

**PART II RULES FOR THE CONSTRUCTION
AND CLASSIFICATION OF SHIPS
IDENTIFIED BY THEIR MISSIONS**

TITLE 25 HIGH SPEED CRAFT

SECTION 3 HULL EQUIPMENT

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CHAPTER A APPROACH

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A1. INCORPORATION OF THE INTERNATIONAL CODE OF SAFETY FOR HIGH SPEED VESSELS BY THE RBNA RULES

100. Incorporation of the Code

101. The present Part II, Title 25 of the Rules incorporate the International Code of Safety of High Speed Vessels in its entirety.

102. The original terminology of the Code has been maintained.

103. Under the conditions of A1.101 and A1.102 above and in those provisions of the HSC Code that are being used for classification purposes the words “Administration” and “Code”, wherever mentioned, are to be understood as equivalent to the words “Society” and “Rules”, respectively. The RBNA “Rules for the Construction and Classification of Ships destined to Open Sea Navigation” are referred to below simply as “Society Rules”.

104. Equipment and arrangements dealt with in the parts of the Code such as those concerning life-saving appliances, radio communications and operational aspects, which are not subject to control by the Society, have been maintained to keep the integrity of the Code, and are to be covered by the relevant certification.

105. All the original texts from the code have been identified by a vertical line on the right side of the text, as

demonstrated here.

106. Additional requirements and comments are inserted at the relevant Part of the Code are identified by the words “RBNA comment” before the text.

A2. APPLICATION

100. Application

101. The present Section 3 of Part II, Title 25, applies to:

- a. passenger craft which do not proceed in the course of their voyage more than four hours at operational speed from a place of refuge; and
- b. cargo craft of 500 gross tonnage and upwards which do not proceed in the course of their voyage more than 8 h at operational speed from a place of refuge when fully laden.

102. RBNA comment: In addition these Rules also apply as far as appropriate to cargo craft of less than 500 tons gross tonnage.

200. Application for vessel with GT ≥ 500 engaged in international voyages

201. 1.4 This Code applies to high speed craft engaged in international voyages the keels of which are laid or which are at a similar stage of construction on or after 1 July 2002.

300. RBNA comment: Application for vessels with GT < 500 engaged in national or international voyages

301. In addition, these Rules also apply to:

- a. high speed craft engaged in national voyages;
- b. high speed craft having GT < 500.

302. Exemptions from some of the requirements of the Rules may be granted when particular circumstances (e.g. restricted services) warrant this, in the opinion of the RBNA

CHAPTER B DOCUMENTS, REGULATIONS AND STANDARDS

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B1. DOCUMENTS TO BE SUBMITTED TO
RBNA

B2. REGULATIONS

B3. STANDARDS

B1. DOCUMENTS TO BE SUBMITTED TO RBNA

100. Documents for the Anchoring mooring and towing systems

101. A detailed drawing, showing all the elements necessary for the evaluation of the equipment number of the craft, is to be submitted together with the calculations of the EN number.

102. The anchoring equipment to be fitted on the concerned craft is to be specified.

103. Windlass, brake and chain stopper are subject to approval by the Society; the relevant documentation is to be submitted.

300. Steering system

301. The documents will inform:

- a. Navigation area;
- b. Mission / service of the vessel;
- c. Draft and speed;
- d. Configuration, materials, dimensions, connections and bearings, rudder stock and rudder tiller.
- e. Driving system and transmission;
- f. System of command; and
- g. Emergency steering system.

400. Life saving appliances (LSA)

401. A Safety Plan is to be presented.

500. Fire prevention, detection and fighting

501. The following plans and documents are to be submitted for approval:

- a. Structural fire protection, showing the method of construction, purpose and category of the various spaces of the ships, the fire rating of bulkheads and decks, means of closings of openings in A and B class divisions, draught stops.
 - b. Natural and mechanical ventilation systems showing the penetrations on A class divisions, location of dampers, means of closing, arrangements of air conditioning rooms
 - c. Means of escape and, where required, the relevant dimensioning. Escape route signage
 - d. Automatic fire detection systems and manually operated call points
 - e. Fire pumps and fire main including pumps head and capacity, hydrant and hose locations
 - f. Arrangement of fixed fire-extinguishing systems
 - g. Arrangement of sprinkler or sprinkler equivalent systems including the capacity and head of the pumps
 - h. Arrangements for gaseous fuel for domestic purposes
 - i. Fire control plan
 - j. Plans showing the means of escape and the means of access to the various craft spaces.
 - k. Evacuation procedure and evacuation time calculation
502. Plans are to be schematic and functional and to contain all information necessary for their correct interpretation and verification such as:
- a. service pressures
 - b. capacity and head of pumps and compressors, if any
 - c. materials and dimensions of piping and associated fittings
 - d. volumes of protected spaces, for gas and foam fire-extinguishing systems
 - e. surface areas of protected zones for automatic sprinkler and pressure water-spraying, low expansion foam and powder fire-extinguishing systems
 - f. capacity, in volume and/or in mass, of vessels or bottles containing the extinguishing media or

propelling gases, for gas, automatic sprinkler, foam and powder fire-extinguishing systems

- g. type, number and location of nozzles of extinguishing media for gas, automatic sprinkler, pressure water-spraying, foam and powder fire-extinguishing systems.

503. All or part of the information may be provided, instead of on the above plans, in suitable operation manuals or in specifications of the systems.

B2. REGULATIONS AND STANDARDS

100. Application

101. For Brazilian flag vessels with GT < 500 the regulations of NORMAN 01 (Brazilian Maritime Authority Standards for Navigation in Open Seas) are applicable as relevant to the equipment and systems covered by this Section 3.

102. For vessel having GT ≥ 500, the requirements of the IMO Code of Safety for High Speed Craft are applicable as relevant to the equipment and systems covered by this Section 3.

B3. STANDARDS

100. National and International Standards

101. Whenever there are not specific requirements in the Rules related to any system, the national and international standards are to be researched and applied.

102. Specific Chapters of this Section 3 are based on national and international standards. Where this is the case, such standards are clearly stated.

CHAPTER D SPECIFIC SYSTEM REQUIREMENTS

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- D1. LIFTING APPLIANCES
See RBNA Guide for Lifting Appliances
- D2. ANCHORING, MOORING AND TOWING
- D3. DIRECTIONAL CONTROL SYSTEMS
- D4. LIFE SAVING APPLIANCES (LSA)
- D5. FIRE DETECTION, PREVENTION, PROTECTION AND FIGHTING
See Chapter E below
- D6. HULL OPENING: MEANS OF PROTECTION AND CLOSURE
See Part II, Title 11, Section 3, D6.
- D7. HULL EQUIPMENT: FITTINGS AND ACCESSORIES
See Part II, Title 11, Section 3, D6.

D2. ANCHORING, MOORING AND TOWING [IMO CODE OF SAFETY FOR HIGH SPEED VESSELS]

100. 6.1 General

101. 6.1.1 A primary assumption made in this chapter is that high-speed craft will only need an anchor for emergency purposes.

102. 6.1.2 The arrangements for anchoring, towing and berthing and the local craft structure, the design of the anchor, towing and berthing arrangements and the local craft structure shall be such that risks to persons carrying out anchoring, towing or berthing procedures are kept to a minimum.

103. 6.1.3 All anchoring equipment, towing bitts, mooring bollards, fairleads, cleats and eyebolts shall be so constructed and attached to the hull that, in use up to design loads, the watertight integrity of the craft will not be impaired. Design loads and any directional limitations assumed shall be listed in the craft operating manual.

104. (RBNA) Only anchoring equipment is considered for the purpose of classification. The design of all the outfitting used for mooring operation and their connection to the deck is out of scope of classification.

200. 6.2 Anchoring

201. 6.2.1 High-speed craft shall be provided with at least one HHP (High Holding Power) anchor with its associated cable or cable and warp and means of recovery. Every craft shall be provided with adequate and safe means for releasing the anchor and its cable and warp.

102. 6.2.2 Good engineering practice shall be followed in the design of any enclosed space containing the anchor recovery equipment to ensure that persons using the equipment are not put at risk. Particular care shall be taken with the means of access to such spaces, the walkways, the illumination and protection from the cable and the recovery machinery.

103. 6.2.3 Adequate arrangements shall be provided for two-way voice communication between the operating compartment and persons engaged in dropping, weighing or releasing the anchor.

104. 6.2.4 The anchoring arrangements shall be such that any surfaces against which the cable may chafe (for example, hawse pipes and hull obstructions) are designed to prevent the cable from being damaged and fouled. Adequate arrangements shall be provided to secure the anchor under all operational conditions.

105. 6.2.5 The craft shall be protected so as to minimize the possibility of the anchor and cable damaging the structure during normal operation.

300. 6.3 Towing

301. 6.3.1 Adequate arrangements shall be provided to enable the craft to be towed in the worst intended conditions.

Where towage is to be from more than one point, a suitable bridle shall be provided.

302. 6.3.2 The towing arrangements shall be such that any surface against which the towing cable may chafe (for example, fairleads) is of sufficient radius to prevent the cable being damaged when under load.

303. 6.3.3 The maximum permissible speed at which the craft may be towed shall be included in the operating manual.

400. 6.4 Berthing

401. 6.4.1 Where necessary, suitable fairleads, bitts and mooring ropes shall be provided.

402. 6.4.2 Adequate storage space for mooring lines shall be provided such that they are readily available and secured against the high relative wind speeds and accelerations which may be experienced.

500. Arrangement (RBNA)

501. For vessels sailing in rivers and canals in which L is significant in relation to the width the installation of stern anchor(s) having the same mass as prescribed for the bow anchors will be analyzed. Additional stern anchors will have a mass at least equal to 35% of the bow anchors total mass.

502. For vessels that always occupy internal positions in convoys, not being the first nor the last, the anchoring equipment will not be required.

503. The anchors must be ready to use at all times. This comprehends the location of the anchors and the device for a quick release. The bow anchors are to be connected to their chain cables and are to be ready for use. The stream anchor is to be ready to be connected with its cable.

504. Chain stoppers are to be provided between the windlass and the hawse pipe in order to relieve the windlass of the pull of the chain cable when the ship is at anchor, holding the anchor firm to the side or place of stowage. The stopper is to be fitted with a quick release device.

a. A chain stopper is to be capable of withstanding a pull of 80% of the breaking load of the chain cable. The deck at the chain stopper is to be suitably reinforced.

b. For the same purpose, a piece of chain cable may be used with a rigging screw capable of supporting the weight of the anchor when housed in the hawse pipe or a chain tensioner. Such arrangements are not to be considered as chain stoppers.

505. The chains and cables must be designed to avoid sharp bending and provide for minimum diameter of curvature. Cables must not chafe against fixed parts destined to change the cable direction.

a. Where the windlass is at a distance from the hawse pipes and no chain stoppers are fitted, suitable arrangements are to be provided to lead the chain cables to the windlass.

506. The hawse pipes are to be designed with a resistance equal to that of the hull structure. The deck and side shell ends of the hawse pipes are to be rounded up.

507. Two bitts are to be installed at the stern and two at the bow, dimensioned in accordance with the cable breaking strength.

508. A tow bitt is to be installed at the bow, scaled to two times the cable breaking strength.

509. Bitts and accessories are to be fitted over local reinforcements that distribute their loads to the structure, and fixed with continuous welding in accordance with Part II Section 2 of the Rules.

210. Third anchor: where three bower anchors are provided, two are to be connected to their own chain cables and positioned on board always ready for use. The third bower anchor is intended as a spare and is not required for the purpose of classification.

600. Equipment number (RBNA)

601. The equipment of anchors and chain cables is to be as given in Table T.D2.601.1 and is to be based on an "Equipment Number" calculated as follows:

$$EN = \Delta^{2/3} + \sum_{i=0}^n [a * B + h_i * b_i * \sin \theta] + \frac{S}{10}$$

where:

Δ : maximum displacement, in t, to the Summer Load Waterline;

a = distance in metres from summer load waterline amidships to the upper deck at side

b_i : moulded breadth of each superstructure deck, in metres;

h_i = height, in metres, on the centerline of each tier of houses having a breadth greater than B/4;

θ_i = Angle of inclination aft of each front bulkhead

S= area, in square metres, in profile view, of the hull, superstructures and houses above the Summer Load Waterline which are within the Equipment length of the vessel and also have a breadth greater than B/4.

B = moulded breadth, in metres

Note: The table T.D2.601.1 has been elaborate for navigation O1. For O1 area and for still waters a reduction in the anchor weight may be granted at RBNA's discretion.

TABLE T.D2.601.1 – ANCHORS AND CHAIN CABLES

Equipment Number	HHP anchors	Stud link chains for bower anchors <i>* Values according to IACS Rec 10</i>				
	No.	Mass per anchor (kg)	Total length (m)	Minimum diameter		
				Mild Steel RBNA-Gr 1 (mm)	Special Quality RBNA- Gr. 2 (mm)	Extra Special Quality RBNA- Gr. 3 (mm)
1	2	3	4	5	6	7
50-70	1	135	60	220	14	12,5
70-90	1	180	80	220	16	14
90-110	1	225	100	247,5	17,5	16
110-130	1	270	120	247,5	19	17,5
130-150	1	315	140	275	20,5	17,5
150-175	1	360	165	275	22	19
175-205	1	424	190	302,5	24	20,5
205-240	1	495	302.5	26	22	20.5
240-280	1	514	330	28	24	22
280-320	1	594	357.5	30	26	24
320-360	1	673	357.5	32	28	24
360-400	1	752	385	34	30	26
400-450	1	851	385	36	32	28
450-500	1	950	412.5	38	34	30
500-550	1	1049	412.5	40	34	30
550-600	1	1148	440	42	36	32
600-660	1	1267	440	44	38	34
	1					
660-720	1	1386	440	46	40	36
720-780	1	1504	467.5	48	32	36
780-840	1	1623	467.5	50	44	38
840-910	1	1742	467.5	52	46	40
910-980	1	1881	495	54	48	42
980-1060	1	2019	495	56	50	44
1060-1140	1	2178	495	58	50	46
1140-1220	1	2336	522.5	60	52	46

Note: The table T.D2.601.1 above has been based on Part II, Title 11, Section 3, Table T.D2.301.1 by multiplying the anchor weight by the factor 0,75 granted for Hight Holding Power anchors.

602. Notes (RBNA):

- a. When calculating h, sheer and trim are to be ignored, i.e., h is the sum of freeboard amidships plus the height (at centerline) of each tier of houses having a breadth greater than B/4.
- b. If a house having a breadth greater than B/4 is above a house with a breadth of B/4 or less then the wide house is to be included by the narrow house ignored.
- c. Screens of bulwarks 1,5 m in height are to be regarded as parts of houses when determining h and S. The height of the hatch coamings and that of any deck cargo such as containers may be disregarded when determining h and S. With regard to determining S when a bulwark is more than 1,5 m high, the area shown below as S should be included in S.
- d. The total length of chain given in Table T.D2.301.1 col. 4 is to be divided in approximately equal parts between the two bower anchors.

603. **Installation of the anchors on board:** the bower anchors are to be connected to their chain cables and are to be ready for use.

700. Chain cables for bower anchors
[IACS A1.5.1 and A1.5.2]

701. Anchor chain cable design
[IACS A1.5.1]

The chain cable is to be as required by Part II, Title 11, Section 3, summarized in Table T.D2.301.1 above. for the calculated equipment number for the vessel. The anchor cable is to be tested in accordance with Table T.D2.701.1 to the test loads corresponding to those for the required chain cable.

702. **Grades of chain cables** Bower anchors are to be associated with stud link chain cables for one of the grades listed in f Table T.D2.701.1.

TABLE T.D2.701.1 GRADES OF CHAIN CABLES

Grade	Material	Range of UTS (N/mm ²)
RB- 2	Special quality steel	490 to 690 (50 to 70 kg/mm ²)
RB- 3	Extra special quality steel	> 690 (>70 kg/mm ²)

503. **Note:** the designation "Grade 1" may be used at discretion of the Society

704. [IACS A1.6] **Permissible Wear down of Stud Link Chain Cable for Bower Anchors:** when a length of chain cable is so worn that the mean diameter of a link, at its most worn part, is reduced by 12% or more from its

required nominal diameter it should be renewed. The mean diameter is half the value of the sum of the minimum diameter found in one cross-section of the link and of the diameter measured in a perpendicular direction in the same cross-section. Grades of chain cables: bower anchors are to be associated with stud link chain cables for one of the grades listed in Table T.D2.701.1.

D3. DIRECTIONAL CONTROL SYSTEM

100. 5.1 General

101. 5.1.1 Craft shall be provided with means for directional control of adequate strength and suitable design to enable the craft's heading and direction of travel to be effectively controlled to the maximum extent possible in the prevailing conditions and craft speed without undue physical effort at all speeds and in all conditions for which the craft is to be certificated. The performance shall be verified in accordance with Part II, Title 25, Section 1, T.2 (annex 9).

102. 5.1.2 Directional control may be achieved by means of air or water rudders, foils, flaps, steerable propellers or jets, yaw control ports or side thrusters, differential propulsive thrust, variable geometry of the craft or its lift-system components or by a combination of these devices.

103. 5.1.3 For the purpose of this chapter, a directional control system includes any steering device or devices, any mechanical linkages and all power or manual devices, con

104. 5.1.4 Attention is drawn to the possibility of interaction between directional control systems and stabilisation systems. Where such interaction occurs or where dual-purpose components are fitted, the requirements of Part II, Title 25, Section 7, Steering and Stabilization (12.5) and chapters Part II, Title 25, Section 1, H.12 (Chapter 16) and Part II, Title 25 Section 1, T.1 (chapter 17) are also to be complied with, as applicable.

200. 5.2 Reliability

201. 5.2.1 The probability of total failure of all directional control systems shall be extremely remote when the craft is operating normally, i.e., excluding emergency situations such as grounding, collision or a major fire

202. 5.2.2 A design incorporating a power drive or an actuation system employing powered components for normal directional control shall provide a secondary means of actuating the device unless an alternative system is provided.

203. 5.2.3 The secondary means of actuating the directional control device may be manually driven when the Administration is satisfied that this is adequate, bearing in mind the craft's size and design and any

limitations of speed or other parameters that may be necessary.

204. 5.2.4 The directional control systems shall be constructed so that a single failure in one drive or system, as appropriate, will not render any other one inoperable or unable to bring the craft to a safe situation. The Administration may allow a short period of time to permit the connection of a secondary control device when the design of the craft is such that such delay will not, in their opinion, hazard the craft

205. 5.2.5 A failure mode and effect analysis shall include the directional control system.

