/NZS 1715—*Selection, use and maintenance of respiratory protective devices*

AS/NZS 1716—*Respiratory protective devices*

AS/NZS 1841—*Portable fire extinguishers*

AS/NZS 1850—*Portable fire extinguishers – Classification, rating and performance testing*

AS 1851—*Maintenance of fire protection equipment*

AS 2118—*Automatic fire sprinkler systems*

AS 2419—*Fire hydrant installations*

AS 2444—*Portable fire extinguishers and fire blankets – Selection and location*

AS 2792—*Fire hose – Delivery layflat*

AS 3504—*Fire blankets*

AS 3786—*Smoke alarms*

AS/NZS 3837—*Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter*

AS 4214—*Gaseous fire extinguishing systems*

AS 4265—*Wheeled fire extinguishers*

AS/NZS 4360—*Risk management*

AS 5062—*Fire protection of mobile and transportable equipment*

AS 5601—*Gas Installations*

HB13—*Electrical equipment for hazardous areas*

AUSTRALIAN BUILDING CODES BOARD

Building Code of Australia

AUSTRALIAN MARITIME SAFETY AUTHORITY

Marine Orders Part 15—Ship Fire Protection, Fire Detection and Fire Extinction

EUROPEAN UNION

EU Marine Equipment Directive—Council Directive 96/98/Ec (As Amended)

BRITISH STANDARDS INSTITUTION

BS EN 1869—*Fire blankets*

BS 7176—*Specification for resistance to ignition of upholstered furniture for non-domestic seating by testing composites*

BS 7177—*Specification for resistance to ignition of mattresses, divans and bed bases*

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Airport Services Manual, part 1 – Rescue and Fire fighting

INTERNATIONAL MARITIME ORGANIZATION

International Code of Safety for High Speed Craft 2000 (HSC Code)

Code of Alarms and Indicators adopted by the Organization by resolution A.830(19)

International Code for Fire Safety Systems (Fire Safety Systems Code) as adopted by resolution MSC.98(73)

International Code for Application of Fire Test Procedures (Fire Test Procedures Code) as adopted by resolution MSC.61(67)

IMO Resolution A.654 (16) Graphical symbols for fire control plans

MSC Resolution MSC.44(65) Standards for fixed sprinkler systems for high speed craft

MSC Circ.451 Guidance concerning the location of fire control plans for assistance of shoreside fire-fighting personnel

MSC Circ.849 Guidelines for the performance, location, use and care of emergency escape breathing devices

MSC Circ.1007 Guidelines for the approval of fixed aerosol fire-extinguishing systems equivalent to fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces

SOLAS—*The International Convention for the Safety of Life at Sea*

IMO International Maritime Dangerous Goods Code

INTERNATIONAL STANDARDS ORGANIZATION

ISO 1716—*Building material reaction-to-fire tests – Determination of calorific potential*

ISO 4589-3—*Plastics - Determination of burning behaviour by oxygen index - Part 3: Elevated-temperature test*

ISO 5660—*Building material reaction-to-fire tests – Heat release, smoke production and mass loss rate*

ISO 9094-1—*Small Craft - Fire Protection*

ISO 9239—*Reaction to fire tests for floor coverings: Part 1— Determination of the burning behaviour using a radiant heat source*

ISO 9705 Fire tests—*Full scale room test for surface products (Room Corner Test)*

ISO 15371—*Ships and Marine technology – Fire-extinguishing systems for protection of galley deep-fat cooking equipment – fire tests*

ISO 17631:2002—*CE Ships and marine technology CE Shipboard plans for fire protection, life-saving appliances and means of escape*

NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 15—*Water Spray Fixed Systems for Fire Protection*

NFPA 17—*Standard for Dry Chemical Extinguishing Systems*

NFPA 750—*Water mist fire protection systems*

NATIONAL OCCUPATIONAL HEALTH AND SAFETY COMMISSION

NOHSC:1015 *National Standard for the Storage and Handling of Workplace Dangerous Goods*

