Sjöfartsverkets författningssamling

Föreskrifter och allmänna råd om ändring i Sjöfartsverkets föreskrifter och allmänna råd (SJÖFS 2003:12) om säkerheten på höghastighetsfartyg (HSC-koden 2000);

SJÖFS 2008:9

Utkom från trycket
den 12 maj 2008

beslutade den 1 april 2008.

Sjöfartsverket föreskriver följande med stöd av 2 kap. 1 § fartygssäkerhetsförordningen (2003:438) i fråga om verkets föreskrifter och allmänna råd (SJÖFS 2003:12) om säkerheten på höghastighetsfartyg (HSC-koden 2000)

dels att 2 § ska upphöra att gälla,

dels att 1, 3 och 5 §§ ska ha följande lydelse,

dels att i föreskrifterna ska införas en ny paragraf, 1 a §, och nya bilagor, bilaga 2 och 3, samt

beslutar följande allmänna råd.

1 § Svenska fartyg och utländska fartyg på svenskt sjöterritorium med byggnadsdatum den 1 juli 2002 eller senare ska, om inget annat anges, för att äga rätt till ett höghastighetsfartygscertifikat, uppfylla koden för höghastighetsfartyg (International Code of Safety for High-Speed Craft, 2000 (HSC-koden 2000)), som antogs av den internationella sjöfartsorganisationen (IMO) den 5 december 2000 genom IMO-resolution MSC.97(73)[1] i den utsträckning som anges i koden. Med ett fartygs byggnadsdatum menas det datum då fartyget kölsträcks eller befinner sig på ett motsvarande byggnadsstadium; motsvarande byggnadsstadium innebär att byggnation som kan identifieras till ett enskilt fartyg har påbörjats och sammansättning av detta fartyg har nått en omfattning av minst 50 ton, eller 3 % av den uppskattade totalvikten av allt material som ingår i fartygets struktur, om det är mindre.

Den arabiska, engelska, franska, kinesiska, ryska och spanska texten av koden ska ha samma giltighet[2]. Kodens engelska text finns i bilagan till dessa föreskrifter.

[1] Resolution MSC.97(73), Adoption of the International Code of Safety for High-Speed Craft, 2000.

[2] Texterna på arabiska, franska, kinesiska, ryska och spanska finns tillgängliga hos IMO.

1 a § De ändringar till HSC-koden 2000 som antogs av den internationella sjöfartsorganisationen (IMO) genom IMO-resolution MSC.175(79)[3] och IMO-resolution MSC.222(82)[4], i den utsträckning som anges i bilaga 2, ska gälla vid tillämpningen av dessa föreskrifter.

Den arabiska, engelska, franska, kinesiska, ryska och spanska texten av resolutionerna ska ha samma giltighet[5].

Allmänna råd

Vid tillämpning av	***bör nedanstående tillämpas***
HSC-koden 2000	*tolkningarna i MSC/Circ.1102[6], om inte annat anges nedan*
HSC-koden 2000, kapitel 7	*MSC/Circ.912[7]*
HSC-koden 2000, regler i 4.8.2	*MSC/Circ.1166[8]*
HSC-koden 2000, regel 9.1.5	*MSC/Circ.1177[9]*
ev. testförfarande enligt HSC-koden, regel 2.2.3.2.2	*MSC/Circ.1195[10]*

Ovanstående cirkulär finns i bilaga 3.

3 § Ett fartyg som är godkänt enligt regelverk i andra medlemsstater inom Europeiska unionen och Europeiska ekonomiska samarbetsområdet samt i Turkiet jämställs med fartyg som uppfyller kraven i dessa föreskrifter, under förutsättning att en likvärdig säkerhetsnivå uppnås genom de regelverken.

5 § Fartyg som är certifierade enligt dessa föreskrifter anses uppfylla kraven i kapitel I-IV[11] och reglerna 18–20 i kapitel V[12] i 1974 års inter-

[3] Resolution MSC.175(79), Adoption of Amendments to the International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code).

[4] Resolution MSC.222(82), Adoption of Amendments to the International Code of Safety for High Speed Craft (1994 HSC Code).

[5] Texterna på arabiska, franska, kinesiska, ryska och spanska finns tillgängliga hos IMO.

[6] MSC/Circ.1102, Interpretations of the 2000 HSC Code and SOLAS Chapter X.

[7] MSC/Circ.912, Interpretations of Standards for Fixed Sprinkler Systems for High-Speed Craft (Resolution MSC.44(65)).

[8] MSC/Circ.1166, Guidelines for a Simplified Evacuation Analysis for High-Speed Passenger Craft.

[9] MSC/Circ.1177, Unified Interpretation of the 2000 HSC Code.

[10] MSC/Circ.1195, Guidelines for the Conduct of High Speed Craft Model Tests.

[11] SJÖFS 1999:17, SJÖFS 2004:28, SJÖFS 2004:29, SJÖFS 2004:31 och SJÖFS 2006:1.

[12] SJÖFS 2006:17.

nationella konvention om säkerheten för människoliv till sjöss (SOLAS 1974) samt lastlinjekonventionen med tillhörande protokoll[13].

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1. Denna författning träder i kraft den 1 juli 2008.

2. Ändringar och tillägg till HSC-koden 2000 genom IMO-resolution MSC.222(82)[14] som rör fartygs struktur gäller inte för fartyg med byggnadsdatum från och med den 1 juli 2002 till den 1 juli 2008, om inte annat särskilt anges.

På Sjöfartsverkets vägnar

JOHAN FRANSON

Jonas Gustafsson
(Sjöfartsinspektionen)

[13] SJÖFS 2006:1.

[14] MSC.222(82), Adoption of Amendments to the International Code of Safety for High Speed Craft (1994 HSC Code).

Utgivare: Jan-Olof Selén, Sjöfartsverket, Norrköping ISSN 0347-531X

Bilaga 2

Bilaga 3

ANNEX*

AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000

CHAPTER 1
GENERAL COMMENT AND REQUIREMENTS

2 In paragraph 1.3.4.1, the words “operational speed” are replaced by the words “90% of maximum speed”.

3 In paragraph 1.3.4.2, the words “operational speed” are replaced by the words “90% of maximum speed”.

4 In paragraph 1.4.16, the words “(main displays and controls for equipment specified in 13.2 to 13.7)” are inserted after the words “navigating equipment”.

5 In paragraph 1.4.29, the word “food” is inserted between the words “cooking or” and “heating”.

6 The existing paragraph 1.4.35 is replaced by the following:

> “1.4.35 *Machinery spaces* are spaces containing internal combustion engines either used for main propulsion or having an aggregate total power output of more than 110 kW, generators, oil fuel units, major electrical machinery and similar spaces and trunks to such spaces.”

7 The existing paragraph 1.4.44 is deleted and the existing paragraphs 1.4.32 to 1.4.43 are renumbered as paragraphs 1.4.33 to 1.4.44, with a new paragraph 1.4.32 being inserted as follows:

* The annex also contains at the end a list of footnotes to be added or to be amended in the 2000 HSC Code.

"1.4.32 *IMDG Code* means the International Maritime Dangerous Goods (IMDG) Code as defined in chapter VII of the Convention."

8 At end of paragraph 1.4.53, the following new sentence is inserted:

"Such spaces containing no cooking appliances may contain:

.1 coffee automats, toasters, dish washers, microwave ovens, water boilers and similar appliances, each of them with a maximum power of 5 kW; and

.2 electrically heated cooking plates and hot plates for keeping food warm, each of them with a maximum power of 2 kW and a surface temperature not above 150°C."

9 In paragraph 1.4.54, the text after "the average" is replaced by the following:

"crest-to-trough height of the highest one third of the zero-upcrossing waves in a specified period."

10 At end of paragraph 1.8.1, the following text is inserted:

"On all craft, all certificates issued under this chapter, or certified copies thereof, shall be carried on the craft. Except where the flag State is a Party to the 1988 SOLAS Protocol, a copy of each of these certificates shall be posted up in a prominent and accessible place in the craft."

11 In paragraph 1.9.1, the second sentence is deleted and the following new paragraph 1.9.1.1 is inserted:

"1.9.1.1 On all craft, transit voyages may be undertaken without a valid Permit to Operate High-Speed Craft provided the craft is not operating commercially with passengers or cargo onboard. For the purpose of this provision, these transit voyages include delivery voyages, i.e., builder's port to base port, and voyages for repositioning purposes, i.e., change of base port and/or route. Such transit voyages in excess of the limits set out in this Code may be undertaken provided that:

.1 the craft has a valid High-Speed Craft Safety Certificate or similar before the start of such a voyage;

.2 the operator has developed a safety plan for the voyage including any temporary accommodation and all relevant matters listed in 18.1.3 to ensure that the craft is capable of safely completing the transit voyage;

.3 the master of the craft is provided with the materials and information necessary to operate the craft safely during the transit voyage; and

.4 the Administration is satisfied that arrangements have been made for the safe conduct of the voyage."

12 The following new paragraph 1.9.7 is added after the existing paragraph 1.9.6:

"1.9.7 In determining the worst intended conditions and the operational limitations on all craft for insertion in the Permit to Operate, the Administration shall give consideration to all the parameters listed in annex 12. The limitations assigned shall be those that enable compliance with all of these factors."

13 In paragraph 1.15.1, the words "four years" are replaced by the words "six years".

CHAPTER 2
BUOYANCY, STABILITY AND SUBDIVISION

14 The existing text of subparagraph .1 of paragraph 2.1.3 is replaced by the following:

".1 *Downflooding point* means any opening, irrespective of size, that would permit passage of water through a water/weathertight structure (e.g., opening windows), but excludes any opening kept closed to an appropriate standard of water/weathertightness at all times other than when required for access or for operation of portable submersible bilge pumps in an emergency (e.g., non-opening windows of similar strength and weathertight integrity to the structure in which they are installed)."

15 In paragraph 2.1.3, subparagraphs .2 to .6 are renumbered as subparagraphs .3 to .7 and the following new subparagraph .2 is inserted after the existing subparagraph .1:

".2 *Elsewhere* when applied to sill and coaming heights in 2.2.7 and 2.2.8 is taken as applying to all weathertight and watertight closures located on or below the datum."

16 The following new paragraph 2.1.5 is inserted and the existing paragraphs 2.1.5 and 2.1.6 are renumbered as paragraphs 2.1.6 and 2.1.7:

"2.1.5 The adequacy of mathematical simulations must first be demonstrated by correlation with full-scale or model tests for the appropriate type of craft. It may be appropriate to use mathematical simulations to help to identify the more critical scenarios for subsequent physical testing.* "

* Some mathematical simulation methods are not well suited to accurate modelling of extreme events. For safety level 3 or 4, it may be appropriate to use model testing as a precursor to, or instead of, full-scale testing.

17 The following text is inserted at the end of paragraph 2.1.7:

"Where calculations are employed, it shall first be shown that they correctly represent dynamic behaviour within the operational limitations of the craft."

18 The third and subsequent sentences of paragraph 2.2.9.3 are replaced by the following:

"In unmanned machinery spaces, main and auxiliary sea inlet and discharge controls in connection with the operation of machinery shall either:

.1 be located at least 50% of the significant wave height corresponding to the worst intended conditions above the deepest flooded waterline following damage specified in 2.6.6 to 2.6.10; or

.2 be operable from the operating compartment."

19 In paragraph 2.3.4, the content of table 2.3.4 is replaced by the following:

"Table 2.3.4 – Application of annexes 7 and 8 to monohull and multihull craft

GM_T	Angle of maximum GZ	
	≤ 25º	> 25º
≤ 3 m	annex 7 or annex 8	annex 8
> 3 m	annex 7	annex 7 or annex 8

"

20 In paragraph 2.3.4, the definitions of B_{WL}, A_{WP} *and* ∇ which appear after "where:" are deleted and the definition "GZ = righting lever" is inserted to replace them.