206. 5.2.6 If necessary to bring the craft to a safe condition, power drives for directional control devices, including those required to direct thrust forward or astern, shall become operative automatically, and respond correctly, within 5 s of power or other failure. Back-up electrical systems may be required for the starting-up time of an auxiliary diesel according to Part II, Title 25, Section 7, Main Source of Electrical Power (12.2) or an emergency diesel generator according to Part II, Title 25, Section 7, Emergency Generator(12.3.6).

207. 5.2.7 Directional control devices involving variable geometry of the craft or its lift system components shall, so far as is practicable, be so constructed that any failure of the drive linkage or actuating system will not significantly hazard the craft.

300. 5.3 Demonstrations

301. 5.3.1 The limits of safe use of any of the control system devices, shall be based on demonstrations and a verification process in accordance with Part II, Title 25, Section 1, Chapter T, T2.

302. 5.3.2 Demonstration in accordance with Part II, Title 25, Section 1, Chapter T, T2 shall determine any adverse effects upon safe operation of the craft in the event of an uncontrollable total deflection of any one control device. Any limitation on the operation of the craft as may be necessary to ensure that the redundancy or safeguards in the systems provide equivalent safety shall be included in the craft operating manual.

400. 5.4 Control position

401. 5.4.1 All directional control systems shall normally be operated from the craft's operating station.

402. 5.4.2 If directional control systems can also be operated from other positions, then two-way communication shall be arranged between the operating station and these other positions.

403. 5.4.3 Adequate indications shall be provided at the operating station and these other positions to provide the person controlling the craft with verification of the correct response of the directional control device to this demand, and also to indicate any abnormal responses or

malfunction. The indications of steering response or rudder angle indicator shall be independent of the system for directional control. The logic of such feedback and indications shall be consistent with the other alarms and indications so that in an emergency operators are unlikely to be confused.

D4. LIFE SAVING APPLIANCES (LSA) FOR HIGH SPEED CRAFT OF GR ≥ 500

RBNA NOTE 1 – This Chapter has been maintained to keep the integrity of the Code, although containing items not applicable for classification purposes.

RBNA NOTE 2 – For craft with GT < 500, NORMAM 01 regulations apply for vessels under Brazilian Flag; for craft under foreign Flags, National Regulations apply or, in the absence of those, the regulation of the Code as far as possible.

100. 8.1 General and definitions

101. 8.1.1 Life-saving appliances and arrangements shall enable abandonment of the craft.

101. 8.1.2 Except where otherwise provided in this Code, the life-saving appliances and arrangements required by this chapter shall meet the detailed specifications set out in chapter III of the Convention and the LSA Code and be approved by the Administration.

103. 8.1.3 Before giving approval to life-saving appliances and arrangements, the Administration shall ensure that such life-saving appliances and arrangements:

- a. .1 are tested to confirm that they comply with the requirements of this chapter, in accordance with the recommendations of the Organization*; or

Note: Refer to Revised Recommendation on Testing of Life-Saving Appliances, adopted by the Organization by resolution MSC.81(70).

- b. .2 have successfully undergone, to the satisfaction of the Administration, tests which are substantially equivalent to those specified in those recommendations.

104. 8.1.4 Before giving approval to novel life-saving appliances or arrangements, the Administration shall ensure that such appliances or arrangements:

- a. .1 provide safety standards at least equivalent to the requirements of this chapter and have been evaluated and tested in accordance with the recommendations of the Organization*; or

Note: Refer to the Code of Practice for the Evaluation, Testing and Acceptance of Prototype Novel Life-Saving Appliances and Arrangements, adopted by the Organization by resolution

A.520(13).

b. .2 have successfully undergone, to the satisfaction of the Administration, evaluation and tests which are substantially equivalent to those recommendations.

105. 8.1.5 Before accepting life-saving appliances and arrangements that have not been previously approved by the Administration, the Administration shall be satisfied that life-saving appliances and arrangements comply with the requirements of this chapter.

106. 8.1.6 Except where otherwise provided in this Code, life-saving appliances required by this chapter for which detailed specifications are not included in the LSA Code shall be to the satisfaction of the Administration.

107. 8.1.7 The Administration shall require life-saving appliances to be subjected to such production tests as are necessary to ensure that the life-saving appliances are manufactured to the same standard as the approved prototype.

108. 8.1.8 Procedures adopted by the Administration for approval shall also include the conditions whereby approval would continue or would be withdrawn.

109. 8.1.9 The Administration shall determine the period of acceptability of life-saving appliances which are subject to deterioration with age. Such life-saving appliances shall be marked with a means for determining their age or the date by which they shall be replaced.

110. 8.1.10 For the purposes of this chapter, unless expressly provided otherwise:

a. .1 "*Detection*" is the determination of the location of survivors or survival craft.

b. .2 "*Embarkation ladder*" is the ladder provided at survival craft embarkation stations to permit safe access to survival craft after launching.

c. .3 "*Embarkation station*" is the place from which a survival craft is boarded. An embarkation station may also serve as an assembly station, provided there is sufficient room, and the assembly station activities can safely take place there.

d. .4 "*Float-free launching*" is that method of launching a survival craft whereby the craft is automatically released from a sinking craft and is ready for use.

e. .5 "*Free-fall launching*" is that method of launching a survival craft whereby the craft with its complement of persons and equipment on board is released and allowed to fall into the sea without any restraining apparatus.

f. .6 "*Immersion suit*" is a protective suit which reduces the body heat-loss of a person wearing it

in cold water.

g. .7 "*Inflatable appliance*" is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept uninflated until ready for use.

h. .8 "*Inflated appliance*" is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept inflated and ready for use at all times.

i. .9 "*Launching appliance or arrangement*" is a means of transferring a survival craft or rescue boat from its stowed position safely to the water.

j. .10 "*Marine evacuation system (MES)*" is an appliance designed to rapidly transfer a large number of persons from an embarkation station by means of a passage to a floating platform for subsequent embarkation into associated survival craft or directly into associated survival craft.

k. .11 "*Novel life-saving appliance or arrangement*" is a life-saving appliance or arrangement which embodies new features not fully covered by the provisions of this chapter but which provides an equal or higher standard of safety.

l. .12 "*Rescue boat*" is a boat designed to assist and rescue persons in distress and to marshal survival craft.

m. .13 "*Retrieval*" is the safe recovery of survivors.

n. .14 "*Retro-reflective material*" is a material which reflects in the opposite direction a beam of light directed on it.

o. .15 "*Survival craft*" is a craft capable of sustaining the lives of persons in distress from the time of abandoning the craft.

p. .16 "*Thermal protective aid*" is a bag or suit of waterproof material with low thermal conductance.

200. 8.2 Communications

201. 8.2.1 Craft shall be provided with the following radio life-saving appliances:

a. .1 at least three two-way VHF radiotelephone apparatus shall be provided on every passenger high-speed craft and on every cargo high-speed craft of 500 gross tonnage and upwards. Such apparatus shall conform to performance standards not inferior to those adopted by the Organization*;

* Refer to the Recommendation on Performance Standards for Survival Craft Portable Two-Way VHF Radiotelephone Apparatus, adopted by the Organization by resolution A.809(19).

- b. .2 at least one search and rescue locating device shall be carried on each side of every passenger high-speed craft and every cargo high-speed craft of 500 gross tonnage and upwards. Such search and rescue locating device shall conform to the applicable performance standards not inferior to those adopted by the Organization *. The search and rescue locating device shall be stowed in such locations that they can be rapidly placed in any one of the liferafts. Alternatively, one search and rescue locating device shall be stowed in each survival craft.

*Refer to the Recommendation on performance standards for survival craft radar transponders for use in search and rescue operations, adopted by the Organization by resolution MSC.247(83) (A.802(19)), as amended) and the Recommendation on performance standards for survival craft AIS search and rescue transmitter (AIS SART), adopted by the Organization by resolution MSC.246(83).

202. 8.2.2 Craft shall be provided with the following on-board communications and alarm systems:

- a. .1 an emergency means comprising either fixed or portable equipment or both for two-way communications between emergency control stations, assembly and embarkation stations and strategic positions on board;
- b. .2a general emergency alarm system complying with the requirements of paragraph 7.2.1 of the LSA Code to be used for summoning passengers and crew to assembly stations and to initiate the actions included in the muster list. The system shall be supplemented by a public address system complying with the requirements of paragraph 7.2.2 of the LSA Code, or by other suitable means of communication. The systems shall be operable from the operating compartment.

203. 8.2.3 Signalling equipment

- a. 8.2.3.1 All craft shall be provided with a portable daylight signalling lamp which is available for use in the operating compartment at all times and which is not dependent on the craft's main source of electrical power.
- b. 8.2.3.2 Craft shall be provided with not less than 12 rocket parachute flares, complying with the requirements of paragraph 3.1 of the LSA Code, stowed in or near the operating compartment.

300. 8.3 Personal life-saving appliances

301. 8.3.1 Where passengers or crew have access to exposed decks under normal operating conditions, at least one lifebuoy on each side of the craft capable of quick release from the control compartment and from a position at or near where it is stowed, shall be provided with a self-igniting light and a self-activating smoke signal. The

positioning and securing arrangements of the self-activating smoke signal shall be such that it cannot be released or activated solely by the accelerations produced by collisions or groundings.

302. 8.3.2 At least one lifebuoy shall be provided adjacent to each normal exit from the craft and on each open deck to which passengers and crew have access, subject to a minimum of two being installed.

303. 8.3.3 Lifebuoys fitted adjacent to each normal exit from the craft shall be fitted with buoyant lines of at least 30 m in length.

304. 8.3.4 Not less than half the total number of lifebuoys shall be fitted with self-igniting lights. However, the lifebuoys provided with self-igniting lights shall not include those provided with lines in accordance with 8.3.3.

305. 8.3.5 A lifejacket complying with the requirements of paragraph 2.2.1 or 2.2.2 of the LSA Code be provided for every person on board the craft and, in addition:

- a. .1 a number of lifejackets suitable for children equal to at least 10% of the number of passengers on board shall be provided or such greater number as may be required to provide a lifejacket for each child;
- b. .2 every passenger craft shall carry lifejackets for not less than 5% of the total number of persons on board. These lifejackets shall be stowed in conspicuous places on deck or at assembly stations;
- c. .3 a sufficient number of lifejackets shall be carried for persons on watch and for use at remotely located survival craft and rescue boat stations; and
- d. .4 all lifejackets shall be fitted with a light, which complies with the requirements of paragraph 2.2.3 of the LSA Code.

306. 8.3.6 Lifejackets shall be so placed as to be readily accessible and their positions shall be clearly indicated.

307. 8.3.7 An immersion suit, of an appropriate size, complying with the requirements of paragraph 2.3 of the LSA Code shall be provided for every person assigned to crew the rescue boat.

308. 8.3.8 An immersion suit or anti-exposure suit shall be provided for each member of the crew assigned, in the muster list, to duties in an MES party for embarking passengers into survival craft. These immersion suits or anti-exposure suits need not be required if the craft is constantly engaged on voyages in warm climates where, in the opinion of the Administration, such suits are unnecessary.

400. 8.4 Muster list, emergency instructions and manuals

401. 8.4.1 Clear instructions to be followed in the event of an emergency shall be provided for each person on board.*

* Refer to the Guidelines for passenger safety instructions on ro-ro passenger ships (MSC/Circ.681).

402. 8.4.2 Muster lists complying with the requirements of regulation III/37 of the Convention shall be exhibited in conspicuous places throughout the craft including the control compartment, engine-room and crew accommodation spaces.

403. 8.4.3 Illustrations and instructions in appropriate languages shall be posted in public spaces and be conspicuously displayed at assembly stations, at other passenger spaces and near each seat to inform passengers of:

- a. .1 their assembly station;
- b. .2 the essential actions they must take in an emergency;
- c. .3 the method of donning lifejackets.

404. 8.4.4 Every passenger craft shall have passenger assembly stations:

- a. .1 in the vicinity of, and which provide ready access for all the passengers to, the embarkation stations unless in the same location; and
- b. .2 which have ample room for the marshalling and instruction of passengers.

405. 8.4.5 A training manual complying with the requirements of 18.2.3 shall be provided in each crew messroom and recreation room.

500. 8.5 Operating instructions

501. 8.5.1 Poster or signs shall be provided on or in the vicinity of survival craft and their launching controls and shall:

- a. .1 illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions and warnings;
- b. .2 be easily seen under emergency lighting conditions;
- c. .3 use symbols in accordance with the recommendations of the Organization*.

Note: * Refer to Symbols related to Life-Saving Appliances and Arrangements, adopted by the Organization by resolution A.760(18), as amended by resolution MSC.82(70).

600. 8.6 Survival craft stowage

601. 8.6.1 Survival craft shall be securely stowed outside and as close as possible to the passenger accommodation and embarkation stations. The stowage shall be such that each survival craft can be safely launched in a simple manner and remain secured to the craft during and subsequent to the launching procedure. The length of the securing lines and the arrangements of the bowing lines shall be such as to maintain the survival craft suitably positioned for embarkation. The Administrations may permit the use of adjustable securing and/or bowing lines at exits where more than one survival craft is used. The securing arrangements for all securing and bowing lines shall be of sufficient strength to hold the survival craft in position during the evacuation process.

602. 8.6.2 Survival craft shall be so stowed as to permit release from their securing arrangements at or near to their stowage position on the craft and from a position at or near to the operating compartment.

603. 8.6.3 So far as is practicable, survival craft shall be distributed in such a manner that there is an equal capacity on both sides of the craft.

604. 8.6.4 The launching procedure for inflatable liferafts shall, where practicable, initiate inflation. Where it is not practicable to provide automatic inflation of liferafts (for example, when the liferafts are associated with an MES), the arrangement shall be such that the craft can be evacuated within the time specified in 4.8.1.

605. 8.6.5 Survival craft shall be capable of being launched and then boarded from the designated embarkation stations in all operational conditions and also in all conditions of flooding after receiving damage to the extent prescribed in chapter 2.

606. 8.6.6 Survival craft launching stations shall be in such positions as to ensure safe launching having particular regard to clearance from the propeller or waterjet and steeply overhanging portions of the hull.

607. 8.6.7 During preparation and launching, the survival craft and the area of water into which it is to be launched shall be adequately illuminated by the lighting supplied from the main and emergency sources of electrical power required by chapter 12.

608. 8.6.8 Means shall be available to prevent any discharge of water on to survival craft when launched.

609. 8.6.9 Each survival craft shall be stowed:

- a. .1 so that neither the survival craft nor its stowage arrangements will interfere with the operation of any other survival craft or rescue boat at any other launching station;
- b. .2 in a state of continuous readiness;

- c. .3 fully equipped; and
- d. .4 as far as practicable, in a secure and sheltered position and protected from damage by fire and explosion.

610. 8.6.10 Every liferaft shall be stowed with its painter permanently attached to the craft and with a float free arrangement complying with the requirements of paragraph 4.1.6 of the LSA Code so that, as far as practicable, the liferaft floats free and, if inflatable, inflates automatically should the high speed craft sink.

611. 8.6.11 Rescue boats shall be stowed:

- a. .1 in a state of continuous readiness for launching in not more than 5 min;
- b. .2 in a position suitable for launching and recovery; and
- c. .3 so that neither the rescue boat nor its stowage arrangements will interfere with the operation of survival craft at any other launching station.

612. 8.6.12 Rescue boats and survival craft shall be secured and fastened to the deck so that they at least withstand the loads likely to arise due to a defined horizontal collision load for the actual craft and the vertical design load at the stowage position.

700. 8.7 Survival craft and rescue boat embarkation and recovery arrangements

701. 8.7.1 Embarkation stations shall be readily accessible from accommodation and work areas. If the designated assembly stations are other than the passenger spaces, the assembly stations shall be readily accessible from the passenger spaces, and the embarkation stations shall be readily accessible from the assembly stations.

702. 8.7.2 Evacuation routes, exits and embarkation points shall comply with the requirements of E13.100

703. 8.7.3 Alleyways, stairways and exits giving access to the assembly and embarkation stations shall be adequately illuminated by lighting supplied from the main and emergency source of electrical power required by chapter 12.

704. 8.7.4 Where davit-launched survival craft are not fitted, MES or equivalent means of evacuation shall be provided in order to avoid persons entering the water to board survival craft. Such MES or equivalent means of evacuation shall be so designed as to enable persons to board survival craft in all operational conditions and also in all conditions of flooding after receiving damage to the extent prescribed in H6.200.

705. 8.7.5 Subject to survival craft and rescue boat embarkation arrangements being effective within the environmental conditions in which the craft is permitted to operate and in all undamaged and prescribed damage

conditions of trim and heel, where the freeboard between the intended embarkation position and the waterline is not more than 1.5 m, the Administration may accept a system where persons board liferafts directly.

706. 8.7.6 Where an MES was provided for embarkation into survival craft on a category B craft, an alternative means of evacuating passengers and crew into survival craft on the same side of the craft in conditions up to and including the worst intended conditions was to be provided for use if the MES was lost or rendered unserviceable in the event of damage of longitudinal extent.

707. 8.7.7 Rescue boat embarkation arrangements shall be such that the rescue boat can be boarded and launched directly from the stowed position and recovered rapidly when loaded with its full complement of persons and equipment.

708. 8.7.8 Launching systems for rescue boats on category B craft may be based on power supply from the craft's power supply under the following conditions:

- a. .1 the davit or crane shall be supplied with power from 2 sources in each independent engine room;
- b. .2 the davit or crane shall comply with the required launching, lowering and hoisting speeds when using only one power source; and
- c. .3 the davit or crane is not required to be activated from a position within the rescue boat.

709. 8.7.9 On multihull craft with a small HL1 angle of heel and trim, the design angles in paragraph 6.1 of the LSA Code may be changed from 20°/10° to the maximum angles calculated in accordance with annex 7, including heeling lever HL2, HTL, HL3 or HL4.

710. 8.7.10 Rescue boat davits or cranes may be designed for launching and recovering the boat with 3 persons only on the condition that an additional boarding arrangement is available on each side complying with 8.7.5.

711. 8.7.11 A safety knife shall be provided at each MES embarkation station.

800. 8.8 Line-throwing appliance8.9 Operational readiness, Maintenance and inspections,

801. 8.8 Line throwing appliance

A line-throwing appliance complying with the requirements of paragraph E2.101 of the LSA Code shall be provided.

802. 8.9.1 Operational readiness

Before the craft leaves port and at all times during the voyage, all life-saving appliances shall be in working order and ready for immediate use.