SP SVERIGES PROVNINGS- OCH FORSKNINGSINSTITUT

SP-method 2377—*Fire test procedures for water spray fire suppression systems in small machinery spaces*

UNDERWRITERS LABORATORIES

UL 300—*Standard for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas*

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

UN Recommendations on the Transport of Dangerous Goods. Model Regulations

1.10

ABBREVIATIONS**BCA—**

Building Code of Australia

FSS Code—

International Code for Fire Safety Systems (Fire Safety Systems Code) as adopted by resolution MSC.98(73)

FPT Code—

International Code for Application of Fire Test Procedures (Fire Test Procedures Code) as adopted by resolution MSC.61(67)

HSC Code—

International Code of Safety for High Speed Craft 2000

IDG Code—

UN Recommendations on the Transport of Dangerous Goods. Model Regulations

IMDG Code—

IMO International Maritime Dangerous Goods Code

CHAPTER 2 FIRE SAFETY OUTCOMES AND SOLUTIONS

2.1 SCOPE

This Chapter specifies required outcomes and fire safety solutions applicable to vessels.

REQUIRED OUTCOMES

2.2 PREVENTION OF EXPLOSIVE COMBUSTION

A vessel must be designed, constructed and operated to reduce to acceptable levels, or where practicable eliminate, the risks of uncontrolled explosive combustion of vapours, gases, liquids or other substances on board the vessel.

2.3 CONTROL OF RISKS OF SPILLAGE OF FLAMMABLE LIQUIDS

A vessel must be designed, constructed and operated to reduce to acceptable levels, or where practicable eliminate, the risks associated with the spillage of *flammable liquids* on board the vessel.

2.4 CONTROL RISKS OF IGNITION BY SOURCES OF HEAT OR SPARKS

A vessel must be designed, constructed and operated to reduce to acceptable levels, or where practicable eliminate, the risks associated with the sources of heat or sparks on board the vessel.

NOTE: Sources of heat include substances that might be subject to spontaneous combustion under the conditions of loading, storage and use that may exist on board the vessel.

2.5 PREVENTION OF EXPOSURE TO THE SMOKE AND HEAT OF FIRE

A vessel must be designed, constructed and operated to reduce to acceptable levels, or where practicable eliminate, the exposure of persons to the smoke and heat of a fire that might occur on board the vessel.

2.6 PREVENT OR DELAY THE SPREAD OF FIRE

A vessel must be designed, constructed and operated to reduce to acceptable levels, or where practicable eliminate, the rapid spread of fire on board the vessel.

2.7 PROTECTION OF ESSENTIAL SYSTEMS

A vessel must be designed, constructed and operated to reduce to acceptable risk, or where practicable eliminate, the possible disruption or destruction by fire of essential safety systems.

EXAMPLES

Essential safety systems include:

Escape and evacuation

Emergency electrical systems

Fire equipment
 Lifesaving equipment
 Evacuation paths
 Communications equipment

2.8 REDUNDANCY

The combination of fire safety measures on a vessel must have sufficient redundancy, diversity and independence to avoid vulnerability arising from over-reliance on a single measure.

NOTE: See also Clause 1.6.2.

DEEMED-TO-SATISFY SOLUTIONS

2.9 COMPLIANCE

For the purpose of this National Standard, the fire safety measures on a vessel shall be deemed-to-satisfy the Required Outcomes in Clauses 2.2 to 2.8 to the extent specified by this Section if they comply with Table 4.

NOTE: Other Sections of the NSCV have provisions that also pertain to fire safety. See Part C Section 5—Engineering and Part E—Operational Practices.