21 In paragraph 2.4.2, the words "chapter 18" are replaced by the words "chapters 17 and 18".

22 In paragraph 2.6.5, the following new subparagraph .5 is inserted after the existing subparagraph .4:

".5 void spaces filled with foam or modular buoyancy elements or any space without a venting system are considered to be void spaces for the purposes of this paragraph, provided such foam or elements fully comply with 2.6.4."

23 In paragraph 2.6.6, the final sentence is deleted.

24 The following new section of text is added in continuation of paragraph 2.6.7 after subparagraph 2.6.7.3:

"The damages described in this paragraph shall be assumed to have the shape of a parallelepiped.* Applying this to figure 2.6.7 a, the inboard face at its mid-length shall be tangential to, or otherwise touching in a least 2 places, the surface corresponding to the specified transverse extent of penetration, as illustrated in figure 2.6.7 a.

Side damage shall not transversely penetrate a greater distance than the extent of $0.2\nabla^{1/3}$ at the design waterline, except where a lesser extent is provided for in 2.6.7.2. Refer to figures 2.6.7b and c.

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* A parallelepiped is defined as "a solid contained by parallelograms" and a parallelogram is defined as "a four-sided rectilinear figure whose opposite sides are parallel".

If considering a multihull, the periphery of the craft is considered to only be the surface of the shell encompassed by the outboard surface of the outermost hull at any given section.

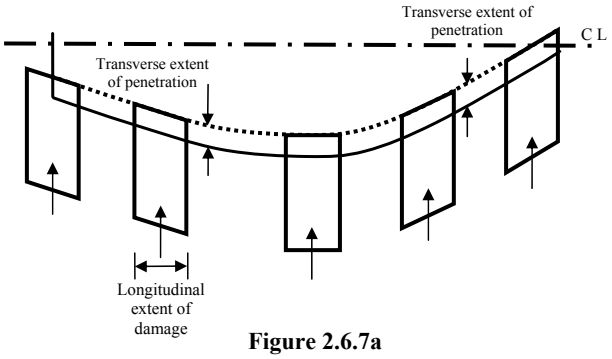

Figure 2.6.7a

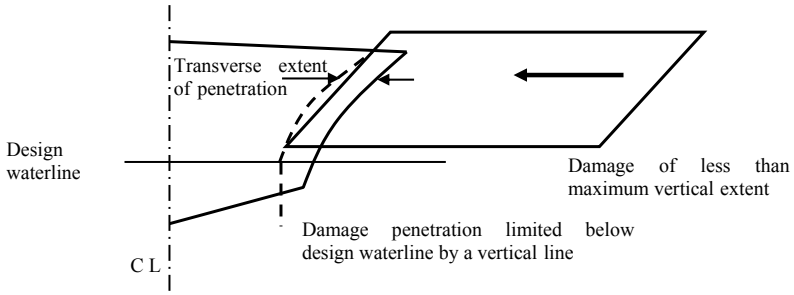

Figure 2.6.7 b

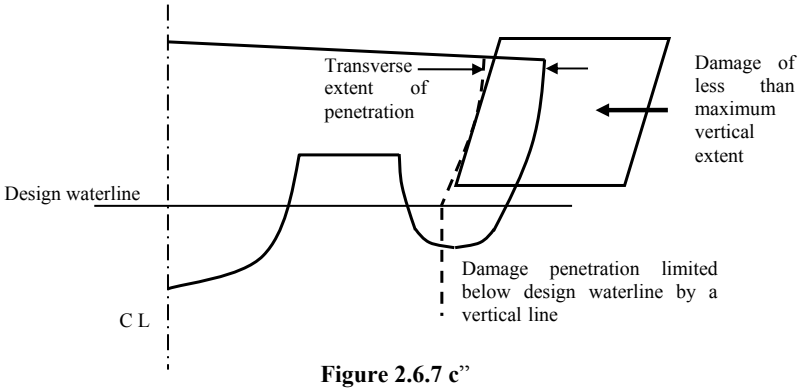

Figure 2.6.7 c”

25 In paragraph 2.6.7, the word “damages” is replaced by the word “damage”.

26 Existing paragraphs 2.6.8 to 2.6.12 are renumbered as paragraphs 2.6.9 to 2.6.13 and the following new paragraph 2.6.8 is inserted after the existing paragraph 2.6.7:

“2.6.8 *Extent of bow and stern damage*

2.6.8.1 The following extents of damage are to be applied to bow and stern, as illustrated in figure 2.6.8:

.1 at the fore end, damage to the area defined as A_{bow} in 4.4.1, the aft limit of which being a transverse vertical plane, provided that this area need not extend further aft from the forward extremity of the craft’s watertight envelope than the distance defined in 2.6.7.1; and

.2 at the aft end, damage to the area aft of a transverse vertical plane at a distance $0.2\nabla^{1/3}$ forward of the aft extremity of the watertight envelope of the hull.

2.6.8.2 The provisions of 2.6.6 in relation to damage of lesser extent remain applicable to such damage.

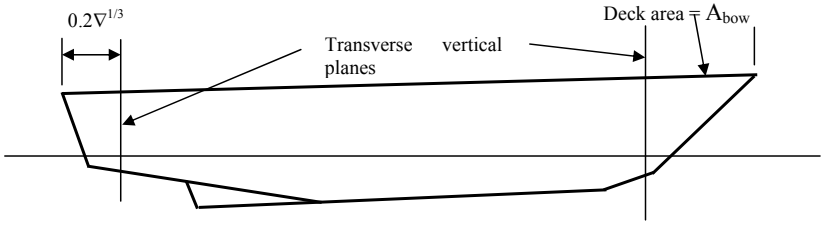

Figure 2.6.8”

27 In paragraph 2.6.9.1.1.1, the words “operational speed” are replaced by the words “90% of maximum speed”.

28 In paragraph 2.6.9.1.2, the following text is inserted at the end of the definition of “T”:

“, provided that structures such as single plate skegs or solid metal appendages shall be considered to be non-buoyant and thus excluded.”

29 The following new paragraph 2.6.9.2.3 is inserted after the existing paragraph 2.6.9.2.2:

“2.6.9.2.3 The shape of damage shall be assumed to be rectangular in the transverse plane as illustrated in figure 2.6.9.2 below. Damage is to be assumed at a series of sections within the defined longitudinal extent in accordance with figure 2.6.9.2, the mid-point of the damaged girth being maintained at a constant distance from the centreline throughout that longitudinal extent.

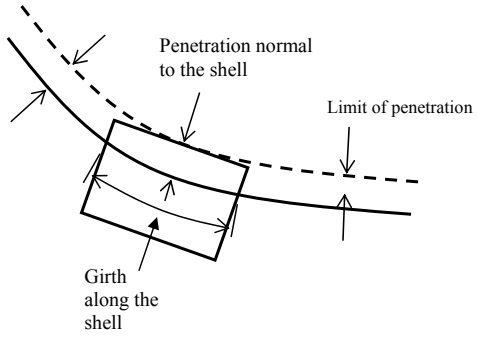

Figure 2.6.9.2"

30 In paragraph 2.6.10.1, the words "below the design waterline" are inserted between the words "hull(s)" and "which".

31 In paragraph 2.6.10.2, the following new subparagraph .4 is inserted after the existing subparagraph .3:

".4 the shape of damage shall be assumed to be rectangular in the plane of the shell of the craft, and rectangular in the transverse plane as illustrated in figure 2.6.9.2."

32 The existing paragraphs 2.7.2 to 2.7.8 are renumbered as paragraphs 2.7.3 to 2.7.9 and the following new paragraph 2.7.2 is inserted after the existing paragraph 2.7.1:

"2.7.2 On all craft, where an accurate inclining experiment is impractical owing to the height of the centre of gravity (VCG or KG) being less than one third of the transverse metacentric height (GM_T), the Administration may accept estimation of KG by detailed calculation in place of an inclining experiment. In such cases, a displacement check shall be undertaken to confirm the calculated lightship characteristics, including LCG, which may be accepted if the measured lightship displacement and LCG are respectively within 2% and 1% L relative to the estimate."

33 In paragraph 2.7.7, the following new sentence is inserted at the end of the paragraph:

"For amphibious air-cushion vehicles this may be achieved by the use of draught gauges in conjunction with deck datum plates."

34 In paragraph 2.10, the following new subparagraphs .7 to .10 are inserted after the existing subparagraph .6:

".7 Passengers assumed to be occupying seats shall be taken as having a vertical centre of gravity corresponding to being seated, with all others standing.

.8 On the decks where assembly stations are located, the number of passengers on each deck shall be that which generates the maximum heeling moment. Any remaining passengers shall be assumed to occupy decks adjacent to those on which the assembly stations are located, and positioned such that the combination

of number on each deck and total heeling moment generate the maximum static heel angle.

.9 Passengers shall not be assumed to gain access to the weather deck nor be assumed to crowd abnormally towards either end of the craft unless this is a necessary part of the planned evacuation procedure.

.10 Where there are seats in areas occupied by passengers, one passenger per seat shall be assumed, passengers being assigned to the remaining free areas of the deck (including stairways, if appropriate) at the rate of four per square metre."

35 The following new paragraph 2.12.3 is inserted after the existing paragraph 2.12.2:

"2.12.3 Demonstrating the effect of the passenger heeling moment calculated as given by 2.10 above, or a defined beam wind pressure when at speed, shall be established by conducting a trial or model test with an equivalent heeling moment applied by test weights. Passenger movement may only be neglected on craft where the safety announcement (refer to 8.4.1 and 18.7) expressly requires passengers to remain seated throughout the voyage."

CHAPTER 4
ACCOMMODATION AND ESCAPE MEASURES

36 In paragraph 4.3.4, the words "two thirds of operational speed" are replaced by the words "60% of maximum speed".

37 In paragraph 4.3.7, the words "operational speed" are replaced by the words "90% of maximum speed".

38 In paragraph 4.4.1, the words "operational speed" are replaced by the words "90% of maximum speed".

39 In table 4.4.2, under Design Level 2:

.1 the existing text of paragraph 1.1 is replaced by the following:

"1.1 Seatbacks with protective deformation and padding."; and

.2 the text "unless satisfactorily tested without belts in that orientation and arrangement" is inserted at the end of paragraph 1.4.

40 The following new sentence is inserted at the end of paragraph 4.4.5:

"The armrests and backrests of seats in public spaces may serve as handholds."

41 In paragraph 4.6.1, the reference to "3g" is replaced by the reference to "3".

42 In paragraph 4.7.10, the second sentence is replaced by the following:

"Clear markings, including the location of the fire control plan, shall be provided for the guidance of rescue personnel outside the craft."

43 In paragraph 4.7.12, the following text is added at the end of the paragraph:

"Doors providing escape from a space shall, where possible, be situated at opposite ends of the space. Where the doors providing escape from a space are situated in the same end of the space, the distance between those doors shall be greater than the maximum length of the space."

44 In paragraph 4.7.13, the following text is added at the end of the paragraph:

"Requirements of this paragraph do not apply to aisles (fore-aft passageways separating seating areas) or to spaces between adjacent rows of seats. However, the width of aisles and the seat pitch shall be such as to allow the craft to comply with the provisions of 4.8."

45 The existing paragraphs 4.7.14 to 4.7.16 are renumbered as paragraphs 4.7.15 to 4.7.17 respectively, and the following new paragraph 4.7.14 is inserted:

"4.7.14 Special category spaces used for stowage of motor vehicles shall be provided with walkways having a width of at least 600 mm leading to a safe means of escape."

46 In paragraph 4.7.17, the following new sentence is added at the end of the paragraph:

"At least one means of escape from a machinery space shall consist of either a ladder leading to a door or hatch (not being a horizontal flush-hatch) or a door located in the lower part of that space and giving access to an adjacent compartment from which a safe means of escape is provided."

47 The following new paragraph 4.7.18 is inserted after the existing paragraph 4.7.17:

"4.7.18 Spaces that are only entered occasionally by crew members may have only one means of escape provided that it is independent of watertight doors."