803. 8.9.2 **Maintenance**

- a. .1 Instructions for on-board maintenance of life-saving appliances complying with the requirements of regulation III/36 of the Convention shall be provided and maintenance shall be carried out accordingly.
- b. .2 The Administration may accept, in lieu of the instructions required by .1, a shipboard planned maintenance programme which includes the requirements of regulation III/36 of the Convention.

804. 8.9.3 **Maintenance of falls**

- a. 8.9.3.1 Falls used in launching shall be turned end for end at intervals of not more than 30 months and be renewed when necessary due to deterioration of the falls or at intervals of not more than five years, whichever is the earlier.
- b. 8.9.3.2 The Administration may accept in lieu of "end for ending" required in D4.804.a. periodic inspection of the falls and their renewal whenever necessary due to deterioration or at intervals of not more than four years, whichever is
- c. he earlier.

805. 8.9.4 **Spares and repair equipment and Rotational deployment of marine evacuation systems**
Spares and repair equipment shall be provided for life-saving appliances and their components which are subject to excessive wear or consumption and need to be replaced regularly.

806. 8.9.5 **Weekly inspection**

The following tests and inspections shall be carried out weekly:

- a. .1 all survival craft, rescue boats and launching appliances shall be visually inspected to ensure that they are ready for use;
- b. .2 all engines in rescue boats shall be run ahead and astern for a total period of not less than 3 min provided the ambient temperature is above the minimum temperature required for starting and running the engine. During this period of time, it should be demonstrated that the gearbox and gearbox train are engaging satisfactorily. If the special characteristics of an outboard motor fitted to a rescue boat would not allow it to be run other than with its propeller submerged for a period of 3 min, it should be run for such period as prescribed in the manufacturer's handbook; and
- c. .3 the general emergency alarm system shall be tested.

807. 8.9.6 **Monthly inspections**

Inspection of the life-saving appliances, including

survival craft equipment shall be carried out monthly using the checklist required by regulation III/36.1 of the Convention to ensure that they are complete and in good order. A report of the inspection shall be entered in the log-book.

808. 8.9.7 **Servicing of inflatable liferafts, inflatable lifejackets, marine evacuation systems and inflated rescue boats**

- a. 8.9.7.1 Every inflatable liferaft, inflatable lifejacket and MES shall be serviced:
 - a.1. .1 at intervals not exceeding 12 months, provided where in any case this is impracticable, the Administration may extend this period by one month;
 - a.2. .2 at an approved servicing station which is competent to service them, maintains proper servicing facilities and uses only properly trained personnel*.

* Refer to the Recommendation on Conditions for the Approval of Servicing Stations for Inflatable Liferafts, adopted by the Organization by resolution A.761(18), as amended by resolution MSC.55(66).

- b. In addition to or in conjunction with the servicing intervals of marine evacuation systems required by 8.9.7.1, each marine evacuation system shall be deployed from the craft on a rotational basis at intervals to be agreed by the Administration provided that each system is to be deployed at least once every six years.

809. 8.9.9 An Administration which approves new and novel inflatable liferaft arrangements pursuant to 8.1 may allow for extended service intervals under the following conditions:

- a. 8.9.9.1 The new and novel liferaft arrangement shall maintain the same standard, as required by testing procedure, throughout the extended service intervals.
- b. 8.9.9.2 The liferaft system shall be checked on board by certified personnel according to E4.808 a.
- c. 8.9.9.3 Service at intervals not exceeding five years shall be carried out in accordance with recommendations of the Organization.

810. 8.9.10 All repairs and maintenance of inflated rescue boats shall be carried out in accordance with the manufacturer's instructions. Emergency repairs may be carried out on board the craft, however, permanent repairs shall be effected at an approved servicing station.

811. 8.9.11 An Administration which permits extension of liferaft service intervals in accordance with 8.9.9 shall notify the Organization of such action in accordance with

regulation I/5(b) of the Convention.

812. 8.9.12 Periodic servicing of hydrostatic release units

a. Hydrostatic release units shall be serviced:

- a.1. .1 at intervals not exceeding 12 months, provided where in any case this is impracticable, the Administration may extend this period by one month;
- a.2. .2 at a servicing station which is competent to service them, maintains proper servicing facilities and uses only properly trained personnel.

813. 8.9.13 Marking of stowage locations

Containers, brackets, racks and other similar stowage locations for life-saving equipment, shall be marked with symbols in accordance with the recommendations of the Organization, indicating the devices stowed in that location for that purpose. If more than one device is stowed in that location, the number of devices shall also be indicated.

814. 8.9.14 Periodic servicing of launching appliances

a. 8.9.14.1 Launching appliances:

- a.1. .1 shall be serviced at recommended intervals in accordance with instructions for on-board maintenance as required by regulation III/36 of the Convention;
- a.2. .2 shall be subject to a thorough examination at the annual surveys required by paragraph 1.5.1.3; and
- a.3. .3 shall upon completion of the examination in .2 be subjected to a dynamic test of the winch brake at maximum lowering speed. The load to be applied shall be the mass of the survival craft or rescue boat without persons on board, except that, at intervals not exceeding five years, the test shall be carried out with a proof load equal to 1.1 times the weight of the survival craft or rescue boat and its full complement of persons and equipment.

900. 8.10 Survival craft and rescue boats and 8.11 Helicopter pick-up areas

901. 8.10.1 All craft shall carry:

- a. .1 survival craft with sufficient capacity as will accommodate not less than 100% of the total number of persons the craft is certified to carry, subject to a minimum of two such survival craft being carried;

- b. .2 in addition, survival craft with sufficient aggregate capacity to accommodate not less than 10% of the total number of persons the craft is certified to carry;

- c. .3 sufficient survival craft to accommodate the total number of persons the craft is certified to carry, even in the event that all the survival craft to one side of the craft centreline and within the longitudinal extent of damage are considered lost or rendered unserviceable;

- d. .4 at least one rescue boat for retrieving persons from the water, but not less than one such boat on each side when the craft is certified to carry more than 450 passengers;

- e. .5 craft of less than 30 m in length may be exempted from carrying a rescue boat, provided the craft meets all of the following requirements:

- e.1. .5.1 the craft is arranged to allow a helpless person to be recovered from the water;
- e.2. .5.2 recovery of the helpless person can be observed from the navigating bridge; and
- e.3. .5.3 the craft is sufficiently manoeuvrable to close in and recover persons in the worst intended conditions.

- f. .6 notwithstanding the provisions of D4.900.d. and D4.900.e. above, craft shall carry sufficient rescue boats to ensure that, in providing for abandonment by the total number of persons the craft is certified to carry:

- f.1. .6.1 not more than nine of the liferafts provided in accordance with D4.901.a. are marshalled by each rescue boat; or
- f.2. .6.2 if the Administration is satisfied that the rescue boats are capable of towing a pair of such liferafts simultaneously, not more than 12 of the liferafts provided in accordance with D4.901.1 are marshalled by each rescue boat; and
- f.3. .6.3 the craft can be evacuated.

902. 8.10.2 Where the Administration considers it appropriate, in view of the sheltered nature of the voyages and the suitable climatic conditions of the intended area of operations, the Administration may permit the use of open reversible inflatable liferafts complying with annex 11 on category A craft as an alternative to liferafts complying with paragraph 4.2 or 4.3 of the LSA Code.

903. Helicopter pick-up area

- a. 8.11.1 Craft operating on voyages having a duration of 2 h or more between each port of call

shall be provided with a helicopter pick-up area approved by the Administration having regard to the recommendations adopted by the Organization*.

Note: * Refer to the Merchant ship search and rescue manual (MERSAR), adopted by the Organization by resolution A.229(VII)/A.894(21), as amended.

D5. OPEN REVERSIBLE LIFERAFTS ANNEX 11

RBNA NOTE 1 – This Chapter has been maintained to keep the integrity of the Code, although containing items not applicable for classification purposes.

RBNA NOTE 2 – For craft with GT < 500, NORMAM 01 regulations apply for vessels under Brazilian Flag; for craft under foreign Flags, National Regulations apply or, in the absence of those, the regulation of the Code as far as possible.

100. A11.1 General

101. A15.1.1 All open reversible liferafts shall :

- a. .1 be constructed with proper workmanship and materials;
- b. .2 not be damaged in stowage throughout the air temperature range of -18° to +65°C;
- c. .3 be capable of operating throughout an air temperature range of -18°C to +65°C and a seawater temperature range of -1°C to +30°C;
- d. .4 be rot-proof, corrosion-resistant and not be unduly affected by seawater, oil or fungal attack;
- e. .5 be stable and maintain their shape when inflated and fully laden; and
- f. .6 be fitted with retro-reflective material, where it will assist in detection, and in accordance with the recommendations adopted by the Organization.

Refer to the Recommendation on the Use and Fitting of Retro-Reflective Materials on Life-Saving Appliances, adopted by the Organization by resolution A.658(16).

200. A11.22 Construction

201. A15.2.1 The open reversible liferaft shall be so constructed that when it is dropped into the water in its container from a height of 10 m, the liferaft and its equipment will operate satisfactorily. If the open reversible liferaft is to be stowed at a height of more than 10 m above the waterline in the lightest seagoing condition, it shall be of a type which has been satisfactorily drop-tested from at least that height.

202. A15.2.2 The open reversible floating liferaft shall

be capable of withstanding repeated jumps on to it from a height of at least 4.5 m.

203. A15.2.3 The open reversible liferaft and its fittings shall be so constructed as to enable it to be towed at a speed of 3 knots in calm water when loaded with its full complement of persons and equipment, with the sea-anchor deployed.

204. A15.2.4 The open reversible liferaft when fully inflated shall be capable of being boarded from the water whichever way up it inflates.

205. A15.2.5 The main buoyancy chamber shall be divided into:

- a. .1 not less than two separate compartments, each inflated through a nonreturn inflation valve on each compartment; and
- b. .2 the buoyancy chambers shall be so arranged that in the event of one of the compartments being damaged or failing to inflate, the intact compartment shall be able to support, with positive freeboard over the open reversible liferaft's entire periphery, the number of persons which the liferaft is permitted to accommodate, each having a mass of 75 kg and seated in their normal positions.

206. A15.2.6 The floor of the open reversible liferaft shall be waterproof.

207. A15.2.7 The open reversible liferaft shall be inflated with a non-toxic gas by an inflation system complying with the requirements of paragraph 4.2.2 of the LSA Code. Inflation shall be completed within the period of one minute at an ambient temperature of between 18°C and 20°C and within a period of three minutes at an ambient temperature of -18°C. After inflation the open reversible liferaft shall maintain its form when loaded with its full complement of persons and equipment.

208. A15.2.8 Each inflatable compartment shall be capable of withstanding a pressure equal to at least three times the working pressure and shall be prevented from reaching a pressure exceeding twice the working pressure either by means of relief valves or by a limited gas supply. Means shall be provided for fitting the topping-up pump or bellows.

209. A15.2.9 The surface of the buoyancy tubes shall be of non-slip material. At least 25% of these tubes shall be of a highly visible colour.

210. A15.2.10 The number of persons which an open reversible liferaft shall be permitted to accommodate shall be equal to the lesser of:

- a. .1 the greatest whole number obtained by dividing by 0.096 the volume, measured in cubic metres, of the main buoyancy tubes (which for this purpose

- shall not include the thwarts, if fitted) when inflated; or
- b. .2 the greatest whole number obtained by dividing by 0.372 the inner horizontal cross-sectional area of the open reversible liferaft measured in square metres (which for this purpose may include the thwart or thwarts, if fitted) measured to the innermost edge of the buoyancy tubes; or
 - c. .3 the number of persons having an average mass of 75 kg, all wearing lifejackets, that can be seated inboard of the buoyancy tubes without interfering with the operation of any of the liferaft's equipment.

300. A11.3 Open reversible liferaft fittings

301. A15.3.1 Lifelines shall be securely becketed around the inside and outside of the open reversible liferaft.

302. A15.3.2 The open reversible liferaft shall be fitted with an efficient painter of a length suitable for automatic inflation on reaching the water. For open reversible liferafts accommodating more than 30 persons an additional bowsing-in line shall be fitted.

303. A15.3.3 The breaking strength of the painter system, including its means of attachment to the open reversible liferaft, except the weak link required by paragraph 4.1.6.2 of the LSA Code, shall be:

- a. .1 7.5 kN for open reversible liferafts accommodating up to 8 persons;
- b. .2 10.0 kN for open reversible liferafts accommodating 9 to 30 persons; and
- c. .3 15.0 kN for open reversible liferafts accommodating more than 30 persons.

304. A15.3.4 The open reversible liferaft shall be fitted with at least the following number of inflated ramps to assist boarding from the sea whichever way up the raft inflates:

- a. .1 one boarding ramp for open reversible liferafts accommodating up to 30 persons; or
- b. .2 two boarding ramps for open reversible liferafts accommodating more than 30 persons; such boarding ramps shall be 180° apart.

305. A15.3.5 The open reversible liferaft shall be fitted with water pockets complying with the following requirements:

- a. .1 the cross-sectional area of the pockets shall be in the shape of an isosceles triangle with the base of the triangle attached to the buoyancy tubes of the open reversible liferaft;

- b. .2 the design shall be such that the pockets fill to approximately 60% of capacity within 15 s to 25 s of deployment;
- c. .3 the pockets attached to each buoyancy tube shall normally have aggregate capacity of between 125 l and 150 l for inflatable open reversible liferafts up to and including the 10-person size;
- d. .4 the pockets to be fitted to each buoyancy tube on liferafts certified to carry more than 10 persons shall have, as far as practicable, an aggregate capacity of 12 N litres, where N is the number of persons carried;
- e. .5 each pocket on a buoyancy tube shall be attached so that when the pocket is in the deployed position it is attached along the full length of its upper edges to, or close to, the lowest part of the lower buoyancy tube; and
- f. .6 the pockets shall be distributed symmetrically round the circumference of the liferaft with sufficient separation between each pocket to enable air to escape readily

306. A15.3.6 At least one manually controlled lamp complying with the requirements shall be fitted on the upper and lower surfaces of the buoyancy tubes.

307. A15.3.7 Suitable automatic drain arrangements shall be provided on each side of the floor of the liferaft in the following manner:

- a. .1 one for open reversible liferafts accommodating up to 30 persons; or
- b. .2 two for open reversible liferafts accommodating more than 30 persons.

308. A15.3.8 The equipment of every open reversible liferaft shall consist of:

- a. .1 one buoyant rescue quito, attached to not less than 30 m of buoyant line with a breaking strength of at least 1 kN;
- b. .2 two safety knives of the non-folding type, having a buoyant handle, shall be fitted attached to open reversible liferaft by light lines. They shall be stowed in pockets so that, irrespective of the way in which the open reversible liferaft inflates, one will be readily available on the top surface of the upper buoyancy tube in a suitable position to enable the painter to be readily cut;
- c. .3 one buoyant bailer;
- d. .4 two sponges;
- e. .5 one sea-anchor permanently attached to the open reversible liferaft in such a way as to be readily deployable when the open reversible

- liferaft inflates. The position of the sea-anchor shall be clearly marked on both buoyancy tubes;
- f. .6 two buoyant paddles;
 - g. .7 one first-aid outfit in a waterproof case capable of being closed tightly after use;
 - h. .8 one whistle or equivalent sound signal;
 - i. .9 two hand flares;
 - j. .10 one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;
 - k. .11 one repair outfit for repairing punctures in buoyancy compartments; and
 - l. .12 one topping-up pump or bellows.
- m. 3.9 The equipment specified in 3.8 is designated an HSC Pack.

310. A15.3.10 Where appropriate, the equipment shall be stowed in a container which, if it is not an integral part of, or permanently attached to, the open reversible liferaft, shall be stowed and secured to the open reversible liferaft and be capable of floating in water for at least 30 min without damage to its contents. Irrespective of whether the equipment container is an integral part of, or is permanently attached to, the open reversible liferaft, the equipment shall be readily accessible irrespective of which way up the open reversible liferaft inflates. The line which secures the equipment container to the open reversible liferaft shall have a breaking strength of 2 kN or a breaking strength of 3:1 based on the mass of the complete equipment pack, whichever is the greater.

400. A11.4 Containers for open reversible inflatable liferafts

401. A15.4.1 The open reversible liferafts shall be packed in a container that is:
- a. .1 so constructed as to withstand conditions encountered at sea;
 - b. .2 of sufficient inherent buoyancy, when packed with the liferaft and its equipment, to pull the painter from within and to operate the inflation mechanism shall the craft sink; and
 - c. .3 as far as practicable, watertight, except for drain holes in the container bottom.
402. A15.4.2 The container shall be marked with:
- a. .1 maker's name or trademark;
 - b. .2 serial number;

- c. .3 the number of persons it is permitted to carry;
- d. .4 non-SOLAS reversible;
- e. .5 type of emergency pack enclosed;
- f. .6 date when last serviced;
- g. .7 length of painter;
- h. .8 maximum permitted height of stowage above waterline (depending on drop-test height); and
- i. .9 launching instructions.

500. A11.5 Markings on open reversible inflatable liferafts

501. The open reversible liferafts shall be marked with:
- a. .1 maker's name or trademark;
 - b. .2 serial number;
 - c. .3 date of manufacture (month and year);
 - d. .4 name and place of service station where it was last serviced; and
 - e. .5 number of persons it is permitted to accommodate on the top of each buoyancy tube, in characters not less than 100 mm in height and of a colour contrasting with that of the tube.

600. A11.6 Instructions and information

601. Instructions and information required for inclusion in the craft's training manual and in the instructions for on-board maintenance shall be in a form suitable for inclusion in such training manual and instructions for on-board maintenance. Instructions and information shall be in a clear and concise form and shall include, as appropriate, the following:

- a. .1 general description of the open reversible liferaft and its equipment;
- b. .2 installation arrangements;
- c. .3 operational instructions, including use of
- d. .4 servicing requirements.

700. A11.7 Testing of open reversible inflatable liferafts

701. 7.1 When testing open reversible liferafts in accordance with the recommendations of resolution MSC.81(70), part 1:

- a. .1 tests.
- b. .2 the part of test No. 5.8 regarding closing

arrangement may be omitted,

- c. .3 the temperature - 30 degree C in test No. 5.17.3 and 5.17.5 may be substituted with - 18°C; and
- d. .4 the drop height of 18 m in test may be substituted with 10 m.
- e. Omissions and substitution, as described above, shall be reflected in the type approval certificate.