Table 4 — Deemed-to-satisfy solutions

| Vessel use | Operational area | | | | | |
|------------|---------------------------|--------------------------------|---------------------------|--------------------------------|--------------------------------|---------------|
| | Class A excepting tankers | | Class B excepting tankers | | Class C to E excepting tankers | Tankers |
| Class 1 | $L_m \geq 35$ m | MO 15 | $L_m \geq 35$ m | MO 15 | NSCV Part C Sec.4 | Not permitted |
| | $L_m < 35$ m | MO 15 (1) or NSCV Part C Sec.4 | $L_m < 35$ m | MO 15 (1) or NSCV Part C Sec.4 | | |
| Class 2 | $L_m \geq 35$ m | MO 15 | NSCV Part C Sec.4 | | NSCV Part C Sec.4 | MO 15 (2) |
| | $L_m < 35$ m | NSCV Part C Sec.4 | | | | |
| Class 3 | NSCV Part Sec.4 | | NSCV Part Sec.4 | | NSCV Part C Sec.4 | MO 15 (2) |

KEY:

L_m denotes measured length.

MO 15 denotes that the vessel shall comply with the requirements specified in Marine Orders Part 15 Construction—Fire protection, fire detection and fire extinction for SOLAS vessels.

NSCV Part C Sec.4 denotes that the vessel shall comply with the applicable provisions contained in Chapter 3 to Chapter 13 of this Section.

- (1) MO 15 applies to Class I passenger vessels carrying more than 450 day passengers or more than 36 berthed passengers.
- (2) A vessel carrying moderate quantities of *flammable liquids* as cargo may, as an alternative to being arranged as a *tanker*, be arranged to comply with the requirements specified for the carriage of *dangerous goods* specified in Clause 6.6.

EQUIVALENT SOLUTIONS

2.10 ASSESSMENT METHODS

Assessment methods for equivalent solutions applicable to fire safety shall comply with Part B of this National Standard and Annex B of this Section. Equivalent solutions applicable to fire safety shall be verified in a manner appropriate to the risks that would arise should the safety system fail to perform at time of need.

NOTE: Assessment methods (see Part B of this standard) applicable to systems of fire safety tend to be rigorous to promote reliability of performance. Special diligence is needed to avoid the possibility of insufficient or inappropriate equipment being provided at time of need. In addition to the need for rigorous assessment, options for equivalent solutions may be limited by enabling legislation.

AS 5062 Chapters 2 and 3 provides a methodology that can assist in developing equivalent solutions.

2.11 STANDARDS FOR ADDITIONAL EQUIPMENT, WHERE FITTED

Fire safety equipment that is provided on a vessel that is additional to the requirements specified in this section but which may be relied upon in an emergency shall comply with this standard.

NOTE: Compliance is necessary because of the risks associated with the use of inappropriate or unreliable *fire equipment* in an emergency situation and the accidental operation of *fire equipment* in normal situations.

CHAPTER 3 GENERAL REQUIREMENTS FOR PASSIVE FIRE PROTECTION MEASURES

3.1 SCOPE

This Chapter specifies requirements for *passive fire protection measures*. Specific requirements applicable to particular spaces on a vessel are specified in later chapters, see Table 5.

Table 5 — Chapters applicable to specific spaces

| 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 |

PREVENTION OF FIRE AND EXPLOSION

3.2 STORAGE OF COMBUSTIBLE OR FLAMMABLE OILS

Storage for fuel oil, lubrication oil and other *combustible* or *flammable liquids* shall not be located forward of the collision bulkhead.

NOTE: On vessels not required to have a collision bulkhead, storage for fuel oil, lubrication oil and other combustible or flammable liquids should not be located in the forward extremity of the vessel.

3.3 ENGINE EXHAUSTS, BOILER AND GALLEY UPTAKES

Internal combustion engine exhausts, boiler and *galley* uptakes and similar sources of ignition, shall be—

- a) kept clear of any *combustible materials*; and
- b) insulated with *non-combustible* materials where—
 - i) the temperature of an exposed unprotected surface could exceed 93°C; and
 - ii) either—
 - A) persons or equipment, *flammable* or *combustible liquids* or other combustible items may come into contact with the exhaust system; or
 - B) the surface is within 230 mm of any *combustible materials*.