48 In paragraph 4.8.1, the following new sentence is added at the end of the paragraph:

"In determining the evacuation time, all means of escape are to be considered serviceable and they need not be dimensioned to take into account any additional number of persons that might be diverted from other means of escape if one or more of those other means of escape are lost or rendered unserviceable."

49 The existing paragraphs 4.8.10 and 4.8.11 are renumbered as paragraphs 4.8.11 and 4.8.12 and the following new paragraph 4.8.10 inserted:

"4.8.10 Where the Administration is satisfied that the evacuation time determined in accordance with 4.8.1 to 4.8.9 can thereby be accurately estimated, the Administration may accept an evacuation demonstration in which persons are not required to descend through MES or equivalent means of evacuation, provided the time required to embark into the survival craft can be determined using:

.1 data obtained from the type-approval tests of the equipment, increased by a factor based on the guidelines developed by the Organization; or

.2 time extrapolated from trials using a limited number of participants."

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* Refer to the Guidelines for a simplified evacuation analysis of high-speed passenger craft (MSC/Circ.1166), in particular paragraph 3.5.1 thereof.

CHAPTER 6
ANCHORING, TOWING AND BERTHING

50 The following new paragraph 6.1.4 is inserted after the existing paragraph 6.1.3:

"6.1.4 Under any operating load up to the breaking strength of the anchor cable or mooring lines, the loads on the bitts, bollards, etc., shall not result in damage to the hull structure that will impair its watertight integrity. A strength margin of at least 20% above the resultant load based on the minimum specified breaking strength of the relevant cable or warp shall be required."

CHAPTER 7
FIRE SAFETY

51 In paragraph 7.3.1.2, in the first bullet point, the reference to "1.4.4" is replaced by the reference to "1.4.5".

52 In paragraph 7.3.1.3, in the first bullet point, the reference to "1.4.5" is replaced by the reference to "1.4.6".

53 In paragraph 7.3.1.4, the words "as defined in 1.4.15" are replaced by the words "as defined in 1.4.16".

54 The existing paragraph 7.3.2 is renumbered as paragraph 7.3.3 and the following new paragraph 7.3.2 is inserted:

"7.3.2 In relation to the classification of spaces in 7.3.1, the following additional criteria shall be applied:

.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 7.4-1 and 7.4-2, 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.

.2 Cabinets having a deck area of less than 2 m^2 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.

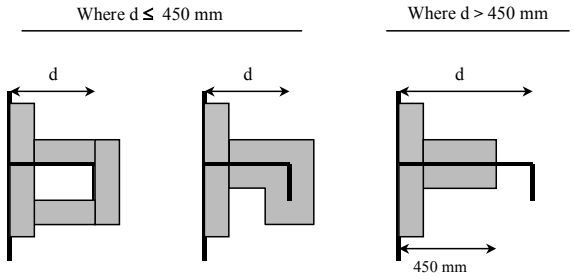
.3 Where a space has the special characteristics of two or more space groupings, the structural fire protection time of the divisions shall be the highest for the space groupings concerned. For example, the structural fire protection time of the divisions of emergency generator rooms shall be of the highest value for the space when the space is considered as being a control station (D) and a machinery space (A).”

55 The following new paragraphs 7.3.4 to 7.3.6 and associated figures 7.3.4a, 7.3.4b and 7.3.6 are inserted after the existing paragraph 7.3.3:

“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 (refer to figures 7.3.4a and 7.3.4b).

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.

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 shown in figure 7.3.6.”



d = depth of stiffener on girder

Figure 7.3.4a

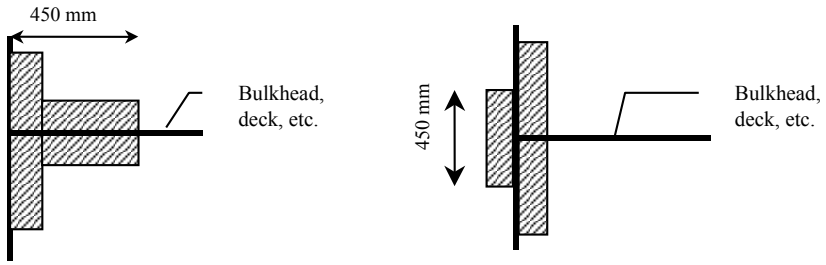


Figure 7.3.4b

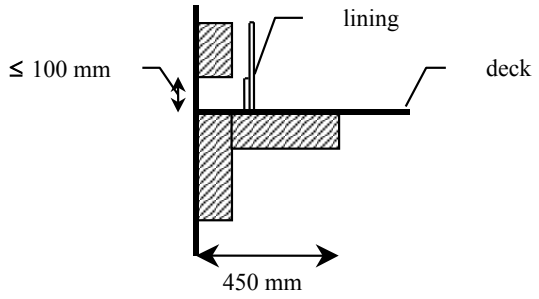


Figure 7.3.6

56 The following new paragraph 7.4.1.4 is inserted after the existing paragraph 7.4.1.3:

"7.4.1.4 Paragraph 7.4.1.3 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."

57 In tables 7.4-1 and 7.4-2, note 1 is replaced by the following:

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

58 In paragraph 7.4.2.1, in the second sentence, the words "at the lightweight condition" are replaced by the words "at least 300 mm below the craft's waterline in the lightweight condition in displacement mode".

59 At the end of paragraph 7.4.2.6, the following new sentence is added:

"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."

60 The following new paragraph 7.4.2.7 is inserted after the existing paragraph 7.4.2.6:

"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."

61 At the end of paragraph 7.4.3.2, the following sentence is added:

"The fire insulation in such spaces may be covered by metal sheets (not perforated) or by vapour proof glass cloth sealed at joints."

62 In paragraph 7.4.3.3.1, the words "e.g., desks, wardrobes, dressing tables, bureaux and dressers" are inserted after the words "case furniture".

63 In paragraph 7.4.3.4, the words "Subject to 7.4.3.5" are inserted at the beginning of the paragraph.

64 The following new paragraph 7.4.3.5 is inserted after the existing paragraph 7.4.3.4 and the existing paragraphs 7.4.3.5 to 7.4.3.10 are renumbered as paragraphs 7.4.3.6 to 7.4.3.11:

> "7.4.3.5 Paragraph 7.4.3.4 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 7.4.3.3[*]."

[*] Refer to paragraph 7.9.3.4 and the FTP Code, annex 2, paragraphs 1 and 5.1.

65 The last sentence of paragraph 7.4.4.1 is deleted.

66 The following new paragraph 7.4.4.2 is added after the existing paragraph 7.4.4.1 and the existing paragraphs 7.4.4.2 and 7.4.4.3 are renumbered as paragraphs 7.4.4.3 and 7.4.4.4:

> "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:
>
> .1 all levels are used for the same purpose;
>
> .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;
>
> .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;
>
> .4 sufficient means of escape are provided from both levels of the space directly leading to an adjacent safe area or compartment; and
>
> .5 the whole space is served by one section of the sprinkler system."

67 The second sentence of paragraph 7.4.4.4 is replaced by the following:

> "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."

68 The following sentence is added at the end of paragraph 7.5.2:

> "The use of aluminium in lubricating oil sump tanks for engines, or in lubricating oil filter housings fitted integral with the engines, is accepted."

69 In paragraph 7.6.1, the following sentence is inserted between the two existing sentences:

"The controls shall be easily accessible as well as prominently and permanently marked and shall indicate whether the shut-off is open or closed."

70 In paragraph 7.6.3.2, the words "(the junction between the duct and the galley range hood)" are inserted after the words "lower end of the duct".

71 In paragraph 7.6.3.4, the word "means" is replaced by the words "a remote means located with the above controls".

72 The following sentence is added at the end of the existing paragraph 7.6.3.5:

"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 7.6.3.2."

73 The following text is added at the end of the existing paragraph 7.6.4:

"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."

74 In paragraph 7.6.6, the following sentence is inserted before the last sentence:

"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.)."

75 In paragraph 7.7.1, the following sentence is inserted after the first sentence:

"Control stations not normally occupied (e.g., emergency generator rooms) need not be provided with manually operated call points."

76 In paragraph 7.7.1.1.4, the words ", 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" are added at the end of the first sentence.

77 In paragraph 7.7.1.1.9, in the first sentence, the text after "7.11.1" is deleted and a new sentence is added at the end of the paragraph as follows:

"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 are located in the fore or aft end of the craft or they are so arranged that they constitute common spaces on different decks (e.g., fan rooms, galleys, public spaces, etc.)."

78 The following sentence is added at the end of paragraph 7.7.1.1.10:

"In the case of a fire detection system with remotely and individually identifiable fire detectors, this requirement is met if no machinery spaces of a major fire hazard are 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."

79 In paragraph 7.7.1.1.14, the text following the words "except that" is replaced by the following:

"the control panel may be used to activate one or more of the following:

.1 paging system;

.2 fan stops;

.3 closure of fire doors;

.4 closure of fire and smoke dampers; and

.5 sprinkler system."

80 In paragraph 7.7.1.1.15, the text of the chapeau is replaced by the following:

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

81 In paragraph 7.7.1.1.15.1, the following words are added at the end of the paragraph:

"and no loop shall pass through a space twice. When this is 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."

82 In paragraph 7.7.1.1.15.2, the word "not" is inserted between the words "shall" and "render".

83 The following new paragraph 7.7.1.1.16 is inserted after the existing paragraph 7.7.1.1.15:

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

84 The last sentence of paragraph 7.7.1.2.3 is replaced by the following:

"Detectors which are located in the overhead shall be a minimum distance of 0.5 m away from bulkheads, except in corridors, lockers and stairways."

85 In the first sentence of paragraph 7.7.3.1, the words "operating compartment and, where provided, from a" are inserted between the words "the" and "control".

86 The following new paragraph 7.7.3.2 is inserted after the existing paragraph 7.7.3.1 and the existing paragraphs 7.7.3.2 and 7.7.3.3 are renumbered as paragraphs 7.7.3.3 and 7.7.3.4:

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

87 In paragraph 7.7.3.3.3, the following text is added after the first sentence:

"Pipelines may pass through accommodation spaces, provided they are of substantial thickness and their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm^2. 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."

88 The following sentence is added at the end of paragraph 7.7.3.3.5:

"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."

89 The following text is added at the end of paragraph 7.7.3.3.6:

"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."

90 In paragraph 7.7.3.3.7, the words "which personnel can be expected to enter (e.g., ro-ro spaces) and where their access is facilitated by doors or hatches or" are inserted after the words "work or" in the first sentence; and in the second sentence, the word "operate" is replaced by the words "automatically operate (e.g., by opening of the release cabinet door)".

91 The following text is added at the end of paragraph 7.7.3.3.10:

"Spaces are considered as separated where divisions comply with tables 7.4-1 and 7.4-2, as appropriate, or the divisions are gastight and of steel or equivalent materials."

92 The following text is added at the end of paragraph 7.7.3.3.12:

"without moving the containers completely from their fixing position."

93 The existing paragraph 7.7.3.3.14 is replaced by the following:

"7.7.3.3.14 When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible location. For the purpose of the application of tables 7.4-1 and 7.4-2, 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:

.1 the storage room shall not be used for any other purposes;

.2 if the storage space is 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;

.3 spaces shall be effectively ventilated. Spaces which are located below deck or spaces where access from the open deck is 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

.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."

94 The following text is added at the end of paragraph 7.7.4:

"Each portable fire extinguisher shall:

.1 not exceed 23 kg in total mass;

.2 have a capacity of at least 5 kg if of powder or carbon dioxide type;

.3 have a capacity of at least 9 *l* if of foam type;

.4 be examined annually;

.5 be provided with a sign indicating the date when was last examined;

.6 be hydraulic-pressure tested (cylinders and propellant bottles) every 10 years;

.7 not be placed in accommodation spaces if of carbon dioxide type;

.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 are neither electrically conductive nor harmful to the equipment and appliances;

.9 be ready for use and located in easily visible places such that it can be reached quickly and easily at any time in the event of a fire;

.10 be located such that its serviceability is not impaired by the weather, vibration or other external factors; and

.11 be provided with a device to identify whether it has been used."

