14.2.2.2.1 Watertight doors and weathertight doors shall not be required to comply with the construction requirements of Chapter 6.

14.2.2.2 Doors shall be permitted to have a minimum width of 700 mm (28 in.).

14.2.2.3 Stairs.

14.2.2.3.1 Service stairs and ladders complying with 7.2.7 shall be permitted.

14.2.2.3.2 Vertical ladders complying with 7.2.8 and alternating tread devices complying with 7.2.9 shall be permitted as a secondary means of egress.

14.2.2.3.3 In engineering and machinery space occupancies and in storage occupancies, the clear distance between intermediate rails measured at right angles to the rails shall not exceed 50 cm (19.7 in.).

14.2.2.4 Escape Trunks.

14.2.2.4.1 Where used, escape trunks that are more than 5 m (16.4 ft) in height shall be separated from the machinery space by minimum A-60 Class divisions.

14.2.2.4.2 Escape trunks shall be provided with emergency lighting complying with Section 7.9 and with self-closing doors complying with 7.2.1.7 to allow protected egress from the machinery space.

14.2.2.4.3 Escape trunks that are 5 m (16.4 ft) or less in height shall be permitted to be reduced to a minimum A-0 Class division.

14.2.2.4.4 Where an escape trunk does not provide direct access to the weather, self-closing doors or hatches shall be provided.

14.2.2.5 Shaft Tunnels. Shaft tunnels shall be permitted to serve as an egress route.

14.2.3 Means of Egress Arrangement.

14.2.3.1 All machinery spaces shall be provided with a minimum of two separated means of egress, except as provided in 14.2.3.1.1 and 14.2.3.1.2.

14.2.3.1.1 Low-risk machinery spaces shall not be required to have two separated means of egress.

14.2.3.1.2 Unmanned machinery spaces that open directly to weather or an exit access shall not be required to have two separated means of egress.

14.2.3.2 Exits shall be located remotely from each other, and at least one shall not require passage through a watertight door.

14.2.3.3 Escape trunks shall be provided as indicated in 14.2.3.3.1 through 14.2.3.3.4.

14.2.3.3.1 Escape trunks shall be provided at every engine control room located within the fire-resistive boundaries of the machinery space.

14.2.3.3.2 Escape trunks shall be provided at the lowest deck of the machinery space.

14.2.3.3.3 Escape trunks shall be provided at every high-risk machinery space.

14.2.3.3.4 Escape trunks shall not be required for machinery spaces where the vertical distance from the lower level of the space to the weather deck, exit enclosure, or exit access is less than 5 m (16.4 ft).

14.3 Protection.

14.3.1 High-risk machinery spaces shall be protected throughout by one of the following systems in accordance with Section 9.2:

(1) Water mist system

- (2) Carbon dioxide extinguishing system
- (3) Clean agent system

14.3.2 Energy Sources.

14.3.2.1 Fire protection equipment shall not be the sole protection for the space in which it is located.

14.3.2.2 All feeder and control wiring, switchgear, fuel oil, and starting equipment shall be located such that fire damage in the protected spaces will not impair the system. When such equipment is located outside the space it is protecting, all feeder and control wiring, switchgear, fuel oil, and starting equipment shall be located such that fire damage in the protected spaces will not impair the system.

14.3.2.3 Automatic fire protection systems shall be provided with at least two sources of power, one of which shall be provided from outside the protected space.

14.3.2.4 Machinery space fire protection systems that require electrical power for operation shall be provided with two sources of electrical power, one normal source and the second from an emergency source.

14.3.2.5* For all machinery spaces in excess of 120 m^3 (4237.8 ft³) in volume, at least one source of power for the installed fire protection systems shall be provided from outside the protected space.

14.3.2.6 Wiring and switchgear for fire protection system pumps and controls shall be such that fire damage in the protected space will not impair the system.

14.3.3 Hydrants. Hydrants shall be installed as provided in 14.3.3.1 and 14.3.3.2, unless otherwise provided by Chapters 19 through 21.

14.3.3.1 Hydrants shall be located within or outside machinery spaces such that all areas of the space can be reached by at least two single-length hose lines from separate outlets. The hose line closest to the machinery space shall not exceed 25 m (82 ft). At least one hydrant shall be located outside of the machinery space.

14.3.3.2 Hydrants within the machinery space and those immediately outside the protected space that are connected to a fixed foam system shall be capable of providing low-expansion aqueous film-forming foam (AFFF) or other suitable foam for 30 minutes at rated flow from any 2 hydrants.

14.3.4 Fire Alarm Detection.

14.3.4.1 All machinery spaces, except as provided in 14.3.4.2, shall be fitted with a manual alarm system and automatic fire detectors in accordance with Section 9.1. The system shall initiate visual and audible alarms in the machinery space, machinery control room, navigation bridge, and central control station.

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14.3.4.2 In periodically unattended machinery spaces, the fire detection system shall be so designed and the detectors so positioned as to rapidly detect the onset of fire in any part of those spaces and under any of the designed operating conditions of the machinery and variations of ventilation as required by the possible range of ambient temperatures.

14.3.5* Emergency Escape Breathing Device (EEBD). The minimum number of National Institute for Occupational Safety and Health (NIOSH)–approved EEBDs shall be required in all machinery spaces where the exit travel distance exceeds 15 m (49.2 ft). EEBDs shall be distributed such that no point in the machinery space is more than 15 m (49.2 ft) horizontal travel distance from an EEBD. The number of EEBDs provided shall be the greater of either of the following:

- (1) Twice the number manning the watch
- (2) The maximum number of personnel expected to be working in the space at any given time

14.4 Vessel Services.

14.4.1 Emergency Lighting. All of the following areas shall be provided with emergency lighting:

- (1) Manned spaces
- (2) Escape routes
- (3) Areas housing fire-extinguishing equipment and damagecontrol equipment

14.4.2 Low-Location Lighting. In manned, high-risk machinery spaces, low-location lighting shall be provided in accordance with Section 7.11.