3.4 CERTAIN HIGHLY FLAMMABLE MATERIALS PROHIBITED

Paints, varnishes, or any similar preparations shall not be used if they contain a nitro-cellulose or other highly flammable base. Fabrics containing nitro-cellulose shall not be fitted.

FIRE GROWTH POTENTIAL

3.5 INSULATION

3.5.1 Insulation materials

Except as provided in Clause 3.5.2, insulating materials shall be *non-combustible*. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe and fittings for cold service systems, need not be of *non-combustible* materials. They shall be kept to the minimum quantity practicable.

3.5.2 Insulation for sound control or control of ambient temperature

Insulation for sound control or control of ambient temperature shall comply with Table 6 and Chapter 12.

Table 6 — Fire characteristics of insulation for sound control or control of ambient temperature (1)

| | <i>High Fire Risk Space</i> | <i>Moderate Fire Risk Space</i> | <i>Minor Fire Risk Space</i> | <i>Other spaces</i> |
|-------------------------------|-----------------------------|---------------------------------|------------------------------|---------------------|
| <i>Fire Risk Category I</i> | Annex I (2) | Annex I | Clause 3.4 | Annex I |
| <i>Fire Risk Category II</i> | NC or LFS | Annex I (2) | Clause 3.4 | Annex I |
| <i>Fire Risk Category III</i> | NC or LFS | NC or LFS | Annex I | Annex I (2) |
| <i>Fire Risk Category IV</i> | NC or LFS | NC or LFS | Annex I | NC or LFS |

KEY:

NC means *non-combustible* material complying with Chapter 12

LFS means *low flame spread* surface complying with Chapter 12

Annex I means a material complying with Chapter 12 and Annex I

(1) Includes insulation for airconditioning, environmental comfort or refrigeration.

(2) Insulation used in conjunction with fire-resisting divisions shall comply with the requirements for fire-resisting divisions in Chapter 12 or the requirements for a combustible veneer under Clause 3.7.4.

3.5.3 Surfaces protected against oil penetration

In spaces where penetration of oil products is possible—

- a) the surface of insulation, including structural fire protection insulation, shall not absorb oil or oil vapours, and
- b) the insulation shall have protection where the insulation is vulnerable to damage.

NOTE: Insulation of the type provided with an impervious outside layer is suitable. Where the insulation is cut, the edges could be protected against impregnation by use of tape having comparable fire characteristics.

SMOKE GENERATION POTENTIAL AND TOXICITY

3.6 PAINTS, VARNISHES & OTHER FINISHES ON PASSENGER VESSELS

For vessels in *Fire Risk Category IV*, paints, varnishes and other finishes used on exposed interior surfaces in all spaces other than *Minor Fire Risk*

Spaces shall not be capable of producing excessive quantities of smoke and toxic products. Such finishes shall comply with Chapter 12.

CONTAINMENT OF FIRE

3.7 STRUCTURAL FIRE PROTECTION

3.7.1 Protection of boundaries

Depending upon the *Fire Risk Category* applicable to the vessel as determined from Table 2, the boundaries of spaces shall be protected by *fire-resisting divisions* to the extent required by Table 7, Table 8 or Table 9.

Spaces that are in proximity to one another, but which are not necessarily adjacent, shall be considered to be adjacent if the intervening space would not provide levels of protection equivalent to that required if the spaces had been adjacent.