95 In paragraph 7.7.5.1, the words "independently driven pumps" are replaced by the words "pumps powered by independent sources of power".

96 The following sentence is inserted before the last sentence of paragraph 7.7.5.3:

"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 is used for purposes other than fire-fighting."

97 The following text is added at the end of paragraph 7.7.5.4:

"One hydrant shall be located in the vicinity of and outside each entrance to a machinery space."

98 In paragraph 7.7.5.5, the text after the words "non-perishable material" is replaced by the following:

"Fire hoses shall have a length of:

.1 at least 10 m;

.2 not more than 15 m in machinery spaces; and

.3 not more than 20 m for other spaces and open decks."

99 In paragraph 7.8.1.1, the words "Subject to 7.8.1.2" are inserted at the beginning and the second sentence is deleted.

100 The following new paragraph 7.8.1.2 is added after the existing paragraph 7.8.1.1 and the existing paragraphs 7.8.1.2 and 7.8.1.3 are renumbered as paragraphs 7.8.1.3 and 7.8.1.4:

"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 are not part of, or do not provide support to, the craft's main load-carrying structure and provided satisfactory measures are taken to ensure that the safety of the craft, including fire-fighting abilities, integrity of fire resisting divisions and means of evacuation, is not affected by a partial or total collapse of these internal decks."

101 The first paragraph of 7.8.2 is renumbered 7.8.2.1 and the following text is inserted after paragraph 7.8.1:

"7.8.2.2 The pumps of the system shall be capable of maintaining:

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

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

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

.1 the valve manifold shall be provided with a pressure gauge, and each of the valves shall be marked to identify the protected areas;

.2 instructions for maintenance and operation of the installation shall be set up in the room where the valves are located; and

.3 the piping system shall be provided with a sufficient number of drainage valves."

102 The following text is added at the end of paragraph 7.8.4.1:

", 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;"

103 The following text is added at the end of paragraph 7.8.4.3:

"In addition to complying with 7.7.4, fire extinguishers shall be suitable for A and B class* fires and have a capacity of 12 kg dry powder or equivalent."

104 Paragraph 7.8.6 is renumbered as paragraph 7.8.6.1 and the words "scuppers shall be fitted so" in the first sentence are replaced by the words "pumping and drainage arrangements shall be such as to prevent such accumulation. Scuppers fitted for this purpose shall be so arranged".

105 The following new paragraph 7.8.6.2 is inserted after the existing paragraph 7.8.6.1:

"7.8.6.2 In respect of scuppers and drainage pumps fitted in accordance with 7.8.6.1:

.1 the amount of water for which drainage is provided shall take into account the capacity of both the water spraying system pumps and required number of fire hose nozzles;

.2 the drainage system shall have a capacity of not less than 125% of the capacity specified in .1 above; and

.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."

106 In paragraph 7.8.7.1, the text after the first sentence is replaced by the following:

"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

* Refer to publication IEC 60529 – Degrees 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.

electrical equipment and wiring less than 450 mm above the deck or platform is 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.

107 The existing text of paragraph 7.8.7.2 is replaced by the following:

"7.8.7.2 If installed in an exhaust ventilation duct, electrical equipment shall be certified "safe type".[1] 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."

108 In paragraph 7.10.1.2, the words "complying with the requirements of 7.8.4.1" are inserted after the words "water fog applicator".

109 In paragraph 7.10.2, the words "or sets of personal equipment shall be so stored as" are replaced by the words "and sets of personal equipment shall be stored in permanently and clearly marked locations arranged so as".

110 In paragraph 7.10.3.1.2, the words "and gloves" are deleted.

111 In paragraph 7.10.3.1.4, the word "type" is replaced by the words "explosion-proof type certified to a standard acceptable to the Organization**".

112 The words "having handle provided with high-voltage insulation" are added at the end of paragraph 7.10.3.1.5.

113 Paragraphs 7.10.3.2 and 7.10.3.2.1 are deleted, the remaining paragraph 7.10.3.2.2 is renumbered as 7.10.3.2 and the words "of an approved type" are inserted after the words "breathing apparatus".

114 The second sentence of the renumbered paragraph 7.10.3.2 is replaced by the following:

"Two spare charges suitable for use with the apparatus shall be provided for each required apparatus."

115 In paragraph 7.10.3.3, the words "sufficient length" are replaced by the words "approximately 30 m in length" and the following new sentence is added at the end:

"The lifeline shall be subjected to a test by static load of 3.5 kN for 5 min."

116 In paragraph 7.11.1.3, the words "within the structural fire protection time for areas of major fire hazard." are added at the end.

[1] Refer to publication IEC 60092.
* Refer to zone 1 areas as defined in the publication IEC 60079 series.
** Refer to gas group II A and temperature class T 3 of the publication IEC 60079 series.

117 In paragraph 7.13.1, the following sentence is inserted after the first sentence:

"A stairway open at one deck shall be considered part of the space to which it is open and consequently shall be protected by any sprinkler system provided for that space."

118 In paragraph 7.13.3, the words "operational speed" are replaced by the words "90% of maximum speed".

119 The existing text of subparagraph .2 of paragraph 7.17.2.2 is replaced by the following:

".2 purpose-built container craft and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks. In this regard, a purpose-built container space is a cargo space fitted with cell guides for stowage and securing containers;"

120 In paragraph 7.17.2.3, the words ", including special category spaces," are inserted after the words "ro-ro spaces".

121 The following text is added at the end of paragraph 7.17.3:

"For the purpose of this section, "on deck" shall be taken to mean spaces on the weather deck."

122 In paragraph 7.17.3.1.2, the word "supplying" is replaced by the words "simultaneously supplying the arrangements required by 7.17.3.1.3 for the largest designated cargo space and the" and the following sentence is inserted after the first sentence:

"This requirement shall be met by the total capacity of the main fire pump(s) not including the capacity of the emergency fire pump, if fitted."

123 In the existing paragraph 7.17.3.1.3:

.1 the words "shall be provided" are deleted from the end of the first sentence and are re-inserted after the first word "Means";

.2 the words "copious quantities of water" are replaced by the words "with water at not less than 5 *l*/min/m^2 of the horizontal area of cargo spaces"; and

.3 the words "meet the requirements of 7.8.6 and" are inserted after the words "drainage and pumping arrangements shall".

124 The following sentence is added at the end of paragraph 7.17.3.1.4:

"Substitution by a high expansion foam system complying with regulation II-2/10.4.1.1.2 of the Convention is also acceptable."

125 The following new paragraphs 7.17.3.1.5 and 7.17.3.1.6 are added after existing paragraph 7.17.3.1.4:

"7.17.3.1.5 The requirements of 7.17.3.1.1 to 7.17.3.1.4 may be fulfilled by a water spray system approved by the Administration based on the standards developed by the Organization*, provided that the amount of water required for fire-fighting purposes in the largest cargo space allows simultaneous use of the water spray system plus four jets of water from hose nozzles in accordance with 7.17.3.1.2.

7.17.3.1.6 Craft carrying dangerous goods shall be provided with three fire hoses and nozzles complying with 7.7.5.6 in addition to those required by 7.7.5.5."

* Refer to paragraphs 9.2, 9.3 and 9.4 of the Interim guidelines for open-top containerships (MSC/Circ.608/Rev.1).

126 In the first sentence of paragraph 7.17.3.2, the words "or vehicle decks" are added after the words "enclosed cargo spaces".

127 In paragraph 7.17.3.4.2, the sentence "Exhaust fans shall be of non-sparking type." is inserted after the first sentence and the text of the last sentence is replaced by the following:

"Suitable wire mesh guards having a mesh size not exceeding 13 mm x 13 mm shall be fitted over inlet and outlet ventilation openings to prevent foreign objects from entering into the casing."

128 Existing paragraph 7.17.3.4.3 is renumbered as paragraph 7.17.3.4.4; the relevant reference in table 7.17-2 is amended; and the following new paragraph 7.17.3.4.3 is inserted:

"7.17.3.4.3 If adjacent spaces are not separated from cargo spaces by gastight bulkheads or decks, ventilation requirements shall apply to the adjacent spaces as for the cargo space itself."

129 The following new paragraph 7.17.3.4.5 is added after the existing paragraph 7.17.3.4.4:

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

130 In table 7.17-1, the words "(includes cargoes of group B of the Code of Safe Practice for Solid Bulk Cargoes, 2004, except for cargoes denoted Materials Hazardous in Bulk)" are added to the words "Solid dangerous goods in bulk" at the head of the right-hand column.

131 In table 7.17-1, the words "per hour" are added at the end of the second sentence of note 1.

132 In table 7.17-2, note 4, the words "residues of" are added after the word "containing".

133 In table 7.17-2, the following note 7 is inserted with references from row 7.17.3.4.2, columns 4.2 and 4.3, and the existing notes 7 to 11 to table 7.17-3 together with their references in that table are renumbered as notes 8 to 12:

"7 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 7.17.3.4.1 and 7.17.3.4.2. Ventilation shall be such that any escaping gases cannot reach public spaces or crew accommodation on or under deck."

134 In table 7.17-3, in the seventh and eighth columns, the references to "3.1 3.2" and "3.3" are replaced by the reference to "3" and the following new note 13 is added to "x" in column "5.2", last and penultimate lines:

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

135 At the end of the existing paragraph 7.17.3.5, the following new text is added:

"as follows:

.1 if the bilge drainage system for cargo spaces is additional to the system served by pumps in the machinery space, the capacity of the system shall be not less than than 10 m^3/h per cargo space served. If the additional system is a common system, the capacity need not exceed 25 m^3/h. The additional bilge system need not be arranged with redundancy. Whenever flammable or toxic 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;

.2 if bilge drainage of cargo spaces is arranged by gravity drainage, the drainage shall be either lead directly overboard or to a closed drain tank located outside the machinery spaces. The tank shall be provided with vent pipe to a safe location on the open deck;

.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 six air changes per hour. Electrical equipment in the space shall be of certified safe type.* If the space has access from another enclosed space, the door shall be self-closing; and

.4 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."

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* Refer to publication IEC 60092-506: Special features – Ships carrying dangerous goods and materials hazardous only in bulk.

136 The following text is added at the end of the first sentence of paragraph 7.17.3.6.1:

"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."

137 The following new sentence is added at the end of paragraph 7.17.3.6.2:

"In addition to the requirements of 7.10.3.2.2, two spare charges suitable for use with the breathing apparatus shall be provided for each required apparatus."

138 In paragraph 7.17.3.8.2, the words "meet the requirements of 7.8.6, have valves operable from outside the space at a position in the vicinity of the extinguishing system controls and" are inserted after the words "drainage and pumping arrangements shall".

CHAPTER 8
LIFE-SAVING APPLIANCES AND ARRANGEMENTS

139 Existing paragraphs 8.7.6 to 8.7.10 are renumbered as paragraphs 8.7.7 to 8.7.11 and the following new paragraph 8.7.6 is inserted:

"8.7.6 Where an MES is 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 is to be provided for use if the MES is lost or rendered unserviceable in the event of damage of longitudinal extent specified in 2.6.7.1."

140 In paragraph 8.9.14.2, after the word "shall", the words "be subject to a thorough examination at the annual surveys required by paragraph 1.5.1.3" are added and the remainder of the sentence is deleted.

141 In paragraph 8.9.14.3, after word "brake", the words "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." are added and the remainder of the sentence is deleted.

CHAPTER 10
AUXILIARY SYSTEMS

142 In paragraph 10.2.4.8, the words "the filling pipes" at the end of the first sentence are replaced by the words "bunkering pipes and any filling pipes served by on-board pumps"; and the words "and, for fuel of flashpoint less than 43°C," are replaced by the words "where there is no risk of fire or explosion from the emergence of oils and vapour, shall not lead into crew spaces, passenger spaces, special category spaces, ro-ro spaces (other than open ro-ro spaces), machinery spaces or similar spaces. For fuel of flashpoint less than 43°C such valves and pipes".