14.5 Compartmentation.

14.5.1 There shall be no access between cargo pump rooms and other machinery spaces.

14.5.2* Unless otherwise provided in Chapters 19 through 21, there shall be no doors between high-risk machinery spaces, engine casings, or fiddley areas, and the following types of spaces:

- (1) Passenger egress stairs
- (2) Public spaces
- (3) Embarkation areas
- (4) Refuge areas
- (5) Passenger muster stations
- (6) Bridge
- (7) Radio room
- (8) Emergency generator space
- (9) Cabin areas for passengers
- (10) Fan rooms serving spaces other than the machinery space

14.6* Pressurized Oil Systems.

14.6.1 Flexible fuel and lubricating oil lines operating above 10 bar (145 psi) shall be provided with double-wall tubing and fittings in accordance with SOLAS Chapter II-2, Regulation 15.

14.6.2 Pressurized oil systems shall be provided with remote shutdown controls located as follows:

- (1) Immediately outside the machinery space and adjacent to the fixed fire-extinguishing system actuation controls
- (2) On the bridge deck in an area accessible to all officers

14.6.3* Splash guards to avoid oil spray or oil leakages onto hot surfaces or into machinery air intakes shall be provided for the following:

- (1) Strainers for pressurized oil systems
- (2) Fuel injection pumps
- (3)* Around all fittings, which include takedown joints (flanges, unions, and so forth), valve bonnets, and other areas where leakage can occur

14.6.4* Fuel injector pipelines for all machinery operating at or above 375 kW (500 hp) or operating in excess of 10 bar (145 psi) shall be double-walled, with arrangements provided for an alarm to be given in case of leakage.

14.7 Ventilation Systems.

14.7.1 Machinery space ventilation systems shall be provided with remote shutdown controls located immediately outside the machinery space and adjacent to the fixed fire-extinguishing system actuation controls.

14.7.2 Machinery space ventilation systems shall be provided with remote shutdown controls located on the bridge deck in an area accessible to all officers.

14.8 Hot Surfaces.

14.8.1 Heated pipes, exhaust manifolds, flues, and other hot surfaces shall be insulated such that the exposed surfaces do not pose an ignition source for sprayed or spilled oils.

14.8.2 External surface temperatures shall not exceed 150°C (302°F).

14.9 Bilges.

14.9.1 Where a water mist extinguishing system is installed in high-risk machinery spaces to satisfy the requirements of 14.3.1, one of the following systems shall be installed to protect the bilges:

- (1) Low-expansion foam
- (2) High-expansion foam
- (3) Water mist

14.9.2 Bilge plating shall be solid for walkways to escape routes.

14.10* Incinerator Spaces.

14.10.1 Incinerator spaces shall be provided with remote shutdown controls located immediately outside the machinery space and adjacent to the fixed fire-extinguishing system actuation controls.

14.10.2 Incinerator spaces shall be considered high-risk machinery spaces.

- ▲ **14.11 Portable Extinguishers.** Portable fire extinguishers shall be provided in accordance with 9.2.15 and the following:
 - (1) One B-II for each 750 kW (1000 hp) of internal combustion or gas turbine machinery, but not less than two or more than six, and one B-III
 - (2) One B-V and two B-II for spaces containing oil-fired boilers or oil fuel units
 - (3) One C-II for each electrical generator
 - (4) Unmanned machinery spaces shall be provided with at least one B:C II extinguisher inside the space.

Chapter 15 Storage Spaces

15.1 General Requirements.

15.1.1 Application. Storage spaces shall comply with Chapter 15.

- ▲ 15.1.2 Subclassification of Occupancies. A high-risk storage space shall be considered to be any space that contains high-risk fuels or flammable aerosols. It shall also include any space that is dedicated for trash storage or that contains pyrotechnics or explosives. All storage spaces that are not high risk shall be considered to be low-risk storage spaces. The following fuels shall not be considered toward classification of an occupancy as a high-risk storage space:
 - (1) Alcohol beverages less than 100 proof or stored in containers not exceeding 10 L (2.64 gal)
 - (2) Flammable liquids and aerosols stored in containers in accordance with NFPA 30
- ▲ 15.1.3 Minimum Construction and Minimum Separation Requirements. Storage spaces shall be separated from adjoining spaces by divisions that are constructed in accordance with Table 15.1.3. Decks shall be constructed in accordance with 8.2.5.

15.1.4 Occupant Load. Occupant load shall not be applied to storage spaces.

15.2 Means of Egress Requirements.

15.2.1 General. All means of egress shall be in accordance with Chapter 7 and Section 15.2.

15.2.2 Means of Egress Components.

15.2.2.1 General. Components of means of egress shall be limited to the types described in 15.2.2.2 and 15.2.2.3.

15.2.2.2 Doors. Doors shall comply with 7.2.1.

15.2.2.3 Ramps. Ramps shall comply with 7.2.5.

△ Table 15.1.3 Minimum Separation Requirements

	Separation Requirements			
Adjoining Occupancies	Low-Risk Storage	High-Risk Storage		
High-risk accommodation	B-15	A-60		
Medium-risk accommodation	B-0	A-60		
Low-risk accommodation	С	A-0		
Medical, health care, and child care	B-0	A-0		
High-risk service	A-0	A-0		
Low-risk service	С	A-0		
Electrical and control	A-0	A-0		
Low-risk engineering and machinery	С	A-0		
High-risk engineering and machinery	С	A-0		
High-risk storage	A-0	A-0		
Low-risk storage	С	A-0		
Cargo	A-0	A-0		
Open deck	A-0	A-0		
Helicopter deck	A-0	A-0		
Voids	A-0	A-0		

15.2.3 Means of Egress Arrangement.

15.2.3.1 Multiple exit accesses shall not be required from storage spaces.

15.2.3.2 Means of egress shall be permitted through adjacent spaces of any type.

15.2.4 Travel Distance to Exits. Exits shall be arranged so that the total length of travel from any point to reach an exit shall not exceed 40 m (131 ft).