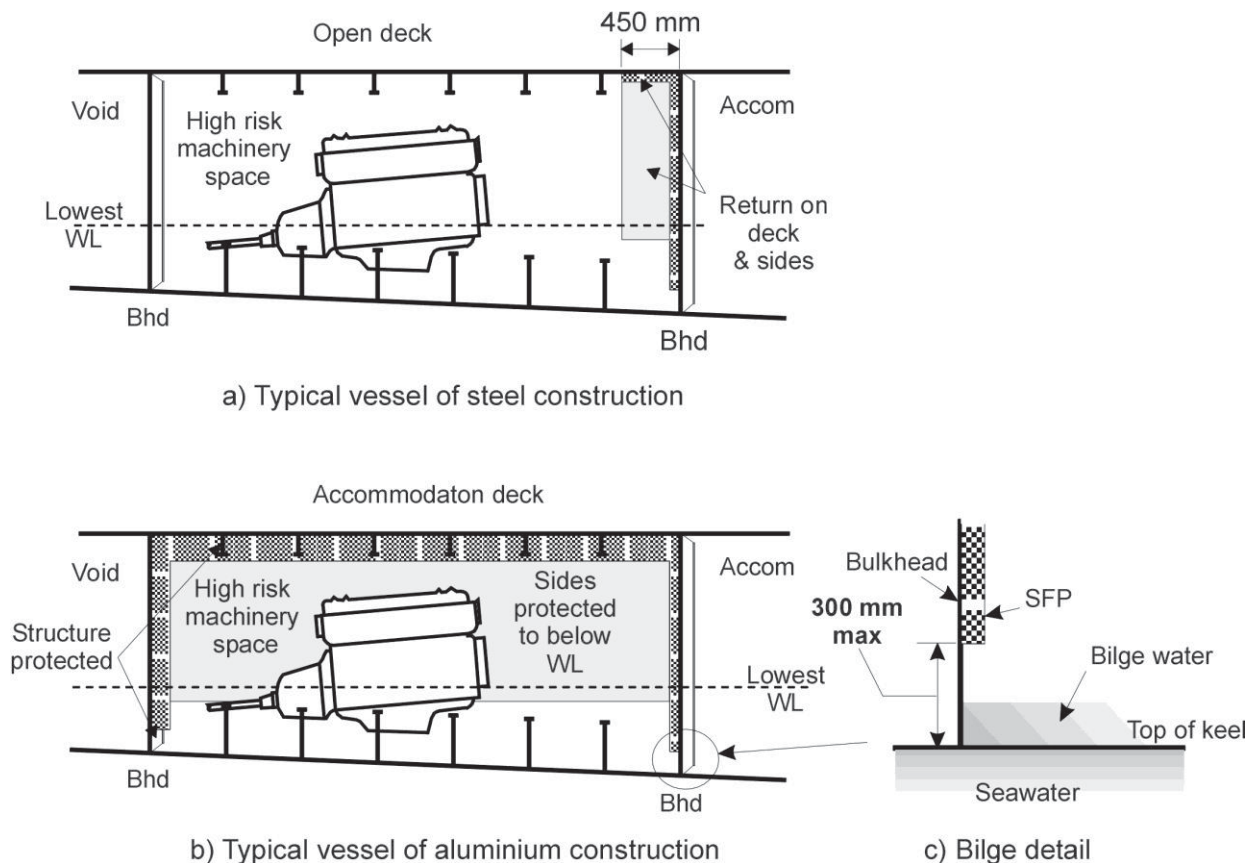


Figure 3 — Structural fire protection details

3.7.2 Returns at the edges of fire-resisting divisions

The insulation of a deck, bulkhead or structural member that is part of a *fire-resisting division* shall be carried past a penetration, intersection or terminal point for the distance necessary to prevent the transmission of excessive levels of heat into the adjacent structure. Where there is an

intersection by a deck or bulkhead of different values, the insulation with the higher value shall continue on the deck or bulkhead with the insulation of the lesser value for the required distance. A distance on the return of not less than 450 mm shall be deemed-to-satisfy, see Figure 3(a).

3.7.3 Arrangements to accommodate drainage

Where the lower end of a fire-resisting bulkhead terminates on the immersed bottom shell in the bilge, the insulation may be terminated a distance not exceeding 300 mm above the top of keel as shown in Figure 3(c).