CHAPTER 11
REMOTE CONTROL, ALARM AND SAFETY SYSTEMS

143 In paragraph 11.3.3, in the first sentence, the words "in a station" are replaced by the words "at one or more stations".

144 In paragraph 11.4.1.2, subparagraphs .4 to .11 are renumbered as subparagraphs .5 to .12 and the following new subparagraph .4 is inserted after the existing subparagraph .3:

".4 detection of bilge water in each watertight compartment below the design waterline;"

CHAPTER 13
SHIPBORNE NAVIGATIONAL SYSTEMS AND EQUIPMENT AND VOYAGE DATA RECORDERS

145 The existing paragraph 13.8.2 is renumbered as paragraph 13.8.3 and the following new paragraph 13.8.2 is inserted:

"13.8.2 High-speed craft shall be fitted with an ECDIS as follows:

.1 craft constructed on or after 1 July 2008;

.2 craft constructed before 1 July 2008, not later than 1 July 2010."

CHAPTER 14
RADIOCOMMUNICATIONS

146 The existing text of paragraph 14.15.10 is replaced by the following:

"14.15.10 Satellite EPIRBs on all craft shall be:

.1 annually tested for all aspects of operational efficiency, with special emphasis on checking the emission on operational frequencies, coding and registration, at intervals as specified below:

.1 on passenger craft, within 3 months before the expiry date of the High-Speed Craft Safety Certificate; and

.2 on cargo craft, within 3 months before the expiry date, or 3 months before or after the anniversary date, of the High-Speed Craft Safety Certificate;

The test may be conducted on board the craft or at an approved testing station; and

.2 subject to maintenance at intervals not exceeding five years, to be performed at an approved shore-based maintenance facility."

CHAPTER 18
OPERATIONAL REQUIREMENTS

147 The existing text of subparagraph .4 of paragraph 18.1.3.4 is replaced by the following:

".4 provision in the area of operation of a base port having functions and facilities in accordance with the requirements of this Code;"

ANNEX 1
FORM OF HIGH–SPEED CRAFT SAFETY CERTIFICATE
AND RECORD OF EQUIPMENT

148 In the Record of Equipment for High-Speed Craft Safety Certificate, in section 3, the following new item 16 is inserted after the existing item 15 and the existing item 16 is renumbered as 17.

"16 Long-range identification and tracking system"

149 In the Record of Equipment for High-Speed Craft Safety Certificate, section 4, the words "Two-way on-scene radiocommunications 121.5 MHz & 123.1 MHz" are inserted as item 7.

ANNEX 6
STABILITY OF HYDROFOIL CRAFT

150 In the chapeau paragraph, the following new paragraphs are inserted after the existing introductory paragraph and prior to paragraph 1:

"As required by 2.3.1, the stability of hydrofoil craft shall be assessed under all permitted conditions of loading.

The term "hull-borne mode" has the same meaning as "displacement mode" defined in 1.4.22 of the Code.

The term "foil-borne mode" has the same meaning as "non-displacement mode" defined in 1.4.38 of the Code."

ANNEX 7
STABILITY OF MULTIHULL CRAFT

151 At the end of paragraph 1.4.2, the following sentence is added:

"Alternatively, another method of assessment may be employed, as provided for in 2.1.4 of this Code."

152 At the end of paragraph 1.5, the following sentence is added:

"The determination of θ_r using model test or other data shall be made using the method for determining θ_Z in 1.1.5.3 of annex 6."

153 At the end of paragraph 2.3, the words ", as determined in 1.5 of this annex" are added.

ANNEX 8
STABILITY OF MONOHULL CRAFT

154 The existing text of paragraph 1.1 is replaced by the following:

"1.1 The weather criterion contained in paragraph 3.2 of the Intact Stability Code* shall apply. In applying the weather criterion, the value of wind pressure *P* (N/m2) shall be taken as:

$$500\{V_w/26\}^2$$

where V_w = wind speed (m/s) corresponding to the worst intended conditions.

The angle of heel due to wind, in applying paragraph 3.2.2.1.2 of the Intact Stability Code, shall not exceed 16° or 80% of the angle of deck-edge immersion (whichever is less). Where the angle of heel due to wind exceeds 10°, efficient non-slip deck surfaces and suitable holding points shall be provided, in accordance with paragraph 2.13.1.1 of this Code. In applying the weather criterion, account shall also be taken of the roll damping characteristics of individual craft in assessing the assumed roll angle θ_1, which may alternatively be derived from model or full scale tests using the method for determining θ_z in 1.1.5.3 of annex 6. Hulls with features which greatly increase damping, such as immersed sidehulls, substantial arrays of foils, or flexible skirts or seals, are likely to experience significantly smaller magnitudes of roll angle. For such craft, therefore, the roll angle shall be derived from model or full scale tests or, in the absence of such data, shall be taken as 15°."

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* Refer to the Code on Intact Stability for All Types of Ships Covered by IMO Instruments, adopted by the Organization by resolution A.749(18), as amended by resolution MSC.75(69).

155 The following new sentence is added at the end of paragraph 2.1.1:

"The range shall be taken as the difference between the equilibrium heel angle and the heel angle at which the residual righting lever subsequently becomes negative or the angle at which progressive flooding occurs, whichever is less."

ANNEX 9
DEFINITIONS, REQUIREMENTS AND COMPLIANCE CRITERIA RELATED TO OPERATIONAL AND SAFETY PERFORMANCE

156 In the second sentence of the first paragraph, the word "prototype" is replaced by the word "first".

157 In paragraphs 2.1.1, 2.1.2, 2.1.3 and 3.3.1, the words "maximum operational speed" are replaced by the words "90% of maximum speed".

158 In paragraph 3.2, the sentence "The worst intended conditions shall not exceed 150% of the more severe of the two measured sea conditions" is inserted as the penultimate sentence.

ANNEX 10
CRITERIA FOR TESTING AND EVALUATION OF SEATS

159 In the title, the words "REVENUE AND CREW" are deleted.

160 In paragraph 3.4, the words "same strength and stiffness" are replaced by the words "equivalent strength and stiffness".

161 In paragraph 3.6, after the words "and measurement," the words "if possible" are deleted.

162 In paragraph 3.9, the following subparagraphs .3.3 to .3.5 are inserted after the existing subparagraph .3.2 and the existing subparagraph .3.3 is renumbered as subparagraph.3.6:

".3.3 neck flexion does not exceed 88 Nm;

.3.4 neck extension does not exceed 48 Nm;

.3.5 in lieu of the requirements of subparagraphs .3.3 and .3.4 above, a seatback or headrest of at least 850 mm above the seat cushion is acceptable; and".

163 The following new annex 12 is added after the existing annex 11:

"**ANNEX 12**

FACTORS TO BE CONSIDERED IN DETERMINING CRAFT OPERATING LIMITATIONS*

1 Purpose and scope

The purpose of this annex is to identify the parameters to which consideration should be given when determining the worst intended conditions (defined in 1.4.61) and other operational limitations (defined in 1.4.41) for insertion into the Permit to Operate, in order to facilitate consistent application of the Code.

2 Factors to be considered

As a minimum, the following factors shall be considered:

.1 The maximum distance from refuge implied by 1.3.4.

.2 The availability of rescue resources to comply with 1.4.12.1 (category A craft only).

.3 Minimum air temperature (susceptibility to icing), visibility and depth of water for safe operation as addressed by 1.4.61.

.4 The significant wave height and maximum mean wind speed used when applying the requirements for stability and buoyancy in chapter 2 and associated annexes.

.5 The safe seakeeping limitations (especially significant wave height) considering the known stability hazards listed in 2.1.5, the operating conditions on the intended route (see 18.1.3.2) and the motions experienced during operation defined in 3.3 of annex 9.

* Refer to the guidelines to be developed by the Organization.

.6 The structural safety of the craft in critical design conditions according to chapter 3.

.7 The safe deployment and operation of evacuation systems and survival craft as required by 8.6.5.

.8 The safe handling limitations determined in accordance with the sea trials required by chapter 17 and annexes 3 and 9, identifying any limitations on weight and centre-of-gravity position according to 17.3, and the effects of failures and malfunctions according to 17.4."

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MSC/Circ.1102

ANNEX 1

INTERPRETATIONS OF PROVISIONS OF THE 2000 HSC CODE

Section 1.4.16 - Explanations to control stations

1 Main navigating equipment includes, in particular, the steering control and the compass, radar and direction-finding equipment.

2 Where in the sections of this Code relevant to fixed fire-extinguishing systems there are no specific requirements for the centralization within a control station of major components of a system, such major components may be placed in spaces which are not considered to be a control station.

3 Spaces containing, for instance, the following battery sources should be regarded as control stations regardless of battery capacity:

.1 emergency batteries in separate battery room for power supply from black-out till start of emergency generator;

.2 emergency batteries in separate battery room as reserve source of energy to radiotelegraph installation;

.3 batteries for start of emergency generator; and

.4 in general, all emergency batteries required in pursuance of 12.3 of the Code.

Section 1.4.53 - Devices in "service spaces" containing no cooking appliances

"Service spaces" containing no cooking appliances may contain:

.1 coffee automat, toaster, dish washer, microwave oven, water boiler and similar appliances, each of them with a maximum power of 5 kW; and

.2 electrically heated cooking plates and hot plates for keeping food warm, each of them with a maximum power of 2 kW and a surface temperature not above 150°C.

Section 1.4.54 - Definition of "significant wave height"

Significant wave height should be taken as "the average crest-to-trough height of the highest one third of the zero-upcrossing waves in a specified period". Alternatively, this may be expressed mathematically as four times the square-root of the area under the wave energy spectrum.

Section 1.8 - Posting of certificates

All certificates or certified copies thereof issued under the present regulation should be posted up in a prominent and accessible place in the craft*.

* This interpretation does not apply to Parties to the 1988 SOLAS Protocol.

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Section 1.9.1 - Transit voyages

1 A transit voyage includes delivery voyages, i.e. builder's port to base port, and voyages for repositioning purposes, i.e. change of base port and/or route. This may involve long trans-ocean passage operating for periods in excess of those set out in the Code, e.g. paragraph 1.3.5. This is acceptable as the craft is not operating commercially with passengers or cargo onboard.

2 The craft should have a valid High-Speed Craft Safety Certificate or similar before the start of such a voyage.

3 The operator should plan (including such matters as manning and temporary accommodation) and ensure that the craft is capable of safely completing the transit voyage.

4 The master of the craft should be provided with the information necessary to operate the craft safely during the transit voyage.

5 The Administration should satisfy itself of the arrangements made for the safe conduct of such voyages.

Section 2.1.3.1 (including 2.6.11.1 and 2.6.11.2) - Definition of "downflooding point"

Downflooding points include all openings, irrespective of size, that would permit passage of water through a water/weathertight bulkhead or deck, e.g. opening windows. Downflooding points exclude openings kept closed to an appropriate standard of water/weathertightness at all times other than when required for access or for operation of portable submersible bilge pumps in an emergency, e.g. non-opening windows of similar strength and weathertight integrity to the structure in which they are installed.

Section 2.2 (including 2.2.7.3, 2.2.8.1.1, 2.2.8.2.2, 2.2.8.3.4 and 2.2.8.4.1) - Explanation of the term "elsewhere"

The term "elsewhere" is taken as applying to "all weathertight and watertight closures located on or below the datum".

Section 2.2.3.2.2 - Interim guidelines for high-speed craft model testing

Reference should be made to MSC/Circ.1029, the annex to which provides interim guidelines for the conduct of high-speed craft model tests with respect to this paragraph.