15.2.5 Emergency Lighting. Emergency lighting shall be provided in accordance with Section 7.9 in storage spaces larger than 50 m^2 (538.2 ft²).

15.3 Protection.

15.3.1 Interior Finish. Interior finish shall comply with Section 8.3.

15.3.2 Detection, Alarm, and Communication Systems. Unless otherwise provided for in Chapters 19 through 21, all storage spaces shall be provided with a smoke detection system in accordance with Section 9.1. Flammable materials storage and flammable materials lockers with flammable liquids shall additionally be provided with a heat detection system in accordance with Section 9.1.

15.3.3 Extinguishing Requirements. High-risk storage spaces and storage spaces exceeding 5 m^2 (53.8 ft²) shall be fitted with a fixed automatic fire protection system in accordance with Section 9.2.

15.4 Special Provisions for High-Risk Fuels Storage.

15.4.1 The provisions of Sections 15.1 through 15.3 shall be met except as modified by 15.4.2 and 15.4.3.

15.4.2 Storage of high-risk fuels shall be in sealed, shatterproof containers. Shelves and storage fixtures shall limit movement of containers with the normal motion of the vessel.

△ 15.4.3 Electrical equipment in high-risk fuels storage shall be installed in accordance with Article 500 of *NFPA 70*.

Chapter 16 Cargo Spaces and Fuel Tanks

16.1 General Requirements.

16.1.1 Application. Cargo spaces and fuel tanks shall comply with Chapter 16.

16.1.2 Special Term: Restricted Access Spaces. See 3.4.5.

▲ 16.1.3 Minimum Separation Requirements. Minimum separation requirements for cargo spaces and fuel tanks shall comply with Table 16.1.3.

16.1.4 Occupant Load. Occupant load shall not be applied to cargo spaces and fuel tanks.

16.2 Means of Egress Requirements.

16.2.1 Means of egress shall be in accordance with Chapter 7 and Section 16.2.

16.2.2 Unless required by Chapters 19 through 21, means of egress from restricted access cargo spaces and fuel tanks shall not be required to comply with Chapter 7.

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Δ Table 16.1.3 Minimum Separation Requirements

Adjoining Occupancies	Separation Requirements
High-risk accommodation	A-60
Medical, health care, and child care	A-60
All other spaces adjacent to cargo spaces intended for the carriage of explosives	A-60
Voids	С
All other spaces	A-0

16.3 Protection.

16.3.1 Cargo spaces and fuel tanks shall be in accordance with this section.

16.3.2 Requirements for Tank Vessels.

16.3.2.1 Inert Gas System. Tankers carrying crude oil, petroleum oils other than crude, or any products with a flash point less than 60° C (140° F) shall be fitted with an inert gas system complying with 9.2.13.

16.3.2.2* Tank vessels carrying flammable or combustible liquid cargoes shall be fitted with a deck foam system in accordance with 9.2.9. The type of foam required for chemical cargoes and the application rates shall be as provided in 9.2.9.

16.3.3 Requirements for Cargo Vessels.

16.3.3.1 General. A fire protection system meeting the requirements of 9.2.10 shall be installed in all cargo spaces.

16.3.3.2 Cargo spaces intended solely for the following purposes shall not be required to comply with 16.3.3.1:

- (1) Spaces for the carriage of ore, coal, grain, or unseasoned timber
- (2) Cargo in emergency schedules (EMS) B2, B3, B4, B5, B6, B7, B9, B10, B12, or B14 as defined in the IMO International Maritime Dangerous Goods (IMDG) Code
- (3) Spaces intended solely for the carriage of liquids or gases

16.3.4 Protection of Vehicle Spaces. Vehicle spaces, other than covered open decks, shall be protected with a fire protection system meeting the requirements of Section 9.2. Portable foam equipment or foam hydrants meeting the requirements of 9.2.9 shall be available on each vehicle deck.

16.3.4.1 Covered open decks shall be permitted to be protected with manual sprinkler systems in accordance with 46 CFR 76.23, "Fire Protection Equipment (Manual Sprinkling Systems, Details)."

16.3.4.2 Vehicle spaces that are accessible to passengers shall not be protected with a carbon dioxide extinguishing system.

16.4* Refrigerated Cargo Holds. Combustible insulation shall be protected from fire.

Chapter 17 Open Decks

17.1 General Requirements.

17.1.1 Application. Open decks shall comply with Chapter 17.

17.1.2* Minimum Separation Requirements.

17.1.2.1 Separation between open decks and helicopter decks shall comply with 18.1.2.

17.1.2.2 Open deck separation requirements shall also apply to sideshell integrity.

17.1.3* Unrated windows shall not be permitted where open decks face machinery spaces.

17.1.3.1 Where not required to be protected or rated by other sections of this code, windows in exterior locations or facing open decks shall not be required to be rated and shall be permitted to be openable or omitted.

17.1.4 Occupant Load. The occupant load permitted on any open deck shall be determined on the basis of the occupant load factors in 17.1.4.1 through 17.1.4.4.

17.1.4.1 Occupant load for fixed seating on an open deck shall be determined based on design capacity.

17.1.4.2 Occupant load for bleachers, pews, and other benchtype seating shall be determined based on having one person per 45 cm (18 in.).

17.1.4.3 Occupant load for open areas shall be determined based on having one person for each 1 m^2 (10 ft²) of gross deck area and 0.65 m² (7 ft²) of net area.

17.1.4.4 Occupant load shall not be required to be applied to open deck areas that are not intended to be occupied.

17.1.5 Storage of Cargo. Open decks intended for the carriage of cargo shall also meet the requirements of Chapter 16.

17.1.6 Storage. Open decks intended for the storage of ship's stores shall comply with Section 17.3.

17.2 Means of Egress Requirements. Means of egress shall be permitted to be entirely by exterior stairways and open decks. Otherwise, all means of egress shall be in accordance with Chapter 7.