Table 7 — Structural fire protection for Fire Risk Category I

| Category of space | | High Fire Risk Spaces | Moderate Fire Risk Spaces | Accommodation Spaces | Minor Fire Risk Spaces | Control Stations | Escape or Evacuation Routes |
|---------------------------|---|-----------------------|---------------------------|----------------------|------------------------|------------------|-----------------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| High Fire Risk Spaces | 1 | 30 (2) | ST | ST | ST | ST | ST |
| | | 30 (1)(2)(4) | 30 (1)(4) | 30 (1)(4) | 30 (1)(3)(4) | 30 (1)(4) | 30 (1)(4) |
| Moderate Fire Risk Spaces | 2 | | ST (2) | Nil | Nil | Nil | Nil |
| | | | ST (2) | Nil | Nil | Nil | Nil |

NOTES:

The value above the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the vertical column. For steel divisions, the *time rating* above the diagonal line need not apply.

The value below the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the horizontal row.

Definitions for the various Categories of Space are described in Clause 1.8.

LEGEND:

ST refers to a division not being a *fire-resisting division* but which is *smoke-tight*.

30 means a 30-minute *time rated fire-resisting division*.

KEY:

- (1) The upper side of the decks of Ro-Ro spaces protected by an aqueous *fixed fire-extinguishing system* need not be insulated.
- (2) A *fire-resisting division* or *smoke-tight* bulkhead or deck between such spaces need not be fitted if omitting the division would not materially affect the safety of the vessel. For example, a bulkhead may not be required between 2 storerooms. A *fire-resisting division* is required between a machinery space and a *Ro-Ro space* even though both spaces are in the same category.
- (3) When steel construction is used, *fire-resisting divisions* adjacent to void spaces or diesel fuel tanks need only be *smoke-tight* without insulation.
- (4) Certain vessels may only require a *smoke-tight* division for a machinery space of *High Fire Risk*, refer to Clause 6.4.11.

Table 8 — Structural fire protection for *Fire Risk Category II*

| Category of space | | High Fire Risk Spaces | Moderate Fire Risk Spaces | Accommodation Spaces | Minor Fire Risk Spaces | Control Stations | Escape or Evacuation Routes |
|-----------------------------|---|---|---------------------------|----------------------|------------------------|------------------|-----------------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| High Fire Risk Spaces | 1 | 30 (2) | 15 | ST | ST | ST (3) | ST |
| | | 30 (1)(2) | 30 (1) | 30 (1) | 30 (1)(5) | 30 (1) | 30 (1)(4) |
| Moderate Fire Risk Spaces | 2 | | 15 (2) | ST | ST | ST (3) | ST |
| | | | 15 (2) | 15 | 15 (5) | 15 | 15 (4) |
| Accommodation Spaces | 3 | | | ST (2) | ST | ST (3)(6) | ST |
| | | | | ST (2) | ST | ST (6) | ST (4) |
| Minor Fire Risk Spaces | 4 | LEGEND: ST refers to a division not being a <i>fire-resisting division</i> but which is <i>smoke-tight</i> . 15 means a 15-minute <i>time rated fire-resisting division</i> . 30 means a 30-minute <i>time rated fire-resisting division</i> . Definitions for the various Categories of Space are described in Clause 1.8. | | | ST (2) | ST (3) | ST |
| Control Stations | 5 | | | | ST (2) | ST | ST (4) |
| | | | | | | ST (2)(3) | ST |
| Escape or Evacuation Routes | 6 | | | | | | Nil |
| | | | | | | | Nil |

NOTES:

The value above the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the vertical column. For steel divisions, the *time rating* above the diagonal line need not apply.

The value below the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the horizontal row.