Section 2.2.8.2.1 - Criteria for ensuring adequate strength of machinery space openings

Conformity with the requirements of organizations recognized by the Administration in accordance with SOLAS regulation XI/1 may be considered to ensure adequate strength.

Section 2.3.4 - Application of annexes 7 and 8 to monohull and multihull craft

The table is advisory, hence the use of the term "may". For example: it may not prove suitable for all styles of trimaran. Examination of the righting lever curve will normally reveal whether the craft has stability characteristics most like a monohull or a multihull: the former having a modest metacentric height and angle of maximum righting lever of over about 25°, whereas the latter have a large metacentric height and an angle of maximum righting lever of less than about 25°.

Section 2.6.5 - Void spaces filled with foam

Void spaces filled with foam are considered to be void spaces for the purposes of this paragraph, provided such foam fully complies with 2.6.4.

Section 2.6.6 - Meaning of the term "parallelepiped"

1 A parallelepiped is defined as "a solid contained by parallelograms" and a parallelogram is defined as "a four-sided rectilinear figure whose opposite sides are parallel". Applying this to 2.6.7.2, the inboard face at its mid-length should be tangential to, or otherwise touching in at least two places, the surface corresponding to the specified transverse extent of penetration, as illustrated in figure 2.6.7a.

2 Side damage should not transversely penetrate a greater distance than the extent of $0.2\nabla^{1/3}$ at design waterline, except where a lesser extent is provided for in 2.6.7.2. Refer to figures 2.6.7 b and c.

3 In cases of damage under 2.6.8 and 2.6.9, the assumed shape of damage to each section should be rectangular.

Section 2.6.7 - Assumed shape of damage

1 Reference is made to the interpretations in 2.6.6 that also relate to this clause.

2 The shape of the damage should be assumed to be a parallelepiped-shaped solid block entering the side of the craft in a transverse direction as illustrated in figures 2.6.7 a, b and c below.

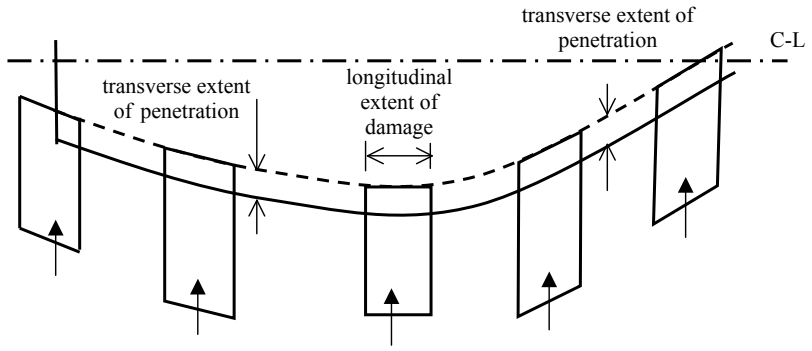


Figure 2.6.7a

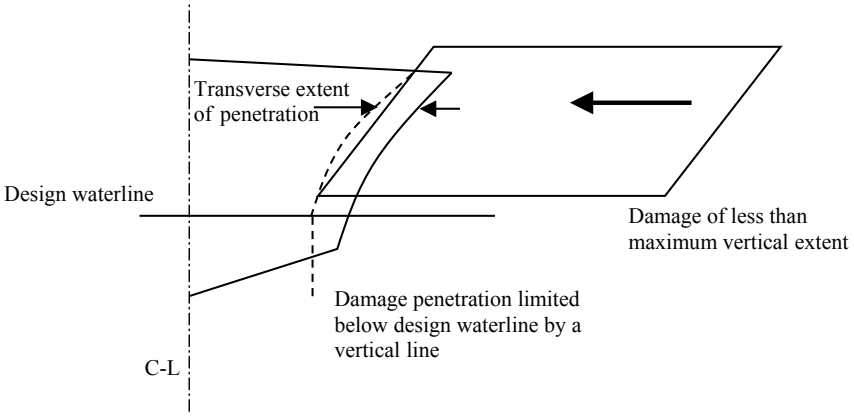


Figure 2.6.7 b

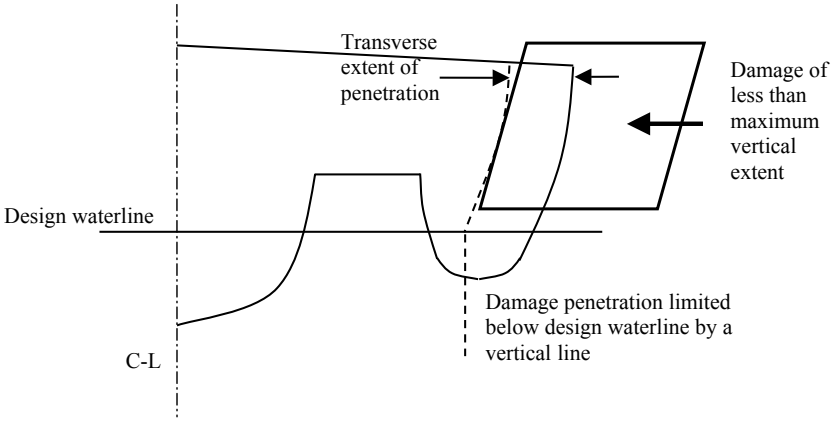


Figure 2.6.7 c

Section 2.6.7 - The "periphery" of the craft

1 In general, the periphery of the craft is considered to only be the surface of the shell encompassed by the outboard surface of the outermost hull at any given section, if considering a multihull.

2 Since damage to the "periphery" at the forward and aft ends of blunt-ended craft are not adequately covered by consideration of side damage using the above general interpretation of "periphery", the following assumed extents of damage should be applied in such cases as illustrated in figure 2.6.7d:

.1 at the fore end, damage to the area defined as A_{bow} in 4.4.1, the aft limit of which being a transverse vertical plane, provided that this area need not extend further aft from the forward extremity of the craft's watertight envelope than the distance defined in 2.6.7.1; and

.2 at the aft end, damage to the area aft of a transverse vertical plane at a distance $0.2\nabla^{1/3}$ forward of the aft extremity of the watertight envelope of the hull.

3 The provisions of 2.6.6 in relation to damage of lesser extent remain applicable to such damage.

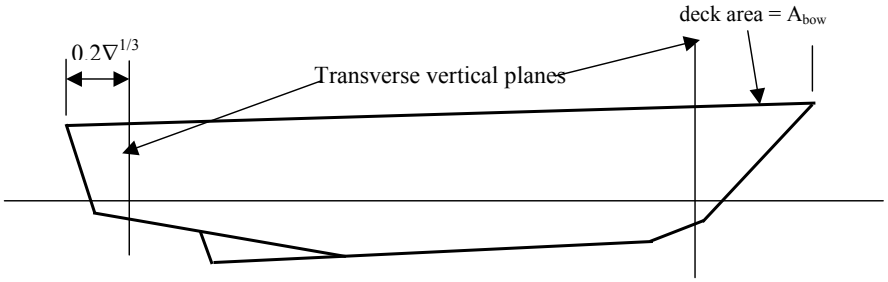


Figure 2.6.7 d

Section 2.6.8.2.2 - Assumed shape of damage

The shape of damage should be assumed to be rectangular in the transverse plane as illustrated in figure 2.6.8 below. Damage should be assumed at a series of sections within the defined longitudinal extent in accordance with figure 2.6.8, the mid-point of the damaged girth being maintained at a constant distance from the centreline throughout that longitudinal extent.

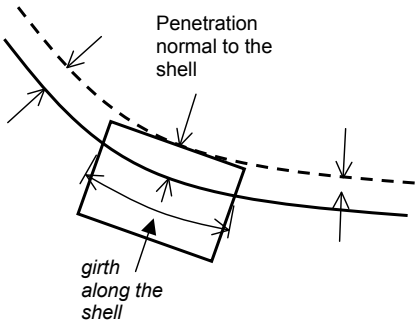


Figure 2.6.8

Section 2.6.9.1 - "All parts" of the hull(s)

The Code, in 2.6.9.1, is only considering bottom damages and therefore it should be clear that the application of damage to all parts of the hull should be only below the design waterline. "All parts" of the hull should be assumed to apply to all parts of the hull(s) below the design waterline that are not defined as vulnerable to raking damage.

Section 2.6.9.2 - Assumed shape of damage

The shape of damage should be assumed to be rectangular in the plane of the shell of the craft and rectangular in the transverse plane as illustrated in figure 2.6.8.

Section 2.6.11.1 and .2 - Downflooding

Opening windows are included for downflooding. Non-opening windows are not included for downflooding.

Section 2.7.1 - Inclining experiment "is not practical"

An accurate inclining experiment becomes impractical when the height of the centre-of-gravity (VCG or KG) is comparatively small in relation to the height of the transverse metacentre (KMT), i.e. when the metacentric height (GMT) is more than three times the KG. When this is so, small percentage errors in determining the metacentric height result in large percentage errors in centre-of-gravity height. In such situations a careful calculation of VCG may be more accurate than the results of an inclining experiment. A displacement check should be undertaken to confirm the calculated lightship characteristics, including VCG, which may be accepted if the measured lightship displacement and LCG are respectively within 2% and 1% L relative to the estimate. Similar considerations are provided for in paragraph 7.1.5 of the Intact Stability Code (resolution A.749(18), as amended).

Section 2.10 - Calculation of passenger heeling moment

For the purposes of this section:

1 When calculating the vertical centre-of-gravity, passengers assumed to be occupying seats should be taken as seated, with all others standing.

2 On the decks where assembly stations are located, the number of passengers on each should be that which generates the maximum heeling moment. Any remaining passengers should be assumed to occupy decks adjacent to those on which the assembly stations are located, and positioned such that the combination of number on each deck and total heeling moment generate the maximum static heel angle.

3 Passengers should not be assumed to gain access to the weather deck nor be assumed to crowd abnormally towards either end of the craft unless this is a necessary part of the planned evacuation procedure.

4 Where there are seats in areas occupied by passengers, one passenger per seat should be assumed, passengers being assigned to the remaining free areas of deck (including stairways if appropriate) at the rate of four per square metre.

Table 4.4.2 - Seat design

A high seat back should be sufficiently high to provide support to the rear of the skull of a seated adult against whip-lash type injuries. All other seats are considered as low seatbacks.

Section 4.7 - Means of escape

Spaces that are only entered occasionally by crew members may have only one means of escape. This sole means of escape should be independent of watertight doors.

Section 4.7.10 - Markings for exits and emergency routes

Although the arrangement of a low-location lighting system is not required, markings, if installed, should be of photoluminescent or electroluminescent material. In addition to exits, routes leading to evacuation stations and routes leading to safe areas should be marked. Markings for rescue personnel should indicate the location of the fire control plan.

Section 4.7.12 - Two unobstructed paths

Doors providing escape from a space should, if possible, be situated at opposite ends of the space. Where the doors providing escape from a space are situated in the same end of the space, the distance between those doors should be greater than the maximum length of the space.

Section 4.7.13 - Corridors, doorways and stairs

An aisle is a fore to aft passageway separating seating areas between seats. As such this paragraph does not apply to aisles. However, the width of such aisles should be such as to allow the craft to comply with the provisions of section 4.8 on evacuation. Nor does this clause apply to spaces between adjacent rows of seats, but the width of such spaces (i.e. the seat pitch) should be such as to allow the craft to comply with section 4.8 on evacuation.

Section 4.7.16 - Means of escape for special category spaces

Special category spaces used for stowage of motor vehicles should be provided with walkways leading to a safe means of escape, having a width of at least 600 mm.

Section 4.7.16 - Means of escape for machinery spaces

At least one means of escape from a machinery space should consist of either a ladder leading to a door or hatch (not being a horizontal flush-hatch) or a door located in the lower part of that space and giving access to an adjacent compartment from which a safe means of escape is provided.

Section 4.8.1 - Dimensioning of the means of escape

It is not required that the means of escape be dimensioned taking into account the additional number of persons that could use it in the event of an accident in an adjacent zone.