CHAPTER E FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION FOR SHIPS HAVING GROSS TONNAGE GT ≥ 500

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E1. 7.1 GENERAL REQUIREMENTS

100. General

101. 7.1.1 The following basic principles underlie the provisions in this chapter and are embodied therein as appropriate, having regard to the category of craft and the potential fire hazard involved:

- a. .1 maintenance of the main functions and safety systems of the craft, including propulsion and control, fire-detection, alarms and extinguishing capability of unaffected spaces, after fire in any one compartment on board;

- b. .2 division of the public spaces for category B craft, in such a way that the occupants of any compartment can escape to an alternative safe area or compartment in case of fire;
- c. .3 subdivision of the craft by fire-resisting boundaries;
- d. .4 restricted use of combustible materials and materials generating smoke and toxic gases in a fire;
- e. .5 detection, containment and extinction of any fire in the space of origin;
- f. .6 protection of means of escape and access for fire fighting; and
- g. .7 immediate availability of fire-extinguishing appliances.

102. 7.1.2 The requirements in this chapter are based in the following conditions:

- a. .1 Where a fire is detected, the crew immediately puts into action the fire-fighting procedures, informs the base port of the accident and prepares for the escape of passengers to alternative safe area or compartment, or, if necessary, for the evacuation of passengers.
- b. .2 The use of fuel with a flashpoint below 43°C is not recommended. However, fuel with a lower flashpoint, but not lower than 35°C, may be used in gas turbines only subject to compliance with the provisions specified in E5.101 to E5.106
- c. .3 The repair and maintenance of the craft is carried out in accordance with the requirements.
- d. .4 Enclosed spaces having reduced lighting, such as cinemas, discotheques, and similar spaces are not permitted.
- e. .5 Passenger access to special category spaces and open ro-ro spaces is prohibited during the voyage except when accompanied by a crew member responsible for fire safety. Only authorised crew members shall be permitted to enter cargo spaces at sea.

E2. 7.2 DEFINITIONS

100. Definitions

101. 7.2.1 "Fire-resisting divisions" are those divisions formed by bulkheads and decks which comply with the following:

- a. .1 They shall be constructed of non-combustible or fire-restricting materials which by insulation or inherent fire-resisting properties satisfy the requirements of E2.101 and E2.101.f.
- b. .2 They shall be suitably stiffened.
- c. .3 They shall be so constructed as to be capable of preventing the passage of smoke and flame up to the end of the appropriate fire protection time
- d. .4 Where required they shall maintain load-carrying capabilities up to the end of the appropriate fire protection time.
- e. .5 They shall have thermal properties such that the average temperature on the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature during the appropriate fire protection time
- f. .6 A test of a prototype bulkhead or deck in accordance with the Fire Test Procedures Code shall be required to ensure that it meets the above requirements.

102. 7.2.2 "Fire-restricting materials" are those materials which have properties complying with the Fire Test Procedures Code.

103. 7.2.3 "Non-combustible material" is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C, this being determined in accordance with the Fire Test Procedures Code.

104. 7.2.4 "A standard fire test" is one in which specimens of the relevant bulkheads, decks or other constructions are exposed in a test furnace by a specified test method in accordance with the Fire Test Procedures Code.

105. 7.2.5 Where the words "steel or other equivalent material" occur, "equivalent material" means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g., aluminium alloy with appropriate insulation).

106. 7.2.6 "Low flame-spread" means that the surface thus described will adequately restrict the spread of flame, this

being determined in accordance with the Fire Test Procedures Code.

107. 7.2.7 "Smoke-tight" or "capable of preventing the passage of smoke" means that a division made of non-combustible or fire-restricting materials is capable of preventing the passage of smoke.

E3. 7.3 CLASSIFICATION OF SPACE USE

100. Classification of space use

101. 7.3.1 For the purposes of classification of space use in accordance with fire hazard risks, the following grouping shall apply:

- a. .1 "Areas of major fire hazard", referred to in tables 7.4-1 and 7.4-2 by A, include the following spaces:
 - a.1. machinery spaces
 - a.2. ro-ro spaces
 - a.3. spaces containing dangerous goods
 - a.4. special category spaces
 - a.5. store-rooms containing flammable liquids
 - a.6. galleys
 - a.7. sales shops having a deck area of 50 m² or greater and containing flammable liquids for sale
 - a.8. trunks in direct communication with the above spaces.
- b. .2 "Areas of moderate fire hazard", referred to in tables E4.100 and E4.200 by B, include the following spaces:
 - b.1. auxiliary machinery spaces.
 - b.2. bond stores containing packaged beverages with alcohol content not exceeding 24% by volume
 - b.3. crew accommodation containing sleeping berths
 - b.4. service spaces
 - b.5. sales shops having a deck area of less than 50 m² containing a limited amount of flammable liquids for sale and where no dedicated store is provided separately

- b.6. sales shops having a deck area of 50 m² or greater not containing flammable liquids
 - b.7. trunks in direct communication with the above spaces.
 - c. .3 "Areas of minor fire hazard", referred to in tables E4.100 and E4.200, include the following spaces:
 - c.1. auxiliary machinery spaces.
 - c.2. cargo spaces
 - c.3. fuel tank compartments
 - c.4. public spaces
 - c.5. tanks, voids and areas of little or no fire risk
 - c.6. refreshment kiosks
 - c.7. sales shops other than those specified in E3.100 and E4.200
 - c.8. corridors in passenger areas and stairway enclosures
 - c.9. crew accommodation other than that mentioned in E3.101.b.
 - c.10. trunks in direct communication with the above spaces.
 - d. .4 "Control stations", referred to in tables E4.100
 - e. .5 "Evacuation Stations and external escape routes", referred to in tables E4.100 and E4.200. by E, include the following areas:
 - e.1. external stairs and open decks used for escape routes
 - e.2. assembly stations, internal and external
 - e.3. open deck spaces and enclosed promenades forming lifeboat and liferaft embarkation and lowering stations
 - e.4. the craft's side to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the liferaft's and evacuation slide's embarkation areas.
 - f. .6 "Open Spaces" referred to in tables 7.4-1 and 7.4-2 by F, include the following areas:
 - f.1. open spaces locations other than evacuation stations and external escape routes and control stations.
102. 7.3.2 In relation to the classification of spaces in E3.101, the following additional criteria shall be applied:
- a. .1 If a space is divided by partial bulkheads into two (or more) smaller areas such that they form enclosed spaces, then the enclosed spaces shall be surrounded by bulkheads and decks in accordance with tables E4.100 and E4.200, as applicable. However, if the separating bulkheads of such spaces are at least 30% open, then the spaces may be considered as the same space.
 - b. .2 Cabinets having a deck area of less than 2 m² may be accepted as part of the space they serve, provided they have open ventilation to the space and do not contain any material or equipment that could be a fire risk.
 - c. .3 Where a space has the special characteristics of two or more space groupings, the structural fire protection time of the divisions shall be the highest for the space groupings concerned. For example, the structural fire protection time of the divisions of emergency generator rooms shall be of the highest value for the space when the space is considered as being a control station (D) and a machinery space (A).
103. 7.3.3 In approving structural fire protection details, the Administration shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers.
104. 7.3.4 To prevent heat transmission at intersections and terminal points, the insulation of the deck or bulkhead shall be carried past the intersection or terminal point for a distance of at least 450 mm in the case of steel or aluminium structures.
105. 7.3.5 If a space is divided by a deck or bulkhead and the fire insulation required for each space is different, the insulation with the higher structural fire protection time shall continue on the deck or bulkhead with the insulation of the lesser structural fire protection time for a distance of at least 450 mm beyond the boundary between the spaces.
106. 7.3.6 Where the lower part of the fire insulation has to be cut for drainage, the construction shall be in accordance with the structural details.

E4. 7.4 STRUCTURAL FIRE PROTECTION

100. 7.4.1 Main structure

101. 7.4.1.1 The requirements below apply to all craft irrespective of construction material. The structural fire protection times for separating bulkheads and decks shall be in accordance with tables E4.100 and E4.200, and the structural fire protection times are all based on providing protection for a period of 60 min. If any other lesser structural fire protection time is determined for category A craft and cargo craft, then the times given below in E4.101 and E4.203 may be amended pro rata. In no case shall the structural fire protection time be less than 30 min.

102. 7.4.1.2 In using tables E4.100 and E4.200, it shall be noted that the title of each category is intended to be typical rather than restricted. For determining the appropriate fire integrity standards to be applied to boundaries between adjacent spaces, where there is doubt as to their classification for the purpose of this section, they shall be treated as spaces within the relevant category having the most stringent boundary requirement.

103. 7.4.1.3 The hull, superstructure, structural bulkheads, decks, deckhouses and pillars shall be constructed of approved non-combustible materials having adequate structural properties. The use of other fire-restricting materials may be permitted provided the requirements of this chapter are complied with and the materials are in compliance with the Fire Test Procedures Code.

104. 7.4.1.4 Paragraph E4.103 does not apply to appendages such as air propellers, air ducts to propellers, transmission shafts, rudders and other control surfaces, struts, spars, flexible skirts, etc., which do not comprise part of the main structure of the craft.

TABLE T.E4.104.2

Table 7.4-1 – Structural fire protection times for separating bulkheads and decks of passenger craft

	A	B	C	D	E	F
Areas of major fire hazard A	60 1, 2	30 1	60 1, 8	30 1	60 1	60 1, 7, 9
Areas of moderate fire hazard B		30 2	30 8	30 3, 4	30 3	30 3
Areas of minor fire hazard C			30 3	30 8, 10	30 3	30 3
Control stations D				30 3, 4	30 3, 4	30 3
Evacuation stations and escape routes E					30 3	30 3
Open spaces F						30 3

Notes: See TABLE T.E4.104.2

Table 7.4-2 – Structural fire protection times for separating bulkheads and decks of cargo craft

	A	B	C	D	E	F
Areas of major fire hazard A	60 1, 2	30 1	60 1, 8	30 1	60 1	60 1, 7, 9
Areas of moderate fire hazard B		30 2, 6	30 6	30 3, 4	30 6	30 3
Areas of minor fire hazard C			30 3	30 8	30 3	30 3
Control stations D				30 3, 4	30 3, 4	30 3
Evacuation stations and escape routes E					30 3	30 3
Open spaces F						30 3

NOTES:

The figures on either side of the diagonal line represent the required structural fire protection time for the protection system on the relevant side of the division. When steel construction is used and two different structural fire protection times are required for a division in the table, only the greater one need be applied.

1 The upper side of decks within spaces protected by fixed fire-extinguishing systems need not be insulated.

2 Where adjacent spaces are in the same alphabetical category and a note 2 appears, a bulkhead or deck between such spaces need not be fitted if deemed unnecessary by the Administration. For example, a bulkhead need not be required between two store-rooms. A bulkhead, is however, required between a machinery space and a special category space even though both spaces are in the same category.

3 No structural fire protection requirements; however, a smoke-tight division made of non-combustible or fire restricting material is required.

4 Control stations which are also auxiliary machinery spaces shall be provided with 30 min structural fire protection.

5 There are no special requirements for material or integrity of boundaries where only a dash appears in the tables.

6 The fire protection time is 0 min and the time for prevention of passage of smoke and flame is 30 min as determined by the first 30 min of the standard fire test.

7 Fire resisting divisions need not comply with E2.101.e.

8 When steel construction is used, fire resisting divisions adjacent to void spaces need not comply with E2.101.f.

9 The fire protection time may be reduced to 0 min for those parts of open ro-ro spaces which are not essential parts of the craft's main load bearing structure, where passengers

have no access to them and the crew need not have access to them during any emergency.

10 On category A craft, this value may be reduced to 0 min where the craft is provided with only a single public space (excluding lavatories) protected by a sprinkler system and adjacent to the operating compartment.

200. 7.4.2 Fire-resisting divisions

201. 7.4.2.1 Areas of major and moderate fire hazard shall be enclosed by fire-resisting divisions complying with the requirements of E2.101 except where the omission of any such division would not affect the safety of the craft. These requirements need not apply to those parts of the structure in contact with water at least 300 mm below the craft's waterline in the lightweight condition in displacement mode, but due regard shall be given to the effect of temperature of hull in contact with water and heat transfer from any uninsulated structure in contact with water to insulated structure above the water.

202. 7.4.2.2 Fire-resisting bulkheads and decks shall be constructed to resist exposure to the standard fire test for a period of 30 min for areas of moderate fire hazard and 60 minutes for areas of major fire hazard except as provided in E4.101.

203. 7.4.2.3 Main load-carrying structures within areas of major fire hazard and areas of moderate fire hazard and structures supporting control stations shall be arranged to distribute load such that there will be no collapse of the construction of the hull and superstructure when it is exposed to fire for the appropriate fire protection time. The load-carrying structure shall also comply with the requirements of E4.204 and E4.205

204. 7.4.2.4 If the structures specified in E4.204 and E4.205 are made of aluminium alloy their installation shall be such that the temperature of the core does not rise more than 200°C above the ambient temperature in accordance with the times in E4.201 and E4.202

205. 7.4.2.5 If the structures specified in E4.203 and E4.205 are made of combustible material, their insulation shall be such that their temperatures will not rise to a level where deterioration of the construction will occur during the exposure to the standard fire test in accordance with the Fire Test Procedures Code to such an extent that the load-carrying capability, in accordance with the times in E4.101 and E4.203, will be impaired.

206. 7.4.2.6 The construction of all doors, and door frames in fire-resisting divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame equivalent to that of the bulkheads in which they are situated. Watertight doors of steel need not be insulated. Also, where a fire-resisting division is penetrated by pipes, ducts, electrical cables etc., arrangements shall be made to ensure that the fire-resisting integrity of the division is not impaired, and necessary testing shall be carried out in accordance with the Fire Test Procedures Code. Where machinery shafts penetrate fire-

resisting watertight divisions, arrangements shall be made to ensure that the required watertight and fire-resisting integrity of the division is not impaired.

207. 7.4.2.7 Ventilation openings may be accepted in entrance doors to public toilets, provided they are positioned in the lower portion of the door and fitted with closable grilles made of non-combustible or fire-restricting material and operable from outside the space.

300. 7.4.3 Restricted use of combustible materials

301. 7.4.3.1 All separating divisions, ceilings or linings if not a fire resisting division, shall be of non-combustible or fire restricting materials. Draught stops shall be of non-combustible or fire-restricting material

302. 7.4.3.2 Where insulation is installed in areas in which it could come into contact with any flammable fluids or their vapours, its surface shall be impermeable to such flammable fluids of vapours. The fire insulation in such spaces may be covered by metal sheets (not perforated) or by vapour proof glass cloth sealed at joints.

303. 7.4.3.3 Furniture and furnishings in public spaces and crew accommodation shall comply with the following standards:

- a. .1 all case furniture e.g., desks, wardrobes, dressing tables, bureaux and dressers constructed entirely of approved non-combustible or fire-restricting materials, except that a combustible veneer with a calorific value not exceeding 45 MJ/m² may be used on the exposed surface of such articles;
- b. .2 all other furniture such as chairs, sofas and tables, is constructed with frames of non-combustible or fire-restricting materials;
- c. .3 all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame, this being determined in accordance with the Fire Test Procedures Code;
- d. .4 all upholstered furniture has qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code;
- e. .5 all bedding components have qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code; and
- f. .6 all deck finish materials comply with the Fire Test Procedures Code.

304. 7.4.3.4 Subject to E4.305 the following surfaces shall, as a minimum standard, be constructed of materials having low flame-spread characteristics:

- a. .1 exposed surfaces in corridors and stairway enclosures, and of bulkheads (including windows),

wall and ceiling linings in all public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations;

- b. .2 surfaces in concealed or inaccessible spaces in corridors and stairway enclosures, public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations.

305. 7.4.3.5 Paragraph E4.304 does not apply to partitions, windows and sidescuttles made of glass which are deemed to be non-combustible and to comply with the requirements for low-flame spread surfaces or to items and materials referred to in E4.303.

* Refer to paragraph E9.204 and the FTP Code, annex 2, paragraphs 1 and 5.1.

306. 7.4.3.6 Any thermal and acoustic insulation shall be of non-combustible or of fire-restricting material. Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible or fire-restricting, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

307. 7.4.3.7 Exposed surfaces in corridors and stairway enclosures, and of bulkheads (including windows), wall and ceiling linings, in all public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations shall be constructed of materials which, when exposed to fire, are not capable of producing excessive quantities of smoke or toxic products, this being determined in accordance with the Fire Test Procedures Code.

308. 7.4.3.8 Void compartments, where low-density combustible materials are used to provide buoyancy, shall be protected from adjacent fire hazard areas by fire-resisting divisions, in accordance with tables E4.100 and E4.200. Also, the space and closures to it shall be gastight but it shall be ventilated to atmosphere.

309. 7.4.3.9 In compartments where smoking is allowed, suitable non-combustible ash containers shall be provided. In compartments where smoking is not allowed, adequate notices shall be displayed.

310. 7.4.3.10 The exhaust gas pipes shall be arranged so that the risk of fire is kept to a minimum. To this effect, the exhaust system shall be insulated and all compartments and structures which are contiguous with the exhaust system, or those which may be affected by increased temperatures caused by waste gases in normal operation or in an emergency, shall be constructed of non-combustible

material or be shielded and insulated with non-combustible material to protect from high temperatures.

311. 7.4.3.11 The design and arrangement of the exhaust manifolds or pipes shall be such as to ensure the safe discharge of exhaust gases.

400. 7.4.4 Arrangement

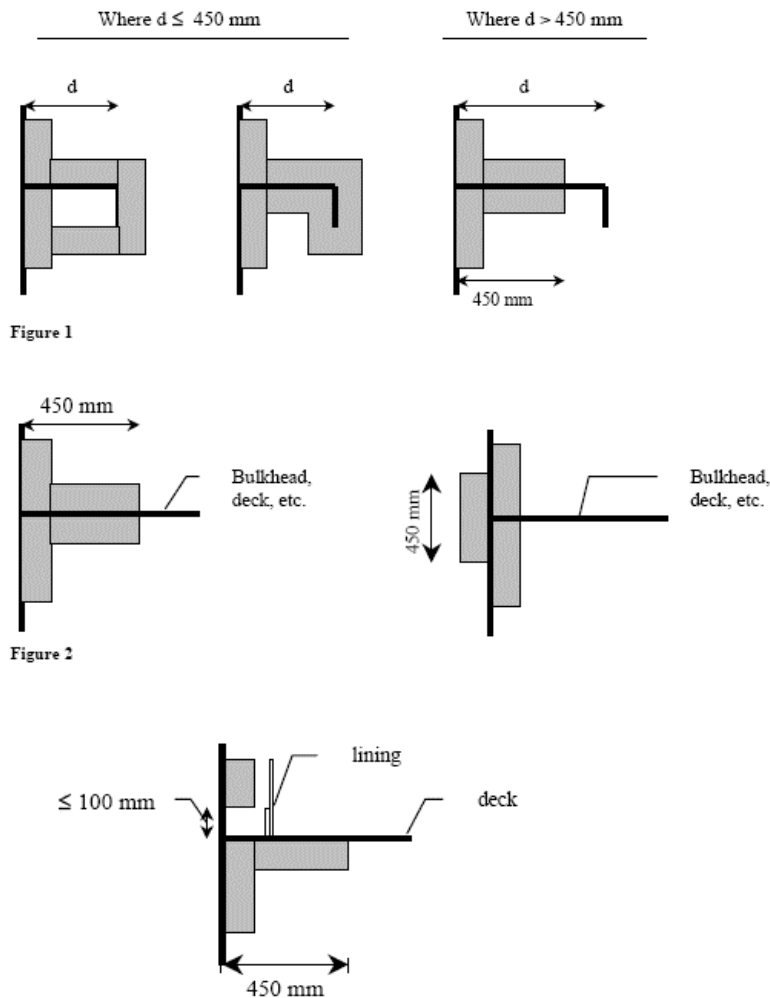
401. 7.4.4.1 Internal stairways connecting only two decks need only be enclosed at one deck by means of divisions and self-closing doors having the structural fire protection time as required by tables E4.100 and E4.200 for divisions separating those areas which each stairway serves.