17.3 Special Considerations for Open Decks Intended for Storage of Ship's Stores.

17.3.1 Storage areas shall not impede means of egress.

17.3.2 Storage areas shall be capable of being reached by two fire hose streams.

17.3.3 Deck house construction adjacent to storage areas shall be at least A-0.

17.3.4 Storage areas shall be designed with provisions for spill or leak containment.

17.3.5 Storage areas shall be remote from the vessel super-structure.

17.3.6 Storage areas shall have permanent means for fastening or lashing containers to the vessel.

Chapter 18 Helicopter Decks

18.1* General Requirements.

18.1.1 Application. Helicopter decks shall comply with Chapter 18.

▲ 18.1.2 Minimum Construction and Minimum Separation Requirements. Helicopter decks shall be separated from adjoining spaces by divisions that are constructed in accordance with Table 18.1.2. Decks shall be constructed in accordance with 8.2.5.

18.1.3 Occupant Load. Occupant load shall not be required to be applied to helicopter decks.

18.2 Means of Egress Requirements. Means of egress shall be in accordance with Chapter 7 and this section.

18.2.1 Means of Egress Components. Means of egress components shall be limited to the types described in 18.2.1.1 and 18.2.1.2.

18.2.1.1 Stairs. Steel stairs complying with 7.2.2 shall be permitted.

18.2.1.2 Service Stairs and Ladders. Service stairs and ladders complying with 7.2.7 shall be permitted.

18.2.2 Each helicopter deck shall have two means of egress.

18.3 Protection.

18.3.1* Each helicopter deck shall be fitted with a foam system complying with 9.2.9. Hydrants for manual application of foam shall be accessible from each of the means of egress required by 18.2.1.

18.3.1.1 Four B:C-II extinguishers shall be provided.

18.3.1.2 Each helicopter hangar shall be equipped with an overhead deluge foam–water sprinkler system complying with 9.2.2. Control switches shall be provided inside and outside the hangar.

18.3.1.2.1 There shall be at least one foam station per hangar for manual application of foam.

△ Table 18.1.2 Minimum Separation Requirements

Adjoining Occupancies	Separation Requirements		
High-risk accommodation	A-60		
Medium-risk accommodation	A-60		
Low-risk accommodation	A-60		
Medical, health care, and child care	A-60		
High-risk service	A-0		
Low-risk service	A-0		
Electrical and control	A-60		
Low-risk engineering and machinery	A-60		
High-risk engineering and machinery	A-60		
High-risk storage	A-0		
Low-risk storage	A-0		
Cargo	A-0		
Open deck	С		
Voids	A-0		

18.3.2 Drainage.

18.3.2.1 Each helicopter deck shall have drainage facilities that collect liquids and prevent liquids from spilling on other parts of the ship.

18.3.2.2 Drainage shall be overboard.

18.3.2.3 Drainage piping shall extend down at least 30 mm (12 in.) over the side.

18.3.3* Communications. Communication capability shall be available between the bridge, fire-fighting foam control stations, hangar, and the helicopter deck.

Chapter 19 Towing Vessels

19.1 General Requirements.

19.1.1 Application.

19.1.1.1 Ocean-going towing vessels shall comply with Chapter 20.

19.1.1.2 This chapter shall apply to all towing vessels that are not defined as ocean-going towing vessels.

19.1.1.3* This chapter shall not apply to towing vessels if they are exempted by the authority having jurisdiction.

19.1.1.4 This chapter shall not apply to towing vessels if they are used solely in a limited geographic area, such as a fleeting area for barges or a commercial facility.

19.1.1.5 This chapter shall not apply to towing vessels if they are used solely for a restricted service, such as making up or breaking larger tows.

19.1.1.6 This chapter shall not apply to towing vessels if they are used solely for assistance towing as defined in 46 CFR 10.103, "Licensing of Maritime Personnel, Definitions."

19.1.1.7 This chapter shall not apply to towing vessels if they are used solely for pollution response.

19.1.2 Occupant Load. Occupant load shall not be required to be applied to towing vessels.

19.2 Means of Egress. Chapter 7 shall not apply to towing vessels.

19.3 Protection. (Reserved)

19.4 Accommodation Spaces. Chapter 10 shall not apply to towing vessels. Accommodation spaces on towing vessels shall comply with this section.

19.4.1 Separation. Accommodation spaces shall be separated from engineering and machinery spaces and from fuel tanks by minimum A-0 Class divisions.

19.4.2 Detection. Single-station smoke detectors complying with ANSI/UL 217, *Single and Multiple Station Smoke Alarms*, shall be provided in each accommodation space.

19.5 Medical, Health Care, and Child Care Spaces. Chapter 11 shall not apply to towing vessels.

19.6 Service Spaces. Chapter 12 shall not apply to towing vessels.

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19.7 Electrical and Control Spaces. Chapter 13 shall not apply to towing vessels.

19.8 Engineering and Machinery Spaces. Chapter 14 shall not apply to towing vessels. Engineering and machinery spaces on towing vessels shall comply with this section.

19.8.1 Separation. Engineering and machinery spaces shall be separated from accommodation spaces by minimum A-0 Class divisions.

19.8.2 Detection.

19.8.2.1 Smoke or heat detectors complying with 9.1.3 shall be provided in all engineering and machinery spaces.

19.8.2.2 Means shall be provided such that detector activation is indicated at the operating station.

19.8.3 Fire Protection Systems and Equipment.

19.8.3.1 Engine rooms on towing vessels shall be provided with a fixed suppression system.

19.8.3.2 The fire suppression system required by 19.8.3.1 shall comply with the applicable paragraphs in Section 9.2.

19.8.4 Remote Main Engine Shutdown and Fuel Shutoff.

19.8.4.1 All towing vessels shall be fitted with a main engine shutdown.

19.8.4.2 All towing vessels shall have a means of securing ventilation systems and dampers.

19.8.4.3 A remotely operated fuel shutoff for securing the flow of fuel to the machinery shall be provided.

19.8.5 Fuel Oil Systems.

19.8.5.1 Portable Fuel Systems. Portable fuel systems shall not be permitted unless intended for portable bilge pumps, portable tanks, and fuel lines meeting ABYC-H-25, *Marine Gasoline Fuel Systems*.