KEY:

- (1) The upper side of the decks need not be insulated in *Ro-Ro spaces* and spaces of *Moderate Fire Risk* other than machinery spaces provided the entire space is protected by an aqueous *fixed fire-extinguishing system* complying with Chapter 12.
- (2) A *fire-resisting division* or *smoke-tight* bulkhead or deck between such spaces need not be fitted if omitting the division would not materially affect the safety of the vessel. For example, a bulkhead may not be required between 2 storerooms. A *fire-resisting division* is required between a machinery space and a *Ro-Ro space* even though both spaces are in the same category.
- (3) Control Stations that contain auxiliary machinery for emergency purposes shall be provided with a 15-minute *fire-resisting division*.
- (4) Refer to Clause 8.14 for requirements for stairways penetrating decks.
- (5) When steel construction is used, *fire-resisting divisions* adjacent to void spaces or diesel fuel tanks need only be *smoke-tight* without insulation.
- (6) Not required for an *operating compartment* on a vessel carrying less than 200 passengers, refer to Clause 10.6.

Table 9 — Structural fire protection for *Fire Risk Category III* and *IV*

| Category of space | | High Fire Risk Spaces | Moderate Fire Risk Spaces | Accommodation Spaces | Minor Fire Risk Spaces | Control Stations | Escape or Evacuation Routes |
|-----------------------------|---|---|---------------------------|----------------------|------------------------|------------------|-----------------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| High Fire Risk Spaces | 1 | 60 (2) | 30 | STNF | STNF | STNF (3) | STNF |
| | | 60 (1)(2) | 60 (1) | 60 (1) | 60 (1)(5) | 60 (1) | 60 (1)(4) |
| Moderate Fire Risk Spaces | 2 | | 30 (2) | STNF | STNF | STNF (3) | STNF |
| | | | 30 (2) | 30 | 30 (5) | 60 | 30 (4) |
| Accommodation Spaces | 3 | | | STNF (2) | STNF | STNF(3)(7) | STNF |
| | | | | STNF (2) | STNF | 30 (7) | 30 (4)(6) |
| Minor Fire Risk Spaces | 4 | <p>LEGEND: STNF refers to a division not being a <i>fire-resisting division</i> but which is <i>smoke-tight</i> and constructed of <i>non-combustible</i> or <i>fire-restricting material</i>. 30 means a 30-minute <i>time rated fire-resisting division</i>. 60 means a 60-minute <i>time rated fire-resisting division</i>. Definitions for the various Categories of Space are described in Clause 1.8.</p> | | | STNF (2) | STNF (3) | STNF |
| | | | | STNF (2) | 30 (5) | STNF (4) | |
| Control Stations | 5 | | | | | STNF (2)(3) | STNF |
| | | | | | | STNF (2)(3) | STNF (3)(4) |
| Escape or Evacuation Routes | 6 | | | | | | Nil |
| | | | | | | | Nil |

NOTES:

The value above the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the vertical column. For steel divisions, the *time rating* above the diagonal line need not apply (see Clause 4.2.8 above).

The value below the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the horizontal row.

KEY:

- (1) The upper side of the decks need not be insulated in *Ro-Ro spaces* and spaces of *Moderate Fire Risk* other than machinery spaces provided the entire space is protected by an aqueous *fixed fire-extinguishing system* complying with Chapter 12.
- (2) A *fire-resisting division* or *smoke-tight* bulkhead or deck between such spaces need not be fitted if omitting the division would not materially affect the safety of the vessel. For example, a bulkhead may not be required between 2 storerooms. A *fire-resisting division* is required between a machinery space and a *Ro-Ro space* even though both spaces are in the same category.
- (3) *Control Stations* that contain auxiliary machinery for emergency purposes shall be provided with a 30 minute *fire-resisting division*.
- (4) Refer to Clause 8.14 for requirements for stairways penetrating decks.
- (5) When steel construction is used, *fire-resisting divisions* adjacent to void spaces or diesel fuel tanks need only be *smoke-tight* without insulation.
- (6) Division can be reduced to STNF where the *Accommodation Space* does not include sleeping rooms.
- (7) Not required for an *operating compartment* on a vessel of *Fire Risk Category III* carrying less than 200 passengers, refer to Clause 10.6.