402. 7.4.4.2 Open stairways may be fitted in public spaces consisting of only two decks, provided the stairways lie wholly within such public spaces and the following conditions are met:

- a. .1 all levels are used for the same purpose;
- b. .2 the area of the opening between the lower and upper parts of the space is at least 10% of the deck area between the upper and lower parts of the space;
- c. .3 the design is such that persons within the space should be generally aware, or could easily be made aware of, a developing fire or other hazardous situation located within that space;
- d. .4 sufficient means of escape are provided from both levels of the space directly leading to an adjacent safe area or compartment; and
- e. .5 the whole space is served by one section of the sprinkler system.

403. 7.4.4.3 Lift trunks shall be so fitted as to prevent the passage of smoke and flame from one deck to another and shall be provided with means of closing so as to permit the control of draught and smoke.

404. 7.4.4.4 In public spaces, crew accommodation, service spaces, control stations, corridors and stairways, air spaces enclosed behind ceilings, panelling or linings shall be suitably divided by close-fitting draught stops not more than 14 m apart. Draught stops are not required in public spaces of category A craft having only one public space and on other craft in spaces with open ceilings (perforated ceilings) where the opening is 40% or more and the ceiling is arranged in such a way that a fire behind the ceiling can be easily seen and extinguished.



*Note:
d = Depth of stiffener on girder.

E5 7.5 FUEL AND OTHER FLAMMABLE FLUID TANKS AND SYSTEMS

100. Requirements for fuel and other flammable fluid tanks and systems

101. 7.5.1 Tanks containing fuel and other flammable fluids shall be separated from passenger, crew, and baggage compartments by vapour-proof enclosures or cofferdams which are suitably ventilated and drained.

102. 7.5.2 Fuel oil tanks shall not be located in, be formed by any part of the structural boundary of, areas of major fire hazard. However, flammable fluids of a flashpoint not less than 60°C may be located within such areas provided the tanks are made of steel or other equivalent material. The use of aluminium in lubricating oil sump tanks for engines, or in lubricating oil filter housings fitted integral with the engines, is accepted.

103. 7.5.3 Every fuel oil pipe which, if damaged, would allow oil to escape from a storage, settling or daily service tank shall be fitted with a cock or valve directly on the tank capable of being closed from a position outside the space

concerned in the event of a fire occurring in the space in which such tanks are situated.

104. 7.5.4 Pipes, valves and couplings conveying flammable fluids shall be of steel or such alternative material satisfactory to a standard*, in respect of strength and fire integrity having regard to the service pressure and the spaces in which they are installed. Wherever practicable, the use of flexible pipes shall be avoided.

* Refer to the Guidelines for the Application of Plastic Pipes on Ships, adopted by the Organization by resolution A.753(18).

105. 7.5.5 Pipes, valves and couplings conveying flammable fluids shall be arranged as far from hot surfaces or air intakes of engine installations, electrical appliances and other potential sources of ignition as is practicable and be located or shielded so that the likelihood of fluid leakage coming into contact with such sources of ignition is kept to a minimum.

106. 7.5.6 Fuel with a flash point below 35° shall not be used. In every craft in which fuel with a flashpoint below 43°C is used, the arrangements for the storage, distribution

and utilization of the fuel shall be such that, having regard to the hazard of fire and explosion which the use of such fuel may entail, the safety of the craft and of persons on board is preserved. The arrangements shall comply, in addition to the requirements of E5.101 to E5.105, with the following provisions:

- a. .1 tanks for the storage of such fuel shall be located outside any machinery space and at a distance of not less than 760 mm inboard from the shell side and bottom plating, and from decks and bulkheads;
 - b. .2 arrangements shall be made to prevent overpressure in any fuel tank or in any part of the oil fuel system, including the filling pipes. Any relief valves and air or overflow pipes shall discharge to a position which, in the opinion of the Administration, is safe;
 - c. .3 the spaces in which fuel tanks are located shall be mechanically ventilated, using exhaust fans providing not less than six air changes per hour. The fans shall be such as to avoid the possibility of ignition of flammable gas-air mixtures. Suitable wire mesh guards shall be fitted over inlet and outlet ventilation openings. The outlets for such exhausts shall discharge to a position which, in the opinion of the Administration is safe. 'No Smoking' signs shall be posted at the entrance to such spaces;
 - d. .4 earthed electrical distribution systems shall not be used, with the exception of earthed intrinsically safe circuits;
 - e. .5 suitable certified safe type* electrical equipment be used in all spaces where fuel leakage could occur, including the ventilation system. Only electrical equipment and fittings essential for operational purposes shall be fitted in such spaces;
- * Refer to the Recommendations published by the International Electrotechnical Commission and, in particular, publication 60092 - Electrical Installations in Ships.
- f. .6 a fixed vapour-detection system shall be installed in each space through which fuel lines pass, with alarms provided at the continuously manned control station;
 - g. .7 every fuel tanks shall, where necessary, be provided with "savealls" or gutters which would catch any fuel which may leak from such tank;
 - h. .8 safe and efficient means of ascertaining the amount of fuel contained in any tank shall be provided. Sounding pipes shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in passenger or crew spaces. The use of cylindrical gauge glasses is prohibited, except for cargo craft where the use of oil-level gauges with flat glasses and self-closing valves between the gauges

and fuel tanks may be permitted by the Administration. Other means of ascertaining the amount of fuel contained in any tank may be permitted if such means do not require penetration below the top of the tank, and providing their failure or overfilling of the tank will not permit the release of fuel;

- i. .9 during bunkering operations, no passenger shall be on board the craft or in the vicinity of the bunkering station, and adequate 'No Smoking' and 'No Naked Lights' signs shall be posted. Vessel-to-shore fuel connections shall be of closed type and suitably grounded during bunkering operations;
- j. .10 the provision of fire detection and extinguishing systems in spaces where non-integral fuel tanks are located shall be in accordance with requirements of E7.100 to E7.103; and
- k. .11 refuelling of the craft shall be done at the approved refuelling facilities, detailed in the route operational manual, at which the following fire appliances are provided:
 - k.1. .11.1 a suitable foam applicator system consisting of monitors and foam-making branch pipes capable of delivering foam solution at a rate of not less than 500 l/m for not less than 10 min;
 - k.2. .11.2 dry powder extinguishers of total capacity not less than 50 kg; and
 - k.3. .11.3 carbon dioxide extinguishers of total capacity not less than 16 kg.

E6. 7.6 VENTILATION

100. Requirements for ventilation

101. 7.6.1 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated. The controls shall be easily accessible as well as prominently and permanently marked and shall indicate whether the shut-off is open or closed. In addition, such openings to areas of major fire hazard shall be capable of being closed from a continuously manned control station.

102. 7.6.2 All ventilation fans shall be capable of being stopped from outside the spaces which they serve, and from outside the spaces in which they are installed. Ventilation fans serving areas of major fire hazard shall be capable of being operated from a continuously manned control station. The means provided for stopping the power ventilation to the machinery space shall be separated from the means provided for stopping ventilation of other spaces.

103. 7.6.3 Areas of major fire hazard and spaces serving as assembly stations shall have independent ventilation

systems and ventilation ducts. Ventilation ducts for areas of major fire hazard shall not pass through other spaces, unless they are contained within a trunk or in an extended machinery space or casing insulated in accordance with tables E4.100 and E4.200; ventilation ducts of other spaces shall not pass through areas of major fire hazard. Ventilation outlets from areas of major fire hazard shall not terminate within a distance of 1 m from any control station, evacuation station or external escape route. In addition, exhaust ducts from galley ranges shall be fitted with:

- a. .1 a grease trap readily removable for cleaning unless an alternative approved grease removal system is fitted;
- b. .2 a fire damper located in the lower end of the duct (the junction between the duct and the galley range hood) which is automatically and remotely operated, and in addition a remotely operated fire damper located in the upper end of the duct;
- c. .3 a fixed means for extinguishing a fire within the duct;
- d. .4 remote control arrangements for shutting off the exhaust fans and supply fans, for operating the fire dampers and for operating the fire-extinguishing system, which shall be placed in a position close to the entrance to the galley. Where a multi-branch system is installed, a remote means located with the above controls shall be provided to close all branches exhausting through the same main duct before an extinguishing medium is released into the system; and
- e. .5 suitably located hatches for inspection and cleaning. At minimum, one hatch shall be provided close to the exhaust fan and others located in areas of high grease accumulation such as the lower end of the duct as referred to in E6.103.ii

104. 7.6.4 Where a ventilation duct passes through a fire-resisting division, a fail safe automatic closing fire damper shall be fitted adjacent to the division. The duct between the division and the damper shall be of steel or other equivalent material and insulated to the same standard as required for the fire resisting division. The fire damper may be omitted where ducts pass through spaces surrounded by fire-resisting divisions without serving those spaces providing that the duct has the same structural fire protection time as the divisions it penetrates. Where a ventilation duct passes through a smoke-tight division, a smoke damper shall be fitted at the penetration unless the duct which passes through the space does not serve that space. Fire and smoke dampers shall be arranged so as to be readily accessible. Where placed behind ceilings or linings, they shall be provided with an inspection door marked to identify the damper. Such identification shall also be placed on any required remote controls.

105. 7.6.5 Where ventilation systems penetrate decks, the arrangements shall be such that the effectiveness of the deck in resisting fire is not thereby impaired and precautions shall

be taken to reduce the likelihood of smoke and hot gases passing from one between-deck space to another through the system.

106. 7.6.6 All dampers fitted on fire-resisting or smoke-tight divisions shall also be capable of being manually closed from each side of the division in which they are fitted, except for those dampers fitted on ducts serving spaces not normally manned such as stores and toilets that may be manually operated only from outside the served spaces. Manual closing may be achieved by mechanical means of release or by remote operation of the fire or smoke damper by means of a fail-safe electrical switch or pneumatic release (i.e. spring-loaded, etc.). All dampers shall also be capable of being remotely closed from the continuously manned control station.

107. 7.6.7 Ducts shall be made of non-combustible or fire restricting material. Short ducts, however, may be of combustible materials subject to the following conditions:

- a. .1 their cross-section does not exceed 0.02 m²;
- b. .2 their length does not exceed 2 m;
- c. .3 they may only be used at the terminal end of the ventilation system;
- d. .4 they shall not be situated less than 600 mm from an opening in a fire-resisting or fire-restricting division; and
- e. .5 their surfaces have low flame spread characteristics.

E7. 7.7 FIRE DETECTION AND EXTINGUISHING SYSTEMS

100. 7.7.1.1 Fire detection systems

Note: Areas of major and moderate fire hazard and other enclosed spaces not regularly occupied within public spaces and crew accommodation, such as toilets, stairway enclosures, corridors and escape routes shall be provided with an approved automatic smoke detection system and manually operated call points complying with the requirements of E7.100 and E7.300 to indicate at the control station the location of outbreak of a fire in all normal operating conditions of the installations. Detectors operated by heat instead of smoke may be installed in galleys. Main propulsion machinery room(s) shall in addition have detectors sensing other than smoke and be supervised by TV cameras monitored from the operating compartment. Manually operated call points shall be installed throughout the public spaces, crew accommodation, corridors and stairway enclosures, service spaces and where necessary control stations. One manually operated call point shall be located at each exit from these spaces and from areas of major fire hazard

101. .1 Any required fixed fire-detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.

102. .2 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

103. .3 There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fixed fire-detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in or adjacent to the control panel for the fire-detection system.

104. .4 Detectors and manually operated call points shall be grouped into sections, each of which shall comprise a group of fire detectors and manually operated call points as displayed at the indicating unit(s) required by this paragraph. The activation of any detector or manually operated call point shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes an audible alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces. There shall be no time delay for the audible alarms in crew accommodation areas when all the control stations are unattended. The alarm sounder system need not be an integral part of the detection system.

105. .5 The control panel shall be located in the operating compartment or in the main fire control station.

106. .6 Indicating units shall, as a minimum, denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port, except when the craft is out of service. One indicating unit shall be located in the operating compartment if the control panel is located in the space other than the operating compartment.

107. .7 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

108. .8 Where the fire-detection system does not include means of remotely identifying each detector individually, no section covering more than one deck within public spaces, crew accommodation, corridors, service spaces and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited as determined by the Administration. In no case shall more than 50 enclosed spaces be permitted in any section. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

109. .9 In passenger craft, if there is no fire-detection system capable of remotely and individually identifying each detector, a section of detectors shall not serve spaces on both sides of the craft nor on more than one deck and neither shall it be situated in more than one. In passenger craft fitted with individually identifiable fire detectors, a section may serve spaces on both sides of the craft and on several decks. Notwithstanding the preceding requirements of this paragraph, the Administration may accept that the same section of detectors can serve spaces on more than one deck if such spaces were located in the fore or aft end of the craft or they were so arranged that they constitute common spaces on different decks (e.g., fan rooms, galleys, public spaces, etc.).

110. .10 A section of fire detectors which covers a control station, a service space, a public space, crew accommodation, corridor or stairway enclosure shall not include a machinery space of major fire hazard. In the case of a fire detection system with remotely and individually identifiable fire detectors, this requirement was met if no machinery spaces of a major fire hazard were included in a loop (electrical circuit linking detectors of various sections in a sequence and connected (input and output) to the indicating unit(s)) covering accommodation spaces, service spaces and control stations.

111. .11 Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Administration provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.

112. .12 Suitable instructions and component spares for testing and maintenance shall be provided.

113. .13 The function of the detection system shall be periodically tested by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond. All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

114. .14 The fire-detection system shall not be used for any other purpose, except that the control panel may be used to activate one or more of the following:

- a. .1 paging system;
- b. .2 fan stops;
- c. .3 closure of fire doors;
- d. .4 closure of fire and smoke dampers; and
- e. .5 sprinkler system.

115. .15 Fire detection systems in which all fire detectors were individually identifiable (i.e. having zone address identification capability) shall be so arranged that:

- a. .1 a loop cannot be damaged at more than one point by a fire and no loop shall pass through a space twice. When this was not practical (e.g., for large public spaces), the part of the loop which by necessity passes through the space for a second time shall be installed at the maximum possible distance from the other parts of the loop.;
- b. .2 means are provided to ensure that any fault (e.g., power break; short circuit; earth) occurring in the loop shall not render the whole loop ineffective;
- c. .3 all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (electrical, electronic, informatic); and
- d. .4 the first initiated fire alarm shall not prevent any other detector to initiate further fire alarms.

116. .16 The fire detection system in vehicle deck spaces, excluding manual call points, may be switched off with a timer during loading/unloading of vehicles.

200. 7.7.1.2 Installation requirements

201. .1 In addition to E7.100, manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.

202. .2 Where a fixed fire-detection and fire alarm system is required for the protection of spaces other than stairways, corridors and escape routes, at least one detector complying with 7.7.1.1.11 shall be installed in each such space.

203. .3 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. Detectors which were located in the overhead shall be a minimum distance of 0.5 m away from bulkheads, except in corridors, lockers and stairways.

204. .4 The maximum spacing of detectors shall be in accordance with the table t.E3.204.1 below

TABLE T.E7.204.1 – MAXIMUM SPACING OF DETECTORS

Type of detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37m ²	9m	4.5m
Smoke	74m ²	11m	5.5m

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

205. .5 Electrical wiring which forms parts of the system shall be so arranged as to avoid machinery spaces of major fire hazard, and other enclosed spaces of major fire hazard except, where it is necessary, to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

300. 7.7.1.3 Design requirements

301. .1 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.

302. .2 Smoke detectors shall be certified to operate before the smoke density exceeds 12.5 % obscuration per metre, but not until the smoke density exceeds 2 % obscuration per metre. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the

satisfaction of the Administration having regard to the avoidance of detector insensitivity or over-sensitivity.. After installation, the system shall be tested under varying conditions of engine operation and ventilation.

400. 7.7.2 Fire detection for periodicallyunattended machinery spaces

401. A fixed fire-detection and fire alarm system for periodicallyunattended machinery spaces shall comply with the followingrequirements:

- a. .1 The fire-detection system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted.
- b. .2
- c. The detection system shall initiate audible and visual alarms

- d. distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the operating compartment is unmanned the alarm shall sound in a place where a responsible member of the crew is on duty.
- e. .2 After installation, the system shall be tested under varying

500. 7.7.3 Fixed fire-extinguishing systems

501. 7.7.3.1 Application Areas of major fire hazard shall be protected by an approved fixed fire-extinguishing system operable from the operating compartment and, where provided, from a control position which is adequate for the fire hazard that may exist. The system shall comply with E7.502 and E7.503 or with alternative arrangements approved by the Administration taking into account the recommendations and guidelines developed by the Organization* and be capable of local manual control and remote control from the continuously manned control stations.

502. 7.7.3.2 Additional fixed fire-extinguishing systems not required by the Code, but fitted to the craft were to meet the design requirements of this Code, except for the second discharge required for fixed gas fire-extinguishing systems.

503. 7.7.3.3 General requirements

- a. .1 In all craft where gas is used as the extinguishing medium, the quantity of gas shall be sufficient to provide two independent discharges. The second discharge into the space shall only be activated manually from a position outside the space being protected. Where the space has a local fire-suppression system installed, based on the guidelines developed by the Organization*, to protect fuel oil, lubricating oil and hydraulic oil located near exhaust manifolds, turbo chargers or similar heated surfaces on main and auxiliary internal combustion engines, a second discharge need not be required.
 - a.1. Refer to the Guidelines for the approval of water-based local application of fixed fire-suppression systems, to be developed by the Organization.
- b. .2 The use of a fire-extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use will adversely affect the earth's ozone layer and/or gives off toxic gases in such quantities
- c. .3 The necessary pipes for conveying fire-extinguishing medium into protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led.