Section 4.8.2 - Evacuation procedure

Reference should be made to MSC/Circ.1001 – Interim guidelines for a simplified evacuation analysis of high-speed passenger craft, as amended.

Section 6.1.3 - Explanation of 'design loads'

The intent of 6.1.3 is that under any operating load up to the breaking strength of the anchor cable or mooring lines, the loads on the bitts, bollards, etc. will not result in damage to the hull structure that will impair its watertight integrity. A strength margin of at least 20% above the minimum specified breaking strength of the relevant cable or warp should be allowed.

Section 7.3 - Insulation values of spaces with special characteristics of two or more groupings

Where a space has the special characteristics of two or more space groupings, the structural fire protection time of the divisions should be the highest for the space groupings concerned. For example, the structural fire protection time of the divisions of emergency generator rooms should be of the highest value for the space when the space is considered as being a control station (D) and a machinery space (A).

Section 7.3.1 - Separating partial bulkheads of spaces

If a space is divided by partial bulkheads into two (or more) smaller areas such that they form enclosed spaces, then the enclosed spaces should be surrounded by bulkheads and decks in accordance with tables 7.4-1 and 7.4-2, 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.

Section 7.3.1 - Acceptance of cabinets

Cabinets having a deck area of less than 2 m^2 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.

Section 7.3.2 - Prevention of heat transmission, details of insulation

1 To prevent heat transmission at intersections and terminal points, the insulation of the deck or bulkhead should be carried past the intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminium structures (refer to figures 7.3-1 and 7.3-2).

2 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 should continue on the deck or bulkhead with the insulation of the lesser structural fire protection time for a distance of at least 450 mm.

3 In the event the lower part of the fire insulation has to be cut for drainage, the construction should be in accordance with the structural details shown in figure 7.3-3.

Table 7.4-1 - Ventilation openings

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 operable from outside the space and made of non-combustible or fire-restricting material.

Section 7.4.1.3 - Appendages not intended to be of fire-restricting or non-combustible material

This paragraph is only intended to apply to the main structure of the craft. Appendages such as air propellers, air ducts to propellers, transmission shafts, rudders and other control surfaces, struts, spars, flexible skirts, etc., are not intended to be of fire restricting or non-combustible material, therefore 7.4.1.3 should not apply to them.

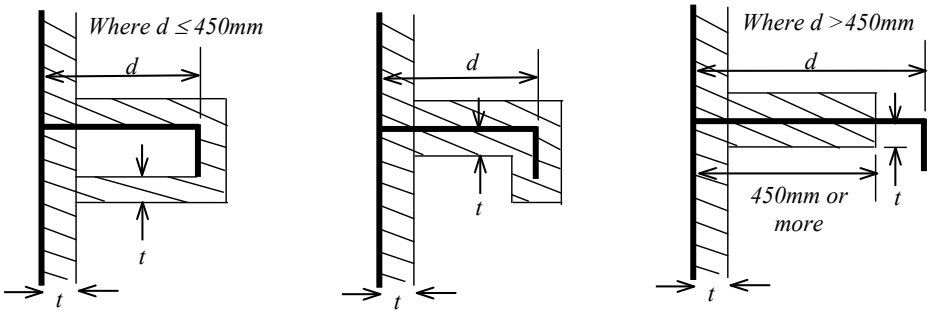


Figure 7.3-1

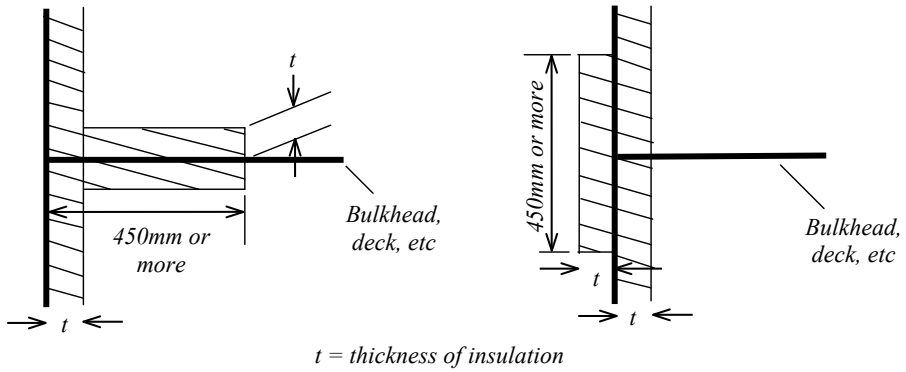
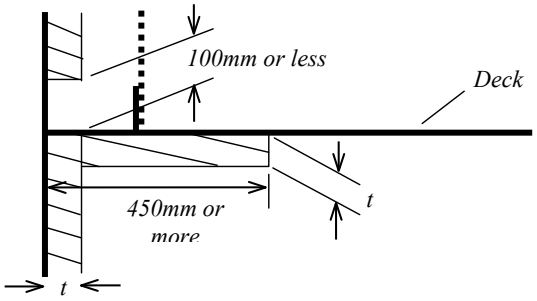


Figure 7.3-2



t = thickness of insulation

Figure 7.3-3

Section 7.4.2.1 - Structures in contact with seawater

Structures in contact with seawater should be insulated to the required standard to a level 300 mm below the waterline in the craft lightweight condition.

Section 7.4.3.2 - Surface protection of insulation

The fire insulation in such spaces may be covered by metal sheets (not perforated) or by vapour proof glass cloth accurately sealed at the joint.

Section 7.4.3.3 - Furniture and furnishings in public spaces and crew accommodation

Fire test procedures referenced in the FTP Code (resolution MSC.61(67), as amended by resolution MSC.101(73)), and MSC/Circs.916, 964, 1004, 1008 and 1036 should be applied to items and materials covered by this paragraph as follows:

.1 case furniture (FTP Code, annex 1, parts 1 and 10);

.2 frames of all other furniture (FTP Code, annex 1, parts 1 and 10);

.3 draperies, textiles and other suspended textile materials (FTP Code, annex 1, part 7

.4 upholstered furniture, e.g. passenger seating (FTP Code, annex 1, part 8);

.5 bedding components (FTP Code, annex 1, part 9); and

.6 deck finish materials (FTP Code, annex 1, parts 2 and 6).

Section 7.4.3.3.1 - Types of case furniture

Different possible types of case furniture are: desks, wardrobes, dressing tables, bureaux and dressers.

Section 7.4.3.4 - Low-flame spread surfaces

1 This section does not apply to items and materials referred to in 7.4.3.3.

2 Consistent with 7.9.3.4 and clauses 1 and 5.1 of annex 2 to the FTP Code, partitions, windows and sidescuttles made of glass are considered to be non-combustible and to comply with the requirements for low-flame spread surfaces.

Section 7.4.4.1 - Public spaces accommodated on two levels

Where stairways are fitted in a public space consisting of only two decks, the following conditions should be met:

.1 all levels are used for the same purpose;

.2 the area of the opening between the lower and upper part of the space should be at least 10% of the deck area between the upper and lower part of the space;

.3 the design should be 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;

.4 sufficient means of escape are provided from both levels of the space directly leading to an adjacent safe area or compartment; and

.5 the whole space is served by one section of the sprinkler system.

Section 7.4.4.3 - Location of draught stops

Draught stops are not required in public 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.

Section 7.5.2 - Use of aluminium in lubricating oil sump tanks

The use of aluminium in lubricating oil sump tanks for engines, or in lubricating oil filter housings fitted integral with the engines, is accepted.

Section 7.6.1 - Accessibility, marking and indication of ventilation controls

The controls should be easily accessible as well as prominently and permanently marked and should indicate whether the shut-off is open or closed.

Section 7.6.3.2 - Meaning of 'lower end' and 'upper end' of the duct in galley range ducts

'Lower end of the duct' means a position at the junction between the duct and the galley range hood.

Section 7.6.3.4 - Means of closing for multi-branch systems in galley range ducts

The means for closing the ends of multi-branch systems should be remote controlled from a position close to the remote controls listed in this regulation.

Section 7.6.3.5 - Location of hatches for inspection and cleaning in galley range ducts

1 One hatch should be provided close to the exhaust fan.

2 In the galley exhaust duct the grease will accumulate more in the lower end. Therefore, hatches should be fitted also in this part of the duct. For interpretation of 'lower end' see that for section 7.6.3.2.

Section 7.6.4 - Accessibility of dampers

Fire and smoke dampers should be easily accessible. Where they are placed behind ceilings or linings, they should be provided with an inspection door on which a plate is fitted, providing the identification number of the damper. Such plates with identification numbers should also be placed on any required remote controls.

Section 7.6.6 - Means of closing fire and smoke dampers

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.).

Section 7.7 - Requirements for fixed fire-extinguishing systems not required by 7.7 of the Code

Where a fixed fire-extinguishing system not required by 7.7 of the Code is installed, it should meet the requirements of this section.

Section 7.7.1 - Control stations not normally occupied

Control stations not normally occupied (e.g. emergency generator rooms) need not be provided with manually operated call points.

Section 7.7.1.1.4 - Definition of section

A section is a group of fire detectors and manually operated call points as displayed at the indicating unit(s) required by this paragraph.

Section 7.7.1.1.9 - Extension of detector sections

The same section of detectors may serve spaces on more than one deck if such spaces are located in the fore or aft end of the craft or they are so arranged that they constitute common spaces on different decks (e.g. fan rooms, galleys, public spaces, etc.).

Section 7.7.1.1.10 - Restriction of loops

For fire detection systems with remotely and individually identifiable fire detectors, the requirement set out in this section is considered met when a loop covering accommodation spaces, service spaces and control stations does not include machinery spaces of a major fire hazard.

Section 7.7.1.1.14 - Acceptable activating arrangements

The following arrangement may be acceptable:

.1 to activate a paging system;

.2 to activate the fan stops;

.3 to activate the closure of fire doors;

.4 to activate the closure of fire and smoke dampers; and

.5 to activate the sprinkler system.

Section 7.7.1.1.15 - Installation of loops and definitions

1 A loop should not pass through a space twice. Where this is not practical (e.g. for large public spaces), the part of the loop which by necessity passes through the space for a second time should be installed at the maximum possible distance from the other parts of the loop.

2 Definitions:

.1 *Loop*: electrical circuit linking detectors of various sections in a sequence and connected (input and output) to the indicating unit(s).

.2 *Zone address identification capability*: a system with individually identifiable fire detectors.

Section 7.7.1.2.3 - Location of detectors

Distances smaller than 0.5 m from bulkheads may be accepted in corridors, lockers and stairways.

Section 7.7.3 - Remote control of the system

The system should be remotely controlled in such a way that it is fully serviceable from the operating compartment without any intervention of personnel outside that space in normal conditions.

Section 7.7.3.2.3 - Construction of pipelines passing through accommodation

Pipelines may pass through accommodation spaces, provided they are of substantial thickness and their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm^2. In addition, pipelines passing through accommodation areas should only be joined by welding and should not be fitted with drains or other openings within such spaces. Pipelines should not pass through refrigerated spaces.

Section 7.7.3.2.5 - Location of closing devices

Openings that may admit air to, or allow gas to escape from, a protected space should be capable of being closed from outside the protected space.

Section 7.7.3.2.6 - Consideration of volume of air receivers when calculating the quantity of extinguishing medium

The volume of starting air receivers converted to free air volume should be added to the gross volume of the machinery space when calculating the necessary quantity of extinguishing medium. Alternatively, a discharge pipe connected to a safety valve may be fitted, provided it leads directly to the open air.

Section 7.7.3.2.7 - Warning of release of extinguishing medium to ro-ro spaces and other spaces where personnel can enter

1 Ro-ro spaces and other spaces where personnel can be expected to enter and where the access is facilitated by doors or hatches should be provided with an automatic warning for the release of the extinguishing medium.