3.7.4 Combustible veneers

Combustible veneers are permitted on non-combustible and fire-resisting divisions, provided that they satisfy the requirements for a low flame spread surface. See also Clause 8.6.3.

3.8 PENETRATIONS IN FIRE-RESISTING DIVISIONS

3.8.1 General

Penetrations through *fire-resisting divisions* shall be designed and installed to prevent the transmission of fire, heat and smoke through the division.

3.8.2 Testing of penetrations

Except as provided in Clauses 3.8.3, 3.8.5.2 and 3.8.6.5, penetrations through *fire-resisting divisions* shall be tested in accordance with Chapter 12.

3.8.3 Pipe penetrations

The minimum melting temperature of pipes in *High Fire Risk Spaces* or *Moderate Fire Risk Spaces* that penetrate *time rated fire-resisting divisions*, including uninsulated metallic pipes, shall be in accordance with Table 10.

A pipe penetration made of steel or equivalent material is deemed-to-satisfy the requirement of Clause 3.8.1 without the testing required under Clause 3.8.2 provided the pipe—

- a) has a thickness of 3 mm or greater;
- b) has a length of not less than 900 mm;
- c) has no openings; and
- d) is suitably insulated by extension of the insulation of the same *time rating* as the division.

Table 10 — Minimum melting temperatures of uninsulated pipes in spaces of *High Fire Risk* or *Moderate Fire Risk* that penetrate *time rated fire-resisting divisions*

| <i>Time rating of fire-resisting division</i> Min. | Minimum melting temperature of pipe material Degrees C | |
|---|---|----------------------------------|
| | <i>High Fire Risk Spaces</i> | <i>Moderate Fire Risk Spaces</i> |
| 15 | No application | 650°C |
| 30 | 850°C | 850°C |
| 60 | 950°C | No application |

3.8.4 Lifts and dumb-waiters

Trunks for lifts and dumb-waiters shall be—

- a) constructed to maintain the fire integrity of boundaries specified in Clause 3.7; and
- b) provided with a means of closing that permits the control of draught and smoke.

Where the machinery for lifts and dumb-waiters falls within the criteria for a space of *Moderate Fire Risk* under Clause 1.8, the machinery shall be arranged in a separate room, to be considered as a space of *Moderate Fire Risk*, except that small openings for lift cables are permitted.

3.8.5 Ventilation ducts

3.8.5.1 General

Ventilation ducts shall be arranged, constructed and installed to maintain the effectiveness of *fire-resisting divisions* within the vessel.

NOTE: Measures that satisfy this Clause include the use of *non-combustible* materials for ducts, the incorporation of *fire flaps* at divisions and/or structural insulation of ducts.

3.8.5.2 Testing

The tests specified in Clause 3.8.2 shall apply to the penetrations of ventilation ducts and shall include tests of the—

- a) *fire dampers* and their relevant means of operation; and
- b) duct penetrations through *fire-resisting divisions*.

However, test b) is not required where—

- i) the penetration is fitted with a steel sleeve of thickness not less than 3 mm, see Figure 4(a);
- ii) portions of the ventilation duct where the contents are intended to be kept separate from the space are directly joined to the sleeve by means of riveted or screwed flanges, or by welding; and
- iii) if the *fire-resisting division* is *time rated*, the steel sleeve—
 - i) extends no less than 450 mm on the insulated side of the division; and
 - ii) has no openings to enable the duct to be suitably insulated by extension of the insulation of the same *time rating* as the division.

3.8.5.3 Separation of systems

The ventilation systems for *High Fire Risk Spaces*, *Moderate Fire Risk Spaces* and cargo shall be separated from each other and from the ventilation systems serving other spaces.

3.8.5.4 Ducts passing through Accommodation Spaces or Control Stations

Ducts provided for the ventilation of *High Fire Risk Spaces* or *Moderate Fire Risk Spaces* shall not pass through *Accommodation Spaces* or *Control Stations* unless the ducts are constructed and insulated so 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.

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