Non-return valves shall be installed in discharge lines between cylinders and manifolds. Suitable provision shall be made to prevent inadvertent admission of the medium to any space. Pipelines may pass through accommodation spaces, provided they were of substantial thickness and their tightness was verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm². In addition, pipelines passing through accommodation areas shall only be joined by welding and shall not be fitted with drains or other openings within such spaces. Pipelines shall not pass through refrigerated spaces.

- d. .4 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.
- e. .5 Means shall be provided to close all openings which may admit air to, or allow gas to escape from, a protected space. Openings that may admit air to, or allow gas to escape from, a protected space shall be capable of being closed from outside the protected space.
- f. .6 Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, the Administration shall require the provision of an additional quantity of fire-extinguishing medium corresponding to the gross volume of the machinery space being increased by the volume of air receivers converted to free air volume. Alternatively, a discharge pipe connected to a safety valve may be fitted to each air receiver, provided it leads directly to the open air.
- g. .7 Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or which personnel can be expected to enter (e.g., ro-ro spaces) and where their access was facilitated by doors or hatches or to which they have access. The alarm shall automatically operate (e.g., by opening of the release cabinet door) for a suitable period before the medium is released, but not less than 20 s. Visible alarm shall be arranged in addition to the audible alarm.
- h. .8 The means of control of any fixed gas fire-extinguishing system shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system, having regard to the safety of personnel.

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| <p>i. .9 Automatic release of fire-extinguishing medium shall not be permitted.</p> <p>j. .10 Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected. Spaces were considered as separated where divisions comply with tables E4.100 and E4.200, as appropriate, or the divisions were gastight and of steel or equivalent materials.</p> <p>k. .11 Pressure containers required for the storage of fire-extinguishing medium shall be located outside protected spaces in accordance with Pressure containers may be located inside the space to be protected if in the event of accidental release persons will not be endangered.</p> <p>l. .12 Means shall be provided for the crew to safely check the quantity of medium in the containers. without moving the containers completely from their fixing position.</p> <p>m. .13 Containers for the storage of fire-extinguishing medium and associated pressure components shall be designed having regard to their locations and maximum ambient temperatures expected in service.</p> <p>n. .14 When the fire-extinguishing medium was stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible location. For the purpose of the application of tables E4.100 and E4.200, such storage rooms shall be treated as control stations. For the storage rooms for fire-extinguishing media of fixed gas fire-extinguishing systems, the following apply:</p> <p>n.1. .1 the storage room shall not be used for any other purposes;</p> <p>n.2. .2 if the storage space was located below deck, it shall be located no more than one deck below the open deck and shall be directly accessible by a stairway or ladder from the open deck;</p> <p>n.3. .3 spaces shall be effectively ventilated. Spaces which were located below deck or spaces where access from the open deck was not provided, shall be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and shall be sized to provide at least 6 air changes per hour; and</p> <p>n.4. .4 access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjacent enclosed spaces shall be gastight.</p> | <p>o. .15 Spare parts for the system shall be stored on board or at a base port.</p> <p>p. .16 If the release of a fire extinguishing medium produces significant over or under pressurisation in the protected space, means shall be provided to limit the induced pressures to acceptable limits to avoid structural damage.</p> <p>504. 7.7.3.4 Carbon dioxide systems</p> <p>a. .1 For cargo spaces, the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30 % of the gross volume of the largest cargo space so protected in the craft.</p> <p>b. .2 For machinery spaces, the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:</p> <p>b.1. .2.1 40 % of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40 % or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or</p> <p>b.2. .2.2 35 % of the gross volume of the largest machinery space protected, including the casing; provided that the above-mentioned percentages may be reduced to 35 % and 30 % respectively for cargo craft of less than 2,000 gross tonnage; provided also that if two or more machinery spaces are not entirely separate they shall be considered as forming one space.</p> <p>c. .3 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m³/kg.</p> <p>d. .4 For machinery spaces, the fixed piping system shall be such that 85 % of the gas can be discharged into the space within 2 min.</p> <p>e. .5 Two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used to discharge the gas from its storage containers. A second control shall be used for opening the valve of the piping which conveys the gas into the protected spaces.</p> <p>f. .6 The two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass type enclosure conspicuously located adjacent to the box.</p> |
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600. 7.7.4 Portable fire extinguishers

601. Control stations, public spaces, crew accommodation, corridors and service spaces shall be provided with portable fire extinguishers of approved type and design. At least five portable extinguishers shall be provided, and so positioned, as to be readily available for immediate use. In addition, at least one extinguisher suitable for machinery space fires shall be positioned outside each machinery space entrance.

Each portable fire extinguisher shall:

- a. .1 not exceed 23 kg in total mass;
- b. .2 have a capacity of at least 5 kg if of powder or carbon dioxide type
- c. .3 have a capacity of at least 9 l if of foam type;
- d. .4 be examined annually;
- e. .5 be provided with a sign indicating the date when was last examined;
- f. .6 be hydraulic-pressure tested (cylinders and propellant bottles) every 10 years;
- g. .7 not be placed in accommodation spaces if of carbon dioxide type;
- h. .8 if located in control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the craft, be provided with extinguishing media which were neither electrically conductive nor harmful to the equipment and appliances;
- i. .9 be ready for use and located in easily accessible places such that it can be reached quickly and easily at any time in the event of a fire;
- j. .10 be located such that its serviceability was not impaired by the weather, vibration or other external factors; and
- k. .11 be provided with a device to identify whether it has been used.

700. 7.7.5 Fire pumps, fire mains, hydrants and hoses

Fire pumps, and appropriate associated equipment, or alternative effective fire-extinguishing systems shall be fitted as follows:

701. .1 At least two pumps powered by independent sources of power shall be arranged. Each pump shall have at least two-thirds the capacity of a bilge pump, but not less than 25 m³/h. Each fire pump shall be able to deliver sufficient quantity and pressure of water to simultaneously operate the hydrants as required by .4.

702. .2 The arrangement of the pumps shall be such that in the event of a fire in any one compartment, all the fire pumps will not be put out of action.

703. .3 Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the craft, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. The fire main shall be capable of being drained and shall be fitted with valves arranged so that fire main branches can be isolated when the main was used for purposes other than fire-fighting. The spindles of manually operated valves shall be easily accessible and all valves shall be clearly marked.

704. .4 Hydrants shall be so arranged so that any location on the craft can be reached by the water jets from two fire hoses from two different hydrants, one of the jets being from a single length of hose. Ro-ro spaces hydrants shall be located so that any location within the space can be reached by two water jets from two different hydrants, each jet being supplied from a single length of hose. One hydrant shall be located in the vicinity of and outside each entrance to a machinery space.

705. .5 Each fire hose shall be of non-perishable material. Fire hoses shall have a length of:

- a. .1 at least 10 m;
- b. .2 not more than 15 m in machinery spaces; and
- c. .3 not more than 20 m for other spaces and open decks.

706. .6 Each fire hose shall be provided with a nozzle of an approved dual purpose type (i.e. spray/jet type) incorporating a shutoff.

800. 7.7.6 Protection of deep fat cooking equipment

801. Where deep-fat cooking equipment is installed, all such installations shall be fitted with:

- a. .1 an automatic or manual fixed extinguishing system tested to an appropriate standard acceptable to the Organization*;

* Refer to ISO 15371 - Ships and marine technology - Fire-extinguishing systems for protection of galley deep-fat cooking equipment - Fire tests.

- b. .2 a primary and back up thermostat with an alarm to alert the operator in the event of failure of either thermostat;

- c. .3 arrangements for automatically shutting off the electrical power to the deep-fat cooking equipment upon activation of the extinguishing system;
- d. .4 an alarm for indicating operation of the extinguishing system in the galley where the equipment is installed; and
- e. .5 controls for manual operation of the extinguishing system which are clearly labelled for ready use by the crew.

E8. 7.8 PROTECTION OF SPECIAL CATEGORY SPACES AND RO-RO SPACES

100. 7.8.1 Structural protection

101. 7.8.1.1 Subject to E8.102 boundaries of special category spaces shall be insulated in accordance with tables E7.601.a. and E7.400.

102. 7.8.1.2 The vehicle deck of a special category space or a ro-ro space, including an open ro-ro space, need only be insulated on the underside if required. Vehicle decks located totally within ro-ro spaces may be accepted without structural fire protection, provided these decks were not part of, or do not provide support to, the craft's main load-carrying structure and provided satisfactory measures were taken to ensure that the safety of the craft, including fire-fighting abilities, integrity of fire resisting divisions and means of evacuation, was not affected by a partial or total collapse of these internal decks.

103. 7.8.1.3 Indicators shall be provided on the navigating bridge which shall indicate when any door leading to or from the special category space or ro-ro space is closed.

104. 7.8.1.4 Fire doors in boundaries of special category spaces leading to spaces below the vehicle deck shall be arranged with coamings of a height of at least 100 mm.

200. 7.8.2 Fixed fire-extinguishing system

201. 7.8.2.1 Each special category space and ro-ro space shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space, provided that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test in conditions simulating a flowing petrol fire in the space to be not less effective in controlling fires likely to occur in such a space.

202. 7.8.2.2 The pumps of the system shall be capable of maintaining:

- a. .1 half the total required application rate with any one pump unit out of function, for category A craft; and

- b. .2 the total required application rate with any one pump unit out of function, for category B craft.

203. 7.8.2.3 Fixed fire-extinguishing systems shall fulfil the following requirements:

- a. .1 the valve manifold shall be provided with a pressure gauge, and each of the valves shall be marked to identify the protected areas;
- b. .2 instructions for maintenance and operation of the installation shall be set up in the room where the valves were located; and
- c. .3 the piping system shall be provided with a sufficient number of drainage valves.

300. 7.8.3 Patrols and detection

301. 7.8.3.1 A continuous fire patrol shall be maintained in special category spaces and ro-ro spaces unless a fixed fire detection and fire alarm system, complying with the requirements E7.100, and a television surveillance system are provided. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The spacing and location of detectors shall be tested taking into account the effects of ventilation and other relevant factors.

302. 7.8.3.2 Manually operated call points shall be provided as necessary throughout the special category spaces and ro-ro spaces and one shall be placed close to each exit from such spaces. Manually operated call points shall be spaced so that no part of the space shall be more than 20 m from a manually operated call point.

400. 7.8.4 Fire-extinguishing equipment

401. 7.8.4.1 There shall be provided in each special category space and ro-ro space, which shall consist of a metal L-shaped pipe, the long limb being approximately 2 m in length and capable of being fitted to a fire hose, and the short limb being approximately 250 mm in length and fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle;

- a. .1 at least three water fog applicators;
- b. .2 one portable foam applicator unit consisting of an air foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing 20 l of foam-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire of at least 1.5 m³/min. At least two portable foam applicator units shall be available in the craft for use in such space; and
- c. .3 portable fire extinguishers of approved type and design shall be located so that no point in the space is more than approximately 15 m walking distance from an extinguisher, provided that at least one

portable extinguisher is located at each access to such space. In addition to complying with E7.600, fire extinguishers shall be suitable for A and B class* fires and have a capacity of 12 kg dry powder or equivalent.

* Refer to publication IEC 60529 -° of protection provided by enclosures (IP Code), in particular, refer to the standards for an ingress protection of at least IP 55 or refer to the publication IEC 60079 series - Electrical apparatus for explosive gas atmospheres, in particular, refer to the standards for protection by an apparatus for use in zone 2 areas.

500. 7.8.5 Ventilation system

501. 7.8.5.1 There shall be provided an effective power ventilation system for the special category spaces and ro-ro spaces sufficient to give at least 10 air changes per hour while navigating and 20 air changes per hour at the quayside during vehicle loading and unloading operations. The system for such spaces shall be entirely separated from other ventilation systems and shall be operating at all times when vehicles are in such spaces. Ventilation ducts serving special category spaces and ro-ro spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces.

502. 7.8.5.2 The ventilation shall be such as to prevent air stratification and the formation of air pockets.

503. 7.8.5.3 Means shall be provided to indicate in the operating compartment any loss or reduction of the required ventilating capacity.

504. 7.8.5.4 Arrangements shall be provided to permit a rapid shutdown and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

505. 7.8.5.5 Ventilation ducts, including dampers, shall be made of steel or other equivalent material. Ducts lying inside the served space may be made of non-combustible or fire-restricting material.

600. 7.8.6 Scuppers, bilge pumping and drainage

601. 7.8.6.1 In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks consequent to the operation of the fixed pressure water-spraying system, pumping and drainage arrangements shall be such as to prevent such accumulation. Scuppers fitted for this purpose shall be so arranged as to ensure that such water is rapidly discharged directly overboard. Alternatively, pumping and drainage facility shall be provided additional to the requirements of chapter 10. When it is required to maintain watertight or weathertight integrity, as appropriate, the scuppers shall be arranged so that they can be operated from outside the space protected.

602. 7.8.6.2 In respect of scuppers and drainage pumps fitted in accordance with E7.601

- a. .1 the amount of water for which drainage was provided shall take into account the capacity of both the water spraying system pumps and required number of fire hose nozzles;
- b. .2 the drainage system shall have a capacity of not less than 125% of the capacity specified in .1 above; and
- c. .3 bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment.

700. 7.8.7 Precautions against ignition of flammable vapours or liquids

701. 7.8.7.1 On any deck or platform, if fitted, on which vehicles are carried and on which explosive vapours might be expected to accumulate, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, equipment which may constitute a source of ignition of flammable vapours and, in particular, electrical equipment and wiring, shall be installed at least 450 mm above the deck or platform. Electrical equipment installed more than 450 mm above the deck or platform shall be of a type enclosed and protected by an enclosure having an ingress protection based on an international standard acceptable to the Organization *.

However, if the installation electrical equipment and wiring less than 450 mm above the deck or platform was necessary for the safe operation of the craft, such electrical equipment and wiring may be installed provided that the equipment is certified "safe type" based on an international standard acceptable to the Organization. *

* Refer to the publication IEC 60079 series - Electrical apparatus for explosive gas atmospheres, in particular, refer to the standards for equipment and wiring to be suitable for use in zone 1 areas.

702. 7.8.7.2 If installed in an exhaust ventilation duct, electrical equipment shall be certified "safe type". * The equipment and wiring, if fitted, shall be suitable for use based on standards acceptable to the Organization ** and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

* Refer to publication IEC 60092.

** Refer to zone 1 areas as defined in the publication IEC 60079 series.

703. 7.8.7.3 If pumping and drainage arrangements are provided, it shall be ensured that:

- a. .1 water contaminated with petrol or other flammable substances is not drained to machinery

spaces or other spaces where sources of ignition may be present; and

- b. .2 electrical equipment fitted in tanks or other components of the drainage system shall be of a type suitable for use in explosive petrol/air mixtures.

800. 7.8.8 Open ro-ro spaces

801. 7.8.8.1 Open ro-ro spaces shall comply with the requirements set out in E8.801, E8.802, E8.803, E8.804 and E8.600.

802. 7.8.8.2 For those parts of a ro-ro space which are completely open from above, the requirements set out in E8.802, E8.301 and E8.600 need not be complied with. However, a continuous fire patrol or a television surveillance system shall be maintained.

E9. 7.9 MISCELLANEOUS

100. Control plans

101 7.9.1 There shall be permanently exhibited, for the guidance of the master and officers of the craft, fire control plans showing clearly for each deck the following positions: the control stations, the sections of the craft which are enclosed by fire-resisting divisions together with particulars of the fire alarms, fire detection systems, the sprinkler installations, the fixed and portable fire-extinguishing appliances, the means of access to the various compartments and decks in the craft, the ventilating system (including particulars of the master fan controls, the positions of dampers and identification numbers of the ventilating fans serving each section of the craft), the location of the international shore connection, if fitted, and the position of all means of control referred to in E5.103, E6.102, E7.101 and E7.501. The text of such plans* shall be in the official language of the flag state. However, if the language is not English, French or Spanish, a translation into one of those languages shall be included.

* Refer to Graphical Symbols for Fire Control Plans, adopted by the Organization by resolution A.654(16).

102. 7.9.2 A duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel.

200. Openings in fire resisting divisions

201. Except for any hatches between cargo, special category, ro-ro, store, and baggage spaces and between such spaces and the weather decks, all openings shall be provided with permanently attached means of closing which shall be at least as effective for resisting fires as the divisions in which they are fitted.

202. It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only.

203. Fire doors bounding areas of major fire hazard and stairway enclosures shall satisfy the following requirements:

- a. .1 The doors shall be self-closing and be capable of closing with an angle of inclination of up to 3.5° opposing closure. The approximate time of closure for hinged fire doors shall be no more than 40 s and no less than 10 s from the beginning of their movement with the craft in the upright position. The approximate uniform rate of closure for sliding fire doors shall be of no more than 0.2 m/s and no less than 0.1 m/s with the craft in the upright position.
- b. .2 Remote released sliding or power-operated doors shall be equipped with an alarm that sounds at least 5 s but no more than 10 s after the door is released from the continuously manned control station and before the door begins to move and continue sounding until the door is completely closed. Doors designed to reopen upon contacting an object in their paths shall re-open no more than 1 m from the point of contact.
- c. .3 All doors shall be capable of remote release from a continuously manned central control station, either simultaneously or in groups, and shall be capable of release also individually from a position at both sides of the door. Indication shall be provided at the fire door indicator panel in the continuously manned control station whether each of the remote released doors is closed. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system or main source of electrical power. Release switches shall have an on-off function to prevent automatic resetting of the system. Hold-back hooks not subject to continuously manned control station release shall be prohibited.
- d. .4 A door closed remotely from the continuously manned control station shall be capable of being re-opened at both sides of the door by local control. After such local opening, the door shall automatically close again.
- e. .5 Local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated after disruption of the control system or main source of electric power at least ten times (fully opened and closed) using the local controls.
- f. .6 Disruption at one door of the control system or main source of electric power shall not impair the safe functioning of the other doors.