19.8.5.2 Fuel Restrictions. Fuel for main propulsion and ship's service generators shall not have a flash point less than 43° C (110° F).

19.8.5.3 Pressurized Oil Systems. Flexible fuel oil lines operating above 10 bar (145 psi) shall be provided with double-wall tubing and fittings.

19.9 Storage Spaces. Chapter 15 shall not apply to towing vessels.

19.10 Fuel Tanks. Chapter 16 shall not apply to towing vessels. Integral fuel tanks shall comply with this section.

19.10.1 Each fuel tank shall be fitted with a vent pipe connected to the highest point of the tank that terminates in a 3.14-radian (180-degree) bend on a weather deck and that is fitted with a flame screen. Vents from two or more tanks may combine in a system that discharges on a weather deck.

19.10.2 The net cross-sectional area of the vent pipe required by 19.10.1 shall be 312 mm^2 (0.484 in.²), except that where provisions are made to fill a tank under pressure, the net cross-sectional area of the vent pipe shall be permitted to be reduced to not less than the net cross-sectional area of the fill pipe.

19.10.3 Fuel Piping.

19.10.3.1 All fuel piping shall be seamless. Fuel piping shall be made of steel, copper-nickel, annealed copper, or nickel-copper and shall have a wall thickness of at least 0.9 mm (0.035 in.), unless otherwise indicated in 19.10.3.1.1 or 19.10.3.1.2.

19.10.3.1.1 Aluminum piping shall be permitted on aluminum vessels if it is installed outside the machinery space and is at least 2.4 mm (0.95 in.) thick (Schedule 80).

19.10.3.1.2 Nonmetallic flexible hose shall be permitted if it meets the following conditions:

- (1) It is not used in a length exceeding 0.8 m (2.6 ft).
- (2) It is installed in a visible location.
- (3) It does not penetrate any watertight bulkheads.
- (4) It is fabricated with an inner tube and a cover of synthetic rubber reinforced with a wire braid.
- (5) It is fitted with corrosion-resistant compression fittings.
- (6) It is installed with two clamps that do not rely on spring tension at each end of the hose, if the hose is intended to be secured with clamps.

19.10.3.2 A fuel line subject to internal head pressure from fuel in the tank shall be fitted with a positive shutoff valve that is operable from outside the machinery space.

19.11 Open Decks. Chapter 17 shall not apply to towing vessels.

19.12 Helicopter Decks. Chapter 18 shall not apply to towing vessels.

19.13 Vessel Services.

19.13.1 Fire Protection Systems and Equipment.

19.13.1.1 Fire Pumps, Fire Mains, Hydrants, and Hose.

19.13.1.1.1 Fire pumps, fire mains, hydrants, and hose shall comply with 19.13.1.1.1 through 19.13.1.1.3.

19.13.1.1.1 Fire Pumps. A fire pump capable of supplying the two highest outlets at a flow rate not less than 300 L/min (80 gpm), at a pressure not less than 350 kPa (50 psi), shall be provided.

(A) The fire pump shall be provided with means to be started at the pump and remotely started from outside the space where the pump is located.

19.13.1.1.12 Fire Main and Hydrants. A fire main and a suitable number of hydrants shall be installed such that all portions of the vessel can be reached with a single length of hose of a maximum of 25 m (82 ft) in length.

19.13.1.1.13 Fire Hose. The hose shall be lined commercial fire hose, at least 40 mm (1.5 in.) in diameter, 15 m (50 ft) in length, and fitted with a nozzle made of corrosion-resistant material capable of providing a solid stream and a spray pattern, and is capable of being shut off at the nozzle.

19.13.2 Portable Fire Extinguishers. Portable fire extinguishers shall be provided in accordance with Table 19.13.2.

19.13.3 General Alarm.

19.13.3.1 A general alarm shall be installed.

△ Table 19.13.2 Portable Fire Extinguisher Requirements

	Extinguishers		
Space	Number	Туре	
Control spaces	1 for each space	B-I, C-I, A-II, B-II, C-II	
Engineering and machinery spaces	1 for each space	B-II, C-II, and B-V if oil-fired boilers are present	
Accommodation spaces	1 for each 250 m ² (2691 ft ²)	A-ÎI	
Service spaces	1 for each space	A-II, B-II	

19.13.3.2 The general alarm shall be equipped with both an audible and a visual component in spaces other than the machinery space.

19.13.3.3 The general alarm shall be equipped with a visual component in the machinery space.

19.13.4 Two-Way Communication. A fixed internal or portable communication system capable of providing two-way communication between the wheelhouse and the engine room or a space adjacent to the engine room shall be provided.

Chapter 20 Cargo and Tank Vessels

20.1 General Requirements.

20.1.1 Application. This section shall apply to vessels that carry cargo and to oceangoing towing vessels.

20.1.2* Application to Vessels That Engage in International Voyages.

20.1.2.1 Vessels that engage in international voyages shall comply with the IMO *International Convention for the Safety of Life at Sea (SOLAS)*, as amended.

20.1.2.2 Vessels engaged in international trade shall not be required to comply with Chapter 20.

20.1.3 Special Term: Tank Ship. See 3.3.60.

20.1.4 Occupant Load. Occupant load shall be in accordance with Chapters 10 through 18.

20.2 Means of Egress. Means of egress shall only be required to comply with Chapter 7 as specified in this section.

20.2.1 Definitions. The special terms in 7.1.2 shall apply.

20.2.2 Separation of Means of Egress. Separation of means of egress shall comply with 7.1.3.

20.2.3 Interior Finish and Furnishings in Exits and Exit Accesses. Interior finish and furnishings in exits and exit accesses shall comply with 7.1.4.