- g. .7 Double-leaf doors equipped with a latch necessary to their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the system.
- h. .8 Doors giving direct access to special category spaces which are power-operated and automatically closed need not be equipped with alarms and remote-release mechanisms required in .E9.203.a. and E9.203.c.
- i. .9 The components of the local control system shall be accessible for maintenance and adjusting.
- j. .10 Power operated doors shall be provided with a control system of an approved type which shall be able to operate in case of fire, this being determined in accordance with the Fire Test Procedures Code. This system shall satisfy the following requirements:
 - j.1. .1 the control system shall be able to operate at a temperature of at least 200°C for at least 60 min, served by the power supply;
 - j.2. .2 the power supply for all other doors not subject to fire shall not be impaired; and
 - j.3. .3 at temperatures exceeding 200°C the control system shall be automatically isolated from the power supply and shall be capable of keeping the door closed up to at least 945°C.

204. 7.9.3.4 The requirements for integrity of fire-resisting divisions of the outer boundaries facing open spaces of a craft shall not apply to glass partitions, windows and side scuttles. Similarly, the requirements for integrity of fire-resisting divisions facing open spaces shall not apply to exterior doors in superstructures and deck houses.

205. 7.9.3.5 Doors in smoke-tight divisions shall be self-closing. Doors which are normally kept open shall close automatically or by remote control from a continuously manned control station.

E10. 7.10 FIREFIGHTER' S OUTFITS

100. Firefighter's outfit

101. 7.10.1 All craft other than category A passenger craft shall carry at least two firefighter' s outfits complying with the requirements of 7.10.3

- a. 7.10.1.1 In addition, there shall be provided in category B passenger craft for every 80 m, or part thereof, of the aggregate of the length of all passenger spaces and service spaces on the deck which carries such spaces or, if there is more than one such deck, on the deck which has the largest aggregate of such length, two firefighter' s outfits

and two sets of personal equipment, each comprising the items stipulated in E10.103 a. to E10.103 c.

- b. 7.10.1.2 In category B passenger craft, for each pair of breathing apparatuses there shall be provided one water fog applicator complying with the requirements of E7.401, which shall be stored adjacent to such apparatus.
- c. 7.10.1.3 The Administration may require additional sets of personal equipment and breathing apparatus, having due regard to the size and type of the craft.

102. 7.10.2 The firefighter' s outfits and sets of personal equipment shall be stored in permanently and clearly marked locations arranged so as to be easily accessible and ready for use and, where more than one firefighter' s outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions.

103. 7.10.3 A firefighter' s outfit shall consist of:

- a. .1 Personal equipment comprising:
 - a.1. .1.1 protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam or gases. The outer surface shall be water-resistant;
 - a.2. .1.2 boots of rubber or other electrically non-conductive material;
 - a.3. .1.3 a rigid helmet providing effective protection against impact;
 - a.4. .1.4 an electric safety lamp (hand lantern) of an approved explosion-proof type certified to a standard acceptable to the Organization * with a minimum burning period of 3 h; and.
 - a.5. .1.5 An axe

* Refer to gas group II A and temperature class T 3 of the publication IEC 60079 series.

- b. A breathing apparatus of an approved type which may be either:

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

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

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

E11. REQUIREMENTS FOR PASSENGER HIGH SPEED CRAFT

100. 7.11 Arrangement

7.11.1 For category B craft, the public spaces shall be divided into zones according to the following:

.1 The craft shall be divided into at least two zones. The mean length of each zone shall not exceed 40 m.

.2 For the occupants of each zone there shall be an alternative safe area to which it is possible to escape in case of fire. The alternative safe area shall be separated from other passenger zones by smoke-tight divisions of non-combustible materials or fire-restricting materials extending from deck to deck. The alternative safe area can be another passenger zone. Alternative safe areas shall be dimensioned on the basis of one person per seat and 0.35 m² per person of the net remaining area, based on the maximum number of persons they are called to accommodate in an emergency.

.3 The alternative safe area shall, as far as practicable, be located adjacent to the passenger zone it is intended to serve. There shall be at least two exits from each passenger zone, located as far away from each other as possible, leading to the alternative safe area. Escape routes shall be provided to enable all passengers and crew to be safely evacuated from the alternative safe area within the structural fire protection time for areas of major fire hazard.

7.11.2 Category A craft need not be divided into zones.

7.11.3 Control stations, stowage positions of life-saving appliances, escape routes and places of embarkation into survival craft shall not, as far as practicable, be located adjacent to any areas of major or moderate fire hazard.

200. 7.12 Ventilation

Each safe zone in the public spaces shall be served by a ventilation system independent of the ventilation system of any other zone. The ventilation fans of each zone in the public spaces shall also be capable of being

independently controlled from a continuously manned control station.

300. 7.13 Fixed sprinkler system

301. 7.13.1 Public spaces and service spaces, crew accommodation areas where sleeping berths are provided, storage rooms other than those containing flammable liquids, and similar spaces shall be protected by a fixed sprinkler system based on the standards developed by the Organization *. A stairway open at one deck shall be considered part of the space to which it was open and consequently shall be protected by any sprinkler system provided for that space. Manually operated sprinkler systems shall be divided into sections of appropriate size and the valves for each section, start of sprinkler pump(s) and alarms shall be capable of being operated from two spaces separated as widely as possible, one of which shall be a continuously manned control station. In category B craft, no section of the system shall serve more than one of the zones required E11.100

* Refer to the Standards for fixed sprinkler systems for high speed craft, adopted by the Organization by resolution MSC.44(65), as may be amended.

302. 7.13.2 Plans of the system shall be displayed at each operating station. Suitable arrangements shall be made for the drainage of water discharged when the system is activated.

303. 7.13.3 Category A craft need not comply with the requirements of E11.300 and E11.302 providing that:

- a. smoking is not permitted;
- b. - sales shops, galleys, service spaces, ro-ro spaces and cargo spaces are not fitted;
- c. - the maximum number of passengers carried does not exceed 200; and
- d. - the voyage duration at 90% of maximum speed from departure port to destination when fully laden does not exceed 2 h.

E12. REQUIREMENTS FOR HIGH SPEED CARGO CRAFT

100. 7.14 Control stations

Control stations, life-saving appliances stowage positions, escape routes and places of embarkation into survival craft shall be located adjacent to crew accommodation areas.

200. 7.15 Cargo spaces

Cargo spaces, except open deck areas or refrigerated holds, shall be provided with an approved automatic smoke-detection system complying with E7.100 to indicate at the control station the location of outbreak of a fire in all normal operating conditions of the installations and shall be protected by an approved fixed quick-acting fire-extinguishing system complying with E7.501 operable from the control station.

300. 7.16 Fixed sprinkler system

7.16.1 Crew accommodation where sleeping berths are provided, having a total deck area greater than 50 m² (including corridors serving such accommodation), shall be protected by a fixed sprinkler system based on the standards developed by the Organization*.

* Refer to the Standards for fixed sprinkler systems for high speed craft, adopted by the Organization by resolution MSC.44(65), as may be amended.

7.16.2 Plans of the system shall be displayed at each operating station. Suitable arrangements shall be made for the drainage of water discharged when the system is activated.

E13. EXITS AND MEANS OF ESCAPE

100. 4.7 Exits and means of escape

101. 4.7.1 In order to ensure immediate assistance from the crew in an emergency situation, the crew accommodation, including any cabins, shall be located with due regard to easy, safe and quick access to the public spaces from inside the craft. For the same reason, easy, safe and quick access from the operating compartment to the public spaces shall be provided.

102. 4.7.2 The design of the craft shall be such that all occupants may safely evacuate the craft into survival craft under all emergency conditions, by day or by night. The positions of all exits which may be used in an emergency, and of all life-saving appliances, the practicability of the evacuation procedure, and the evacuation time to evacuate all passengers and crew shall be demonstrated.

103. 4.7.3 Public spaces, evacuation routes, exits, lifejacket stowage, survival craft stowage, and the embarkation stations shall be clearly and permanently marked and illuminated as.

104. 4.7.4 Each enclosed public space and similar permanently enclosed space allocated to passengers or crew shall be provided with at least two exits as widely separated as practical. All exits shall clearly indicate the directions to the evacuation station and safe areas. On category A craft and cargo craft, at least one exit shall give access to the evacuation station serving the persons in the enclosed space considered, and all other exits shall give access to a position on the open deck from which access to

an evacuation station is provided. On category B craft, exits shall provide access to the alternative safe area required by E11.100; external routes may be accepted providing that the requirements of E12.103 and E12.111 are complied with.

105. 4.7.5 Subdivision of public spaces to provide refuge in case of fire may be required in compliance with 7.4.4.1 and 7.11.1.

106. 4.7.6 Exit doors shall be capable of being readily operated from inside and outside the craft in daylight and in darkness. The means of operation shall be obvious, rapid and of adequate strength. Doors along escape routes should, wherever appropriate, open in the direction of escape flow from the space served.

107. 4.7.7 The closing, latching and locking arrangements for exits shall be such that it is readily apparent to the appropriate crew member when the doors are closed and in a safe operational condition, either in direct view or by an indicator. The design of external doors shall be such as to minimize the possibility of jamming by ice or debris.

108. 4.7.8 The craft shall have a sufficient number of exits which are suitable to facilitate the quick and unimpeded escape of persons wearing approved lifejackets in emergency conditions, such as collision damage or fire.

109. 4.7.9 Sufficient space for a crew member shall be provided adjacent to exits for ensuring the rapid evacuation of passengers.

110. 4.7.10 All exits, together with their means of opening, shall be adequately marked for the guidance of passengers. Adequate marking shall also be provided for the guidance of rescue personnel outside the craft.

111. 4.7.11 Footholds, ladders, etc., provided to give access from the inside to exits shall be of rigid construction and permanently fixed in position. Permanent handholds shall be provided whenever necessary to assist persons using exits, and shall be suitable for conditions when the craft has developed any possible angles of list or trim.

112. 4.7.12 At least two unobstructed evacuation paths shall be available for the use of each person. Evacuation paths shall be disposed such that adequate evacuation facilities will be available in the event of any likely damage or emergency conditions, and evacuation paths shall have adequate lighting supplied from the main and emergency sources of power.

113. 4.7.13 The width of corridors, doorways and stairways which form part of the evacuation paths shall be not less than 900 mm for passenger craft and 700 mm for cargo craft. This width may be reduced to 600 mm for corridors, doorways and stairways serving spaces where persons are not normally employed. There shall be no protrusions in evacuation paths which could cause injury,

ensnare clothing, damage lifejackets or restrict evacuation of disabled persons.

114. 4.7.14 Adequate notices shall be provided to direct passengers to exits.

115. 4.7.15 Provision shall be made on board for embarkation stations to be properly equipped for evacuation of passengers into life-saving appliances. Such provision shall include handholds, anti-skid treatment of the embarkation deck, and adequate space which is clear of cleats, bollards and similar fittings.

116. 4.7.16 Main propulsion machinery spaces and ro-ro spaces shall be provided with two means of escape leading to a position outside the spaces from which a safe route to the evacuation stations is available. One means of escape from the main propulsion machinery spaces shall avoid direct access to any ro-ro space. Main propulsion machinery spaces having a length of less than 5 m and not being routinely entered or continuously manned, may be provided with a single means of escape.

200. 4.8 Evacuation time

201. 4.8.1 The provisions for evacuation shall be designed such that the craft can be evacuated under controlled conditions in a time of one third of the structural fire protection time (SFP) provided in E4.200 for areas of major fire hazard areas after subtracting a period of 7 min for initial detection and extinguishing action.

$$\text{Evacuation time} = \left(\frac{\text{SFP} - 7}{3} \right)$$

where:

SFP : structural fire protection time (min).

202. 4.8.2 An evacuation procedure, including an evacuation analysis carried out taking into account the guidelines developed by the Organization shall be developed for the information of the Administration in connection with the approval of fire insulation plans and for assisting the owners and builders in planning the evacuation demonstration required in E12.203 (see note). The evacuation procedures shall include:

- a. .1 the emergency announcement made by the master;
- b. .2 contact with base port;
- c. .3 the donning of lifejackets;
- d. .4 manning of survival craft and emergency stations;
- e. .5 the shutting down of machinery and oil fuel supply lines;
- f. .6 the order to evacuate;

- g. .7 the deployment of survival craft and marine escape systems and rescue boats;
- h. .8 the bowing in of survival craft;
- i. .9 the supervision of passengers;
- j. .10 the orderly evacuation of passengers under supervision;
- k. .11 crew checking that all passengers have left the craft;
- l. .12 the evacuation of crew;
- m. .13 releasing the survival craft from the craft; and
- n. .14 the marshalling of survival craft by the rescue boat, where provided.

Note: Refer to the Guidelines to be developed by the Organization.

203. 4.8.3 Achievement of the required evacuation time (as ascertained in accordance with E12.201) shall be verified by a practical demonstration conducted under controlled conditions in the presence of the Administration, and shall be fully documented and verified for passenger craft by the Administration.

204. 4.8.4 Evacuation demonstrations shall be carried out with due concern for the problems of mass movement or panic acceleration likely to arise in an emergency situation when rapid evacuation is necessary. The evacuation demonstrations shall be dry shod with the survival craft initially in their stowed positions and be conducted as follows:

- .1 The evacuation time on a category A craft shall be the time elapsed from the moment the first abandon craft announcement is given, with any passengers distributed in a normal voyage configuration, until the last person has embarked in a survival craft, and shall include the time for passengers and crew to don lifejackets.
- .2 The evacuation time on a category B craft and cargo craft shall be the time elapsed from the moment the order to abandon the craft is given until the last person has embarked in a survival craft. Passengers and crew may be wearing lifejackets and prepared for evacuation, and they may be distributed among assembly stations.
- .3 For all craft the evacuation time shall include the time necessary to launch, inflate and secure the survival craft alongside ready for embarkation.

205. 4.8.5 The evacuation time shall be verified by an evacuation demonstration which shall be performed using the survival craft and exits on one side, for which the evacuation analysis indicates the greatest evacuation time, with the passengers and crew allocated to them.

206. 4.8.6 On craft where a half trial is impracticable, the Administration may consider a partial evacuation trial using a route which the evacuation analysis shows to be the most critical.

207. 4.8.7 The demonstration shall be carried out in controlled conditions in the following manner in compliance with the evacuation plan.

.1 The demonstration shall commence with the craft afloat in harbour, in reasonably calm conditions, with all machinery and equipment operating in the normal seagoing condition.

.2 All exits and doors inside the craft shall be in the same position as they are under normal seagoing condition.

.3 Safety belts, if required, shall be fastened.

.4 The evacuation routes for all passengers and crew shall be such that no person need enter the water during the evacuation.

208. 4.8.8 For passenger craft, a representative composition of persons with normal health, height and weight shall be used in the demonstration, and shall consist of different sexes and ages so far as it is practicable and reasonable.

4.8.9 The persons, other than the crew selected for the demonstration, shall not have been specially drilled for such a demonstration.

4.8.10 An emergency evacuation demonstration shall be carried out for all new designs of high-speed craft and for other craft where evacuation arrangements differ substantially from those previously tested.

4.8.11 The specific evacuation procedure followed during the craft's initial demonstration on which certification is based shall be included in the craft operating manual together with the other evacuation procedures contained in E12.202. During the demonstration, video recordings shall be made, both inside and outside the craft, which shall form an integral part of the training manual.

300. 4.9 Baggage, stores, shops and cargo compartments

301. 4.9.1 Provision shall be made to prevent shifting of baggage, stores and cargo compartment contents, having due regard to occupied compartments and accelerations likely to arise. If safeguarding by positioning is not practicable, adequate means of restraint for baggage, stores and cargo shall be provided. Shelves and overhead shelves for storage of carry-on baggage in public spaces shall be provided with adequate means to prevent the luggage from falling out in any conditions that may occur.

302. 4.9.2 Controls, electric equipment, high-temperature parts, pipelines or other items, the damage or failure of which could affect the safe operation of the craft or which may require access by crew members during a

voyage, shall not be located in baggage, store and cargo compartments unless such items are adequately protected so that they cannot be damaged or, where applicable, operated inadvertently by loading, by unloading or by movement of the contents of the compartment.

303. 4.9.3 Loading limits, if necessary, shall be durably marked in those compartments.

304. 4.9.4 Having regard to the purpose of the craft, the closures of the exterior openings of the luggage and cargo compartments as well as special-category spaces shall be appropriately weathertight.

CHAPTER H FIRE FIGHTING PREVENTION, AND DETECTION FOR CARRIAGE OF DANGEROUS GOODS ON BOARD SHIPS

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H8. REQUIREMENTS FOR ELECTRICAL EQUIPMENT APPLICABLE TO DANGEROUS GOODS IN SOLID BULK FORM

H1. GENERAL

100. 7.17 General

101. 7.17.1 In addition to complying with the requirements of Subchapter E11 for cargo craft and with the requirements of Subchapter E9 for both passenger and cargo craft as appropriate, craft types and cargo spaces referred to in H1.200 intended for the carriage of dangerous goods shall comply with the requirements of this paragraph, as appropriate, except when carrying dangerous goods in limited quantities, unless such requirements have already been met by compliance with the requirements elsewhere in this chapter (see note 2). The types of craft and modes of carriage of dangerous goods are referred to in H1.200 and in table T.H1.101.11, where the numbers appearing in T.H1.101.2 are referred to in the top line.

102. Cargo craft of less than 500 gross tonnage constructed on or after 1 July 2002 shall comply with this paragraph, but the Administration of the State whose flag the craft is entitled to fly may, in consultation with the port State, reduce the requirements and such reduced requirements shall be recorded in the document of compliance.

Note 1 : Refer to the International Maritime Dangerous Goods Code (IMDG Code), adopted by the Organization by resolution A.716(17), as amended, and the Code of Safe Practice for Solid Bulk Cargoes, adopted by resolution A.434(XI), as amended.

Note 2 : Refer to chapter 3.4 of the International Maritime Dangerous Goods Code (IMDG Code) for the provisions on the carriage of "limited quantities".

103. (RBNA comment) The dangerous goods are to be adequately distant from any fire source

200. 7.17.2 Application of tables T.H1.101.1 and T.H1.101.2

201. The following craft types and cargo spaces shall govern the application of tables T.H1.101.1 and T.H1.101.2:

- .1 craft and cargo spaces not specifically designed for the carriage of freight containers but intended for the carriage of dangerous goods in packaged form including goods in freight containers and portable tanks;
- .2 purpose-built container craft and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks;
- .3 craft and ro-ro spaces intended for the carriage of dangerous goods; and
- .4 craft and cargo spaces intended for the carriage of solid dangerous goods in bulk.

300. 7.17.3 Requirements

301. Unless otherwise specified the following requirements shall govern the application of tables H1.101.1, H1.101.2 and H1.101.3 to both "on deck" and "under deck" stowage of dangerous goods. The numbers of the following sub-sections are indicated in the first column of the above-mentioned tables.

H2. REQUIREMENTS APPLICABLE FOR VARIOUS CLASSES OF DANGEROUS GOODS

100. 7.17.3.1 Water supply

101. .1 Arrangements shall be made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurization or by suitably placed remote starting arrangements for the fire pumps..

102. .2 The quantity of water delivered shall be capable of supplying four nozzles simultaneously capable of being trained on any part of the cargo space when empty. This amount of water may be applied by equivalent means to the satisfaction of the Society.

103. .3 Means shall be provided for effectively cooling the designated under-deck cargo space by at least 5 l/min per square meter of the horizontal area of cargo spaces, either by a fixed arrangement of spraying

nozzles or by flooding the cargo space with water. Hoses may be used for this purpose in small cargo spaces and in small areas of larger cargo spaces at the discretion of the Society. However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces.

104. .4 Provision to flood a designated under-deck cargo space with suitable specified media may be substituted for the requirements in E1.103. A high expansion foam system is acceptable unless cargoes react dangerously with water (see the IMO "International Maritime Dangerous Goods Code").

105. .5 The total required capacity of the water supply shall satisfy the requirements of E1.102 and E1.103, if applicable, simultaneously calculated for the largest designed cargo space. The capacity requirements of E1.102 shall be met by the total capacity of the main fire pump(s), not including the capacity of the emergency fire pump, if fitted. If a drencher system is used to satisfy the requirements of E1.103, the drencher pump shall also be taken into account in this total capacity calculation. (SOLAS Reg. II-2/19.3.1)

200. 7.17.3.2 Sources of ignition

201. Electrical equipment and wiring shall not be fitted in enclosed cargo spaces or vehicle spaces unless it is essential for operational purposes in the opinion of the Society.

202. However, if electrical equipment is fitted in such spaces, it shall be of a certified safe type for use in the dangerous environments to which it may be exposed unless it is possible to completely isolate the electrical system (e.g. by removal of links in the system, other than fuses).

203. Cable penetrations of the decks and bulkheads shall be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces shall be protected against damage from impact.

104. Any other equipment which may constitute a source of ignition of flammable vapour shall not be permitted. (SOLAS Reg. II-2/19.3.2)

300. 7.17.3.3 Detection system

301. Enclosed cargo spaces shall be provided with an approved automatic smoke detection system or with a detection system which, in the opinion of the Administration gives equivalent protection.

400. 7.17.3.4 Ventilation of cargo spaces

401. .1 Adequate power ventilation shall be provided in enclosed cargo spaces. The arrangement shall be such as to provide for at least six air changes per hour in the cargo space, based on an empty cargo space, and for removal of vapours from the upper or lower parts of the cargo space, as appropriate. (SOLAS Reg. II-2/19.3.4.1)

402. .2 The fans shall be such as to avoid the possibility of ignition of flammable gas airmixtures. Suitable wire mesh guards shall be fitted over inlet and outlet ventilation openings. (SOLAS Reg. II-2/19.3.4.1).

403. .3 If adjacent spaces are not separated from cargo spaces by gastight bulkheads or decks then they are considered as part of the enclosed cargo space and the ventilation requirements shall apply to the adjacent space as for the enclosed cargo space itself

404. .4 Natural ventilation shall be provided in enclosed cargo spaces intended for the carriage of solid dangerous goods in bulk, where there is no provision for mechanical ventilation. (SOLAS Reg. II-2/19.3.4.3)

405. For open-top container craft, power ventilation was required only for the lower part of the cargo hold for which purpose-built ducting was required. The ventilation rate shall be at least two air changes per hour based on the empty hold volume below the weather deck.

500. 7.17.3.5 Bilge pumping – additional requirements

501. Where it is intended to carry flammable or toxic liquids in enclosed cargo spaces, the bilge pumping system shall be designed to protect against inadvertent pumping of such liquids through machinery space piping or pumps. Where large quantities of such liquids are carried, consideration shall be given to the provision of additional means of draining those cargo spaces. These means shall be to the satisfaction of the Society.

502. .1 If the bilge drainage system is additional to the system served by pumps in the machinery space, the capacity of the system shall be not less than 10 m³/h per cargo space served. If the additional system is common, the capacity need not exceed 25 m³/h. The additional bilge system need not be arranged with redundancy. Whenever flammable liquids are carried, the bilge line into the machinery space shall be isolated either by fitting a blank flange or by a closed lockable valve (RBNA comment: outside the machinery space or at the point of exit from the machinery space located close to the bulkhead).

505. .3 Enclosed spaces outside machinery spaces containing bilge pumps serving cargo spaces intended for carriage of flammable or toxic liquids shall be fitted with separate mechanical ventilation giving at least 6 air changes per hour. Electrical equipment in the space is to be in accordance with Part II, Title 104, Section 7, Chapter D. If the space has access from another enclosed space, the door shall be self-closing.

504. .2 If gravity drainage is applied to the bilge drainage of cargo spaces, the drainage shall be either led directly overboard or to a closed drain tank located outside the machinery spaces. The tank shall be

provided with a vent pipe to a safe location on the open deck. Drainage from a cargo space into bilge wells in a lower space is only permitted if that space satisfies the same requirements as the cargo space above. (SOLAS Reg. II-2/19.3.5)

600. 7.17.3.6 Personnel protection

601. .1 Four sets of full protective clothing, resistant to chemical attack, shall be provided in addition to the fire-fighter's outfits required by SOLAS, chapter II-2, regulation 10.10 and shall be selected taking into account the hazards associated with the chemicals being transported and the standards developed by the Organization according to the class and physical state. The protective clothing shall cover all skin, so that no part of the body is unprotected.

602. .2 At least two self-contained breathing apparatuses additional to those required by SOLAS, chapter II-2, regulation 10 shall be provided. Two spare charges suitable for use with the breathing apparatus shall be provided for each required apparatus. Passenger ships carrying not more than 36 passengers and cargo ships that are equipped with suitably located means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required apparatus. (SOLAS Reg. II-2/19.3.6)

700. 7.17.3.7 Portable fire extinguishers

701. Portable fire extinguishers having a capacity of at least 12 kg of dry chemical powder or equivalent are to be fitted in the cargo compartments. Such portable fire extinguishers are to be additional to those required in other places, in this Title. (SOLAS Reg. II-2/19.3.7)

800. 7.17.3.8 Fixed fire extinguishing system

801. .1 A ship engaged in the carriage of dangerous goods in any cargo spaces shall be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provision of the IMO Fire Safety Systems Code or with a fire-extinguishing system which, in the opinion of the Society, gives equivalent protection for the cargoes carried. (SOLAS Reg. II-2/19.3.13)

802. .2 Each open ro-ro cargo space having a deck above it and each space deemed to be a closed ro-ro

cargo space not capable of being sealed shall be fitted with an approved fixed pressure water-spray system for manual operation which is to protect all parts of any deck and vehicle platform in such space. The capacity of the system shall be sufficient for providing at least 5 liters/m²/min of the horizontal area of decks and platforms. The use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective may be permitted. (SOLAS Reg. II-2/19.3.9)

900. Insulation of machinery space boundaries (RBNA)

901. The boundary bulkheads between the cargo compartments and machinery spaces category "A" are to be insulated with a class "A-60" standard, except where the dangerous goods are stowed in such a way as to be 3.00 meters distant, horizontally, from those bulkheads.

902. Stowage above machinery space of category "A" is not permitted in any case. (SOLAS Reg. II-2/19.3.8)

H3. SEPARATION OF THE RO-RO COMPARTMENTS

100. Separation of the ro-ro compartments

101. 7.1.3.9A separation, suitable to minimise the passage of dangerous vapours and liquids, is to be provided between a closed ro-ro space and an adjacent open ro-ro space. Where such separation is not provided the ro-ro space is considered to be a closed ro-ro space over its entire length and the special requirements for closed ro-ro spaces apply.

102. 7.1.3.10A separation, suitable to minimise the passage of dangerous vapours and liquids, is to be provided between a closed ro-ro space and an adjacent weather deck. Where such separation is not provided the arrangements of the closed ro-ro space are to be in accordance with those required for the dangerous goods carried on the adjacent weather deck. (SOLAS Reg. II-2/19.3.10)

TABLE T.H1.101.1 (Table 7.17.1): APPLICATION OF THE REQUIREMENTS OF H2 (7.17.3) TO DIFFERENT MODES OF CARRIAGE OF DANGEROUS GOODS IN SHIPS AND IN THE CARGO COMPARTMENTS (SOLAS Chapter 19, Table 19.1)

Requirements of Subchapter H1	Subchapter H1.200					
	Weather decks .1 to .4 inclusive	H1.201.a	H1.201.b	H1.201.c		H1.201.d
		Not specifically designed	Container cargo spaces	Closed ro-ro spaces (5)	Open ro-ro spaces	Solid dangerous goods in bulk
						Shipborne barges

H2.101	X	X	X	X	X	For application of requirements to different classes of dangerous goods, see Table T.H1.101.3	X
H2.102	X	X	X	X	X		-
H2.103	-	X	X	X	X		X
H2.104	-	X	X	X	X		X
H2.200	-	X	X	X	X		X ⁽⁴⁾
H2.300	-	X	X	X	-		X ⁽⁴⁾
H2.401	-	X	X ⁽¹⁾	X	-		X ⁽⁴⁾
H2.402	-	X	X ⁽²⁾	X	-		X ⁽⁴⁾
H2.500	-	X	X	X	-		-
H2.601	X	X	X	X	X		-
H2.602	X	X	X	X	X		-
H2.700	X	X	-	-	X		-
H2.801	X	X	X ⁽²⁾	X	X		-
H2.802	-	-	-	X ⁽³⁾	X		-
H3.101	-	-	-	X	-		-
H2.102	-	-	-	X	-		-

x : Where “x” appears in the Table, it means that this requirement is applicable to all classes of dangerous goods as given in the appropriate line of Table T.H1.101.2 except as indicated by the following notes.

(1) For classes 4 and 5.1 solids, not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For the purpose of this requirement, a portable tank is a closed freight container.

(2) Applicable to decks only.

(3) Applies only to closed ro-ro spaces, not capable of being sealed.

(4) In the special case where the barges are capable of containing flammable vapours or, alternatively, if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived to the satisfaction of the Society.

(5) Special category spaces shall be treated as closed ro-ro spaces when dangerous goods are carried.

TABLE T.H1.101.2 : APPLICATION OF THE REQUIREMENTS TO DIFFERENT MODES OF CARRIAGE OF DANGEROUS GOODS IN SOLID BULK FORM IN SHIPS AND IN THE CARGO COMPARTMENTS (SOLAS Chapter 19, Table 19.2)

Class	4.1	4.2	4.3 ⁽⁶⁾	5.1	6.1	8	9
H2.101	X	X	-	X	-	-	X
H2.102	X	X	-	X	-	-	X
H2.200	X	X ⁷	X	X ⁸	-	-	X ⁸
H2.401	-	X ⁷	X	-	-	-	-
H2.402	X ⁹	X ^{7,10}	X ¹⁰	X ^{7,9}	-	-	X ^{7,9}
H2.404	X	X	X	X	X	X	X
H2.600	X	X	X	X	X	X	X

(6) The hazards of the substances of this class are such that the Society must give special consideration to the construction and to the equipment of the involved ship, besides complying with the requirements shown in this Table.

(7) Applicable only to seed paste containing solvent extracts, for ammonia nitrate and for ammonia nitrate fertilizers

(8) Only applicable to ammonia nitrate and to the ammonia nitrate fertilizers. However, a degree of protection in accordance with the 60079 Standards of the IEC is sufficient.

(9) If it is adequate when wire screen meshes are required

(10). For seedcake containing residues of solvent extraction and cargoes of BC Code Class 4.3, two separate fans shall be permanently fitted unless portable type fans have been adapted for being securely fitted (e.g., fixed) prior to loading and during the voyage. The ventilation system shall comply with the provisions of h2.4011 and h2.402.. Ventilation shall be such that any escaping gases cannot reach public spaces or crew accommodation on or under deck.

(11) When "mechanically-ventilated spaces" are required by the IMDG Code.

(12) Stow 3 m horizontally away from the machinery space boundaries in all cases.

(13) Refer to the IMDG Code.

(14) As appropriate for the goods to be carried.

(15) FP means flashpoint.

(16) Under the provisions of the IMDG Code, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.

(17) Only applicable to dangerous goods evolving flammable vapour listed in the IMDG Code.

(18) Only applicable to dangerous goods having a flashpoint < 23°C listed in the IMDG Code.

(19) Only applicable to dangerous goods having a subsidiary risk class 6.1.

(20) Under the provisions of the IMDG Code, stowage of class 2.3 having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.

(21) Under the provisions of the IMDG Code, stowage of class 4.3 liquids having a flashpoint < 23°C under deck or in enclosed ro-ro spaces is prohibited

Additional note: Class MHB (Materials Hazardous only in Bulk)– materials which may possess

TABLE T.H1.101.3 : APPLICATION OF THE REQUIREMENTS APPLICABLE TO DIFFERENT MODES OF CARRIAGE, EXCEPT FOR
DANGEROUS GOODS IN SOLID BULK (SOLAS Chapter 19, Table 19.3)

Class/R ule	1.1 to 1.6	1.4S	2.1	2.2	2.3 flammable	2.3 non flammable	3 FP < 23 °C 1 ₁₅	3 FP ≤ 23 FP ≤ 60 °C	4.1	4.2	4.3 liquids	4.3 solids	5.1	5.2	6.1 liquids FP < 23°C	6.1 liquids FP ≤ 23 FP ≤ 60 °C	6.1 liquids	6.1 solids	8 liquids FP < 23°C	8liquids FP ≤ 23 FP ≤	8 liquids	8 solids	9
See notes					2 0		1 5	1 5			2 1			1 6	1 5	15			1 5	1 5			
H2.101	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
H2.102	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
H2.103	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H2.104	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H2.200	X	-	X	-	X	-	X	-	-	-	X 1 8	-	-	-	X	-	-	-	X	-	-	-	X 17
H2.300	X	X	X	X	-	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-
H2.401	-	-	X	-	-	X	X	-	X 1 1	X 1 1	X	X	X 1 1	-	X	X	-	X 1 1	X	X	-	-	X 11
H2.402	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	X	-	-	X	X	-	-	X 17
H2.500	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	X	-	X	-	X 1 9	-	-
H2.601	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X 14
H2.602	-	-	-	-	-	-	X	X	X	X	X	X	-	-	X	X	-	-	X	X	-	-	-
H2.700	X 1 2	-	X	X	X	X	X	X	X	X	X	X	X 1 1	X	X	X	-	-	X	X	-	-	-
H2.801	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
H2.802	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
H3.101	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

CHAPTER T INSPECTIONS AND TESTS

CHAPTER CONTENTS

T1. CARGO OR SERVICE HANDLING

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T6. HULL OPENINGS- PROTECTION AND CLOSING

T7. HULL EQUIPMENT AND APPENDAGES

T1. CARGO OR SERVICE HANDLING

100. Performance trials

See RBNA “*Guide for Lifting Appliances*”.

T2. MOORING AND ANCHORING

100. Windlass test

101. Provide evidence that the minimum speed of hoisting, in windlass drive by driving force, is in compliance with subchapter D2.600.

102. Provide evidence that, in the case of manual drive, a single person can hoist the anchor without excessive effort, is in compliance with the subchapter D2.600.

103. Evidence should be provided of the capacity of the windlass braked during the test of anchor free dropping.

200. Test of anchor handling

201. During the anchor manoeuvring it should be proved that there is not be the possibility of a "stuck anchor".

300. Integrity test

301. The hawse pipes will be tightness tested as an independent tank, in accordance with the requirements laid down in Part II Section 2 of these Rules.

T3. MANOEUVRING SYSTEM

100. Watertightness test of rudder and nozzle ring

101. In double plate rudder and propeller nozzle ring,

carry out watertightness test with the pressure corresponding to the design draft (d), which can be replaced by air pressure equal to the greater of the values in bar: 1.96 or 0.98 d.

200. Hydraulic system test

201. The hydraulic piping system installed should be tested with hydrostatic pressure of 1.5 times the nominal working pressure.

300. Rudder test drive

301. The power operated steering gear should be capable to move the rudder fully submerged, with the vessel running ahead at the maximum continuous rated speed, from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds. For tugs the time for this manoeuvre should be 18 seconds.

302. This manoeuvre should be carried out also with the vessel in reverse, in maximum rotation of the engines, permitting, however, its time interval, which should be registered, be greater.

303. The fitness between the angles specified in bridge, or other place of control, in relation to those indicated in the steering gear compartment are to be checked, as well as the angle limit switches.

400. Test of emergency or manual drive

401. The manoeuvre conditions with the emergency and / or manual system is to be registered.

T4. LIFESAVING APPLIANCES

100. Certificates

101. The compliance with the Safety Plan is to be verified as well as the validity of the last servicing.

102. The certificates of homologation issued by the Maritiem Authority (for Brazilian flag ships, the DPC) should be verified.

200. Abandon ship test

201. The on-load release devices of the lifesaving equipment, such as lifeboat davits, should be tested.

T5. FIRE SAFETY EQUIPMENT

100. Certificates and documents

101. The compliance with the Safety Plan should be checked as well as the validity of the last servicing.

102. There should be verified the certificates of

homologations issued by the Administration of the flag State.

200. Inspections and tests

201. Hydrant testing should be carried out in accordance with the Regulations of the Administration of the flag State. See part II, Title 11, Section 6 – Piping systems, of these Rules.

202. **Tests for fire extinguishers:** the containers of fixed fire extinguishing system should be subjected to hydrostatic tests every 05 (five) years. These tests should comply with existing or ABNT standards or provided for in these Rules, if those are missing. If these containers have been inspected annually, and have not presented loss of pressure, corrosion, and have not been discharged in the period, the hydrostatic test can be postponed for 5 (five) more years, in at most 50% of the containers of the system; the other containers should be tested in 5 (five) years. If any container shows unsatisfactory result on the hydrostatic testing, all other container component of the fixed system should be tested. **NORMAM 01**

203. The other appliances will be inspected according to the Regulation of the Administration of the flag State. See Part II, Title 11, Section 6 – Piping systems, of these Rules.

T6. HULL OPENINGS-PROTECTION AND CLOSING

100. Tests of the cargo hatch covers

101. Cargo hatchcovers will be tested with a hose jet, in the form required in subchapter D6.100 for weather tight opening – type 2.

200. Testing of hull accesses

201. The hull accesses are to be hose jet tested, in the form required in subchapter D6.100 for weather tight opening – type 2.

T7. HULL EQUIPMENT AND APPENDAGES

100. Installation

101. Such facilities will be verified for operability and attachment to the hull

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