20.2.4 Impediments to Egress. Impediments to egress shall comply with 7.1.7.

20.2.5 Means of Egress Components. Means of egress components shall be limited to those described in 20.2.5.1 through 20.2.5.7.

20.2.5.1 Doors.

20.2.5.1.1 A door assembly, including the door opening, frame, door, and necessary hardware, shall be designated as a door.

20.2.5.1.2 Doors shall comply with 7.2.1.2, 7.2.1.4.2, 7.2.1.4.3, 7.2.1.5.1, and 7.2.1.5.3. The permission for a door to have key-operated locks from the egress side, as described in 7.2.1.5.2, shall be specifically authorized.

20.2.5.1.3 Every door that is required to serve as an exit shall be designed and constructed so that the way of exit travel is obvious and direct. All doors, except for stateroom doors and doors opening to exit passageways, shall swing in the direction of egress travel.

20.2.5.1.4 A door designed normally to be kept closed in a means of egress shall be a self-closing door and shall not be secured in the open position at any time.

20.2.5.1.5 Watertight doors in a means of egress shall be either a quick-acting type or a power-operated door complying with the requirements in 46 CFR 170, "Stability Requirements for All Inspected Vessels."

20.2.5.2 Stairs.

20.2.5.2.1 Stairs used in machinery spaces shall comply with 7.2.2.1 through 7.2.2.3.7 except that noncombustible, grated treads and landings shall be permitted to be used.

20.2.5.2.2 Stairs in spaces other than machinery spaces shall comply with 7.2.2.1 through 7.2.2.3.7.

20.2.5.2.3 For stairs continuing beyond the level of exit discharge, the partitions, doors, or other means required to serve as interruptions at the level of exit required by 7.2.2.3.6 are not required, provided the exit discharge is clearly marked.

20.2.5.2.4 Where there are more than two decks, not including the bridge deck, a minimum of one stairtower shall be used to connect them. Stairs, platforms, and landings used in the construction of stairtowers shall be of noncombustible materials throughout and protected in accordance with 7.1.3.1, except that stairs with a minimum clear width of 70 cm (28 in.) shall be permitted.

20.2.5.2.5 Exterior Stairs.

20.2.5.2.5.1 Exterior stairs complying with 7.2.2.5.2 through 7.2.2.5.4 shall be permitted to be used as a means of egress.

20.2.5.2.5.2 The dimensions of the stairs shall be required to comply only with the requirements in Table 7.2.2.5.5 for exterior stairs serving 10 or fewer persons.

20.2.5.2.5.3 The separation required by 7.2.2.6.2 shall not be required.

20.2.5.3 Smokeproof Enclosures. Where provided, smokeproof enclosures shall comply with 7.2.3.1 through 7.2.3.6, 7.2.3.7, 7.2.3.10, and 7.2.3.13.

20.2.5.4 Exit Passageways. Exit passageways shall comply with 7.2.6.1 through 7.2.6.3.

20.2.5.5 Service Stairs and Ladders. Service stairs and ladders shall comply with 7.2.7.1 through 7.2.7.3.

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20.2.5.6 Vertical Ladders.

20.2.5.6.1 Vertical ladders shall comply with 7.2.8.

20.2.5.6.2 Vertical ladders shall be permitted to be used as one of the required means of egress.

20.2.5.7 Alternating Tread Devices. Alternating tread devices complying with 7.2.9 shall be permitted to be used as one of the required means of egress.

20.2.6 Guards.

20.2.6.1 Guards shall comply with 7.2.2.4.1 and 7.2.2.4.3.

20.2.6.2 Guard details shall comply with 7.2.2.4.6.1 through 7.2.2.4.6.3.

20.2.7 Handrails.

20.2.7.1 Handrails shall comply with 7.2.2.4.2.

20.2.7.2 Handrail details shall comply with 7.2.2.4.5.1 through 7.2.2.4.5.8.

20.2.8 Number of Separate Means of Egress.

20.2.8.1 The number of separate means of egress shall comply with Section 7.4.

20.2.8.2 Access to at least one of the required exits shall be independent of watertight doors.

20.2.9 Arrangement of Means of Egress.

20.2.9.1 The arrangement of the means of access shall comply with 7.5.1.3, 7.5.1.4, and 7.5.2.1, except that galley areas shall be permitted to be used as a means of egress from mess areas.

20.2.9.2 Dead-end corridors not exceeding 7 m (23 ft) in length shall be permitted.

20.2.10 Travel Distance to Exits. Travel distance to exits shall not be limited on cargo or tank vessels.

20.2.11 Discharge from Exits.

20.2.11.1 All exits shall terminate directly at an exit discharge, an embarkation area, or to an open deck area that leads to an embarkation area that is visible and identifiable from the point of discharge from the exit.

20.2.11.2 Weatherdeck exit discharge shall be permitted in accordance with 7.7.5.

20.2.12 Illumination of Means of Egress. Illumination of means of egress shall comply with Section 7.8.

20.2.13 Emergency Lighting. Emergency lighting shall be provided in accordance with Section 7.9.

20.2.14 Marking of Means of Egress. Means of egress shall be marked in accordance with Section 7.10.

20.3 Protection. Features of fire protection shall be in accordance with Chapter 8 for cargo vessels, tank vessels, and oceangoing towing vessels.

20.3.1 Protection of Vertical Openings. Any vertical opening shall be enclosed in accordance with 8.2.4.

20.3.2 Passageways. Passageways shall be constructed in accordance with 7.1.3.5.

20.3.3* On tank vessels, exterior boundaries of superstructures and deckhouses enclosing accommodation and including any overhanging decks that support such accommodation shall be insulated to A-60 up to the underside of the navigating bridge for the whole of the portions that face the cargo area.

20.4 Accommodation Spaces.

20.4.1 Accommodation spaces shall be in accordance with Chapter 10 and this section.

20.4.1.1* Isolation from Cargo Tanks. On tank ships, all accommodation spaces shall normally be positioned aft of all cargo tanks, slop tanks, and spaces that isolate cargo or slop tanks from machinery spaces.

20.4.1.2 Accommodation spaces situated above cargo spaces shall be permitted only in roll-on/roll-off (RO/RO) vessels or above open deck cargo spaces.

20.4.2* Isolation from Deck Spills. On tank ships, a means shall be provided to keep deck spills away from the accommodation and service areas.

20.4.3 Openings.

20.4.3.1 On tank ships, access doors, air inlets, and openings to accommodation spaces shall not face the cargo area.

20.4.3.2 Openings shall be located on the transverse bulkhead not facing the cargo area or on the outboard side of the superstructure or deckhouse at a distance of at least 4 percent of the length of the ship but not less than 3 m (9.8 ft) from the end of the superstructure or deckhouse facing the cargo area. This distance shall not be required to exceed 5 m (16.4 ft).

20.4.4 Windows and Sidescuttles.

20.4.4.1 On tank ships, windows and sidescuttles facing the cargo area and on the sides of the superstructures and deckhouses within the limits specified in 20.4.3 shall be of the fixed, non-opening type.

20.4.4.2 Windows and sidescuttles in the first tier on the main deck shall be fitted with inside covers of steel or other equivalent material where such windows are located in the areas described in 20.4.4.1.

20.4.5 Automatic sprinkler systems and water mist systems shall not be required in overnight crew accommodation spaces.

20.5 Medical Spaces. Medical spaces shall be in accordance with Chapter 11.

20.6 Service Spaces. Service spaces shall be in accordance with Chapter 12.

20.7 Electrical and Control Spaces. Electrical and control spaces shall be in accordance with Chapter 13.

20.8 Engineering and Machinery Spaces. Engineering and machinery spaces shall be in accordance with Chapter 14.

20.9 Storage Spaces.

20.9.1 Storage spaces shall be in accordance with Chapter 15 and 20.9.2.

20.9.2 Automatic actuation shall not be permitted for carbon dioxide extinguishing systems protecting manned high-risk storage spaces.

20.10 Cargo Spaces and Fuel Tanks. Cargo spaces and fuel tanks shall be in accordance with Chapter 16.

20.11 Open Decks. Open decks shall be in accordance with Chapter 17.

20.12 Helicopter Decks. Helicopter decks shall be in accordance with Chapter 18.

20.13 Vessel Services.

20.13.1 Fire Detection and Alarm.

20.13.1.1 A fire detection and alarm system complying with Section 9.1 shall be installed in all accommodation spaces, cargo holds, service spaces, and means of egress.

20.13.1.2 A heat detection system shall be permitted to be used in RO/RO cargo space areas in lieu of smoke detectors.

20.13.2 Fire Protection Systems and Equipment.

20.13.2.1 Sprinkler Systems. Where installed, sprinkler systems shall comply with 9.2.7.

20.13.2.2 Fire Pumps, Fire Mains, Hydrants, and Hose.

20.13.2.2.1 General.

△ 20.13.2.2.1.1 Fire-main hydrants complying with Section 9.2 and Table 20.13.2.2.1.1 shall be provided.

20.13.2.2.1.2 Two 40 mm (1.5 in.) hose with nozzles connected to a wye fitting shall be permitted in lieu of 65 mm (2.5 in.) hose.

20.13.2.2.2 Placement.

20.13.2.2.2.1 Hydrants shall be located so that each part of the ship that is accessible by the crew is able to be reached by a single 25 m (75 ft) maximum length of hose.

20.13.2.2.2. Weather deck hydrants on tank ships shall be equipped with a length of hose sufficient to permit "goosenecking" a hose over the side for a floating oil fire.

20.13.2.2.3 Fire Pumps. Fire pumps shall comply with 9.2.16 and Section 20.13.

20.13.2.2.3.1 Capacity of Fire Pumps.

(A) Each of the required fire pumps (other than any emergency pump) shall have a capacity not less than 80 percent of the total required capacity divided by the minimum number of required fire pumps but, in any case, not less than $25 \text{ m}^3/\text{hr}$ (110 gpm).

(B) Each such pump shall be capable of delivering at least two required jets of water 344.75 kPa (50 psi) at the hydraulically most remote point.

(C) These fire pumps shall be capable of supplying the firemain system under the required conditions.

(D) Where 40 mm (1.5 in.) hose is permitted in lieu of 65 mm (2.5 in.) hose by Table 20.13.2.2.1.1, the pump capacity shall be determined on the same basis as if 65 mm (2.5 in.) hose had been required.

20.13.2.2.3.2 Number of Fire Pumps. At least two independently driven fire pumps shall be provided.

20.13.2.2.3.3 Multiple-Use Pumps. Sanitary, ballast, bilge, or general service pumps shall be permitted to be accepted as fire pumps, provided that they are not used for pumping oil.

20.13.2.2.3.4 Isolation Valves. Isolation valves shall be fitted in the fire main in a position protected from the cargo tanks at the forward bulkhead of the deck house and on the tank deck at intervals of not more than 40 m (131.2 ft) to preserve the integrity of the fire-main system in case of fire or explosion.

20.13.2.2.4 Fire Hose. Fire hose meeting 9.2.16.10 and Table 20.13.2.2.1.1 shall be provided.

20.13.2.3 Portable Fire Extinguishers. All fire extinguishers shall be as specified in 9.2.15 and shall be provided in accordance with classification society rules.

20.13.2.4 Spare Charges. Charges for 100 percent of all extinguishers that are capable of onboard recharging shall be provided.

20.13.2.4.1 An additional 10 percent of extinguishers shall be required on a vessel that is not capable of recharging the extinguishers.

20.13.2.4.2 For periodically unattended engine rooms, the number of duplicate extinguishers required shall be equal to the number of extinguishers on the most remote engine room level.

20.13.3 Fire-Fighting Clothing and Equipment.

20.13.3.1 Eight sets of fire fighter protective clothing meeting the requirements of 9.3.1 shall be provided for vessels at least 60 m (197 ft) in length.

20.13.3.2 Vessels less than 60 m (197 ft) in length shall be provided with a minimum of two fire fighters' outfits.

20.13.3.3 A corresponding number of SCBA meeting the requirements of 9.3.2 shall be provided for each set of fire fighter protective clothing as required by 20.13.3.1.

△ Table 20.13.2.2.1.1 Requirements for Fire Hose and Nozzles

		Exterior of Vessel		Interior	of Vessel	
Ve	Vessel Length		Hydrant, Hose, and Nozzle Sizes		Hydrant, Hose, and Nozzle Sizes	
m	ft	mm	in.	mm	in.	
0-20	0-65.6	1 B-V extinguisher		1 B-V extinguisher		
		(instead of nozzle)		(instead	of nozzle)	
20-80	65.6-262.4	40	1.5	40	1.5	
80-130	262.4-426.5	65	2.5	40	1.5	
130 +	426.5+	65	2.5	65	2.5	

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20.13.4 Ventilation Systems. Ventilation systems shall comply with Section 9.4.

20.13.5 Elevators, Escalators, and Dumbwaiters. Where installed, elevators, escalators, and dumbwaiters shall comply with Section 9.5.

20.13.6 Electrical installations shall comply with Section 9.6.

Chapter 21 Passenger Vessels

21.1 General Requirements.

21.1.1 Application. This chapter shall apply to all vessels that carry more than 12 passengers. Portions of vessels that are primarily intended for another service that also carry passengers (i.e., a cargo vessel with passenger accommodations for more than 12 people) shall comply with this chapter.

21.1.1.1 Group I and Group II Passenger Vessels. Group I and Group II passenger vessels shall comply with Sections 21.1 through 21.13.

21.1.1.2 Group V Passenger Vessels. Group V passenger vessels shall comply with Sections 21.1 and 21.14.

21.1.1.3 Group IV Passenger Vessels. Group IV passenger vessels shall comply with Sections 21.1, 21.13, and 21.15.

21.1.2 Special Terms.

21.1.2.1 High-Speed Vessels. See 3.3.40.

21.1.2.2 Passenger. See 3.3.53.

21.1.2.3 Overnight Accommodations. See 3.3.51.

A 21.1.3 Subclassification of Passenger Vessels. Passenger vessels shall be categorized as in Table 21.1.3.

21.1.3.1 Group I Passenger Vessels. Passenger vessels that operate with more than 3000 day passengers or carry more than 300 overnight passengers shall be categorized as Group I.

21.1.3.2 Group II and Group III Passenger Vessels. Passenger vessels that operate with more than 150 day passengers or carry more than 49 overnight passengers shall be categorized as Group II and Group III.

21.1.3.3 Group IV Passenger Vessels. Passenger vessels that operate with no more than 150 day passengers or carry no more than 49 overnight passengers shall be categorized as Group IV.

21.1.3.4* Group V Passenger Vessels. High-speed passenger vessels that operate with no more than 450 day passengers no farther than 4 hours from a harbor of safe refuge shall be categorized as Group V.

Δ

21.1.4 Occupant Load. Occupant load shall be in accordance with Chapters 10 through 18.

21.2 Means of Egress. Means of egress shall comply with Chapter 7 and this section.

21.2.1 Changes in Level of Means of Egress.

21.2.1.1 The elevation of the deck surfaces on both sides of a door shall not vary more than 50 mm (2 in.), except as provided in 21.2.1.5.

21.2.1.2 The elevation shall be maintained on both sides of the door opening for a distance at least equal to the width of the widest leaf.

21.2.1.3 Sills at door openings shall not exceed 15 mm (0.6 in.) in height, except as provided for in 21.2.1.4.

21.2.1.4 Doors required to have sill heights to meet downflooding or load-line requirements shall not be required to comply with 21.2.1.3.

21.2.1.5 The maximum elevation changes for decks that have sheer and/or camber shall be 75 mm (3.0 in.).

21.2.2 Doors. Doors shall comply with 7.2.1.

21.2.2.1 Revolving Doors.

 Δ 21.2.2.1.1 All revolving doors shall comply with the following requirements:

- (1)Revolving doors shall be capable of being collapsed into a book-fold position.
- When in the book-fold position, the parallel egress paths (2)formed shall provide an aggregate width of 90 cm (35.4 in.).
- Revolving doors shall not be used within 3 m (9.8 ft) of (3)the foot of or top of stairs or escalators. Under all conditions, there shall be a dispersal area acceptable to the authority having jurisdiction between the stairs or escalators and the revolving door.
- (4)The revolutions per minute (rpm) of revolving doors shall not exceed those listed in Table 21.2.2.1.1.
- Each revolving door shall have a conforming side-hinged (5)swinging door in the same wall as the revolving door and within 3 m (9.8 ft) of the revolving door.

21.2.2.1.2 Revolving doors shall be permitted as a component in a means of egress, provided they comply with 21.2.2.1.3 through 21.2.2.1.6.

Power Driven-Type

△ Table 21.2.2.1.1 Revolving Door Specifications

Inside Diameter

ble 21.1.3 Pass	enger Vessel Subclassific	ation	m	ft	Speed Control (rpm)	Speed Control (rpm)
Group	Number of Day Passengers	Number of Overnight Passengers	2.0 2.1 2.3	$6.6 \\ 6.9 \\ 7.5$	11 10 9	12 11 11
Ι	>3000	>300	2.3	7.9	9	10
II	>1000 ≤3000	≥150 ≤300	2.6	8.5	8	9
III	$>150 \le 1000$	≥50 <150	2.7	8.9	8	9
IV	≤150	<50	2.9	9.5	7	8
V	≤450	0	3.0	9.8	7	8

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Manual-Type