2 The pre-discharge alarm should be automatically activated (e.g. by opening of the release cabinet door).

3 Reference is made to the Code on Alarms and Indicators, 1995 (resolution A.830(19)).

Section 7.7.3.2.10 - Separation of spaces

Two spaces can be considered as separated spaces where divisions comply with tables 7.4-1 and 7.4-2, as appropriate, or the divisions are of steel construction.

Section 7.7.3.2.12 - Means for checking the quantity of medium in containers

1 Means for checking the quantity of medium in containers should be so arranged that it is not necessary to move the containers completely from their fixing position. This may be achieved for instance by providing hanging bars above each bottle row for a weighing device or by using suitable surface indicators.

2 Surface indicators containing radioactive material should be of a type accepted by the Administration.

Section 7.7.3.2.14 - Location, accessibility, use and ventilation of CO_2 - storage spaces

1 Spaces for storage of the cylinders or tanks for extinguishing gas should not be used for other purposes. Access to these spaces should be possible from the open deck; spaces situated below the deck should be directly accessible by a stairway or ladder from the open deck. The space should be located no more than one deck below the open deck.

2 Spaces where the entrance from the open deck is not provided, or which are located below deck, should be fitted with mechanical ventilation. The exhaust duct (suction) should lead to the bottom of the space. Such spaces should be ventilated with at least 6 air changes per hour.

Section 7.7.4 - Portable fire extinguishers

Reference should be made to resolution A.602(15) on Revised Guidelines for marine portable fire extinguishers.

Section 7.7.4 - Mass and capacity of portable fire extinguishers

1 The mass of portable fire extinguishers should not exceed 23 kg.

2 Each powder or carbon dioxide extinguisher should have a capacity of at least 5 kg and each foam extinguisher a capacity of at least 9 litres.

Section 7.7.4 - Equivalents of portable fire extinguishers

Reference is made to ISO 7165:1999 - Fire protection equipment - Portable fire extinguishers - Performance and construction.

Section 7.7.4 - Examination and testing of portable fire extinguishers

1 Fire extinguishers should be examined annually by a competent person.

2 Each fire extinguisher should be provided with a sign indicating that it has been examined.

3 Fire extinguisher cylinders and propellant bottles should be hydraulic pressure tested every 10 years.

Section 7.7.4 - Type and location of portable fire extinguishers

1 Carbon dioxide fire extinguishers should not be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the craft, fire extinguishers should be provided with extinguishing media which are neither electrically conductive nor harmful to the equipment and appliances.

2 Fire extinguishers should be ready for use and located in easily visible places such that they can be reached quickly and easily at any time in the event of a fire. In addition, the fire extinguisher should be located such that their serviceability is not impaired by the weather, vibration or other external factors. Portable fire extinguishers should be provided with devices to identify whether they have been used.

Section 7.7.5.1 - Independently driven pumps

Independently driven pumps are pumps powered by independent sources of power.

Section 7.7.5.3 - Drainage of fire mains and shutting off fire main branches

Fire mains should be capable of being drained. Valves should be installed in the main so that fire main branches can be isolated when the main is used for purposes other than fire-fighting.

Section 7.7.5.4 - Location of hydrants

One hydrant should be located in the vicinity and outside of each entrance to a machinery space.

Section 7.7.5.5 - Length of fire hoses

Fire hoses should have a length of:

.1 at least 10 m;

.2 not more than 15 m in machinery spaces; and

.3 not more than 20 m for other spaces and open decks.

Section 7.7.5.5 - Additional hoses and nozzles when carrying dangerous goods

Ships carrying dangerous goods should be provided with 3 additional hoses and 3 additional nozzles.

Section 7.8.1.1 - Vehicle decks located totally within ro-ro spaces

Vehicle decks located totally within ro-ro spaces may be accepted without structural fire protection, provided these decks are not part of, or do not provide support to, the craft's main load-carrying structure and provided satisfactory measures are taken to ensure that the safety of the craft, including fire-fighting abilities, integrity of fire resisting divisions and means of evacuation, is not affected by a partial or total collapse of these internal decks.

Section 7.8.2 - Fixed fire-extinguishing systems

1 Reference should be made to resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces; and complementary devices for fire-extinguishing systems including instructions for maintenance and operation.

2 The pumps should be capable of maintaining:

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

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

3 Fixed fire-extinguishing systems should fulfil the following requirements:

.1 the valve manifold should be provided with a pressure gauge and each of the valves should be marked;

.2 instructions for maintenance and operation of the installation should be set up in the room where the valves are located; and

.3 the piping system should be provided with a sufficient number of drainage valves.

Section 7.8.3.1 - Fixed fire detection systems, if fitted, in special category spaces

The fire detection system, excluding manual call points, may be switched off with a timer during loading/unloading of vehicles to avoid "false" alarms.

Section 7.8.4.1.1 - Construction of water fog applicators

A water fog applicator may 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.

Section 7.8.4.1.3 - Location of portable fire extinguishers including suitability and capacity

Fire extinguishers in special category spaces should be suitable for A and B class fires. The extinguishers should have a capacity of 12 kg dry powder or equivalent.

Section 7.8.4.1.3 - Weight and capacity of fire extinguishers

1 The weight of portable fire extinguishers should not exceed 23 kg.

2 Each powder or carbon dioxide fire extinguisher should have a capacity of at least 5 kg and each foam extinguisher a capacity of at least 9 *l*.

Section 7.8.5.1 - Ventilation system

Reference is made to MSC/Circ.729 on Design guidelines and operational recommendations for ventilation systems in ro-ro cargo spaces.

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Section 7.8.6 - Size of pumping and drainage arrangements

1 Pumping and drainage arrangements should be such as to prevent the accumulation of water on any such decks.

2 In respect of scuppers and drainage pumps, the following should be complied with:

.1 when calculating the amount of water, the capacity of both the water spraying system pumps and required number of fire hose nozzles should be taken into account;

.2 the drainage system should have a capacity of not less than 125% of the capacity specified in paragraph 2.1 above; and

.3 bilge wells should be of sufficient holding capacity and should 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.

Section 7.8.7.1 - Degree of protection for electrical equipment

1 For equipment above a height of 450 mm above the deck, the degree of protection for electrical equipment required by this section should have an enclosure having an ingress protection of at least IP 55 as defined in IEC Publication 529 - Classification of degree of protection provided by enclosures, or by apparatus for use in zone 2 areas as defined in IEC Publication 79 - Electrical apparatus for explosive gas atmospheres (temperature class T 3).

2 For equipment at or below a height of 450 mm above deck, the electrical equipment referred to in this section should be certified "safe type" and wiring, if fitted, and should be suitable for use in zone 1 areas as defined in IEC Publication 79 - Electrical apparatus for explosive gas atmospheres - (gas group II A and temperature class T 3).

Section 7.8.7.2 - Degree of protection for electrical equipment in exhaust ventilation ducts and exhaust fans

1 The electrical equipment referred to in these regulations should be certified "safe type" and wiring, if fitted, and should be suitable for use in zone 1 areas as defined in IEC Publication 79 - Electrical apparatus for explosive gas atmospheres (gas group II A and temperature class T 3).

2 Exhaust fans should be of a non-sparking type in accordance with IACS Unified Requirement F 29, as revised.

Section 7.8.8.1 - Vehicle decks without structural fire protection

Vehicle decks located totally within ro-ro spaces may be accepted without structural fire protection provided these decks are not part of the craft's main load-carrying structure and provided satisfactory measures to ensure that the safety of the craft, including fire fighting abilities and integrity of fire resisting divisions, are not affected by a partial or total collapse of these internal decks.

Section 7.9.3.4 - Open spaces

"Open spaces" as referred to in 7.9.3.4 of the Code is interpreted as excluding grouping E in tables 7.4-1 and 7.4-2.

Section 7.10.1.2 - Construction of water fog applicators

A water fog applicator might 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 fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

Section 7.10.2 - Storage of fire-fighter's outfits and marking of location

The storage of fire-fighter's outfits and personal equipment should be permanently and clearly marked.

Section 7.10.3.1.1 - Fire-fighter’s protective clothing

Reference is made to ISO 6942:2002 - Protective clothing - Protection against heat and fire - Evaluation of materials and material assemblies when exposed to source of radiant heat.

Section 7.10.3.1.4 - Fire-fighter’s safety lamp

Electric safety lamps intended to be used in hazardous areas should be of an explosion-proof type. Reference is made to IEC Publication 60079 - Electrical apparatus for explosive gas atmospheres (gas group II A and temperature class T 3).

Section 7.10.3.1.5 - Fire-fighter’s hand axe

The handle of the axe should be provided with high-voltage insulation.

Section 7.10.3.2.2 - Spare charges and recharging of air cylinders for breathing apparatus

Two spare charges suitable for use with the apparatus should be provided for each required apparatus.

Section 7.10.3.3 - Fireproof lifeline for breathing apparatus

Each breathing apparatus should be provided with a flexible fireproof lifeline approximately 30 m in length. The lifeline should be subjected to a test by static load of 3.5 kN for 5 min.

Section 7.11.1.3 - Safe evacuation from the alternative safe area

Safe evacuation from the alternative safe area should be completed within the structural fire protection time for areas of major fire hazard.

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Section 7.13.1 - Fixed sprinkler system

A stairway open at one deck should be considered part of the space to which it is open and, consequently, should be protected by a sprinkler system, if provided.

Section 7.17.1 - Requirements for carriage of dangerous goods

Reference is made to the IMDG Code, General introduction, sections 17 and 18:

.1 Reference is made to section 17 of the General Introduction to the International Maritime Dangerous Goods Code (IMDG Code) for operational measures in association with the requirements of this regulation.

.2 Reference is made to section 18 of the General Introduction to the International Maritime Dangerous Goods Code (IMDG Code) for a definition of the term "limited quantities".

Section 7.17.2.2 - Meaning of "purpose built container spaces"

A purpose built container space is a cargo space fitted with cell guides for stowage and securing of containers.

Section 7.17.2.3 - Extended meaning of "ro-ro cargo spaces"

Ro-ro cargo spaces include special category spaces and vehicle deck spaces.

Section 7.17.3.1 - Water supplies for open-top container cargo spaces in ships

1 The water spray system required by paragraphs 9.2, 9.3 and 9.4 of the Interim guidelines for open-top containerships (MSC/Circ.608/Rev.1) will also satisfy the requirement for dangerous goods.

2 The amount of water required for fire-fighting purposes in the largest hold should allow simultaneous use of the water spray system plus four jets of water from hose nozzles (MSC/Circ.608/Rev.1).

Section 7.17.3.1.2 - Required capacity of water supply for fire-extinguishing

The total required capacity of the water supply should satisfy SOLAS regulations II-2/19.3.1.2 and II-2/19.3.1.3 (if applicable), simultaneously calculated for the largest designated cargo space. The capacity requirement for SOLAS regulation II-2/19.3.1.2 should 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 SOLAS regulation II-2/19.3.1.3, then the drencher pump should also be taken into account in this total capacity calculation.

Section 7.17.3.1.3 - Size of pumping and drainage arrangements

1 Reference is made to resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces.

2 With respect to drainage and pumping arrangements, reference is made to SOLAS regulation II-2/20.6.1.4.1.3.

3 The quantity of water referred to in this regulation should be not less than 5 *l*/min/m^2 of the horizontal area of cargo spaces.

Section 7.17.3.1.4 - Acceptance of high expansion foam systems in case of dangerous goods

A high expansion foam system, complying with SOLAS regulation II-2/10.4.1.1.2, is acceptable, except if cargoes dangerously react with water (see the IMDG Code).

Section 7.17.3.2 - Sources of ignition

Reference is made to the International Standard IEC Publication 60092-506: Electrical installations in ships - Part 506: Special features - Ships carrying specific dangerous goods and materials hazardous only in bulk.

Section 7.17.3.4 - Ventilation requirements for individual cargoes and open-top container cargo holds

If adjacent spaces are not separated from cargo spaces by gastight bulkheads or decks, ventilation requirements should apply as for the cargo space itself, required under SOLAS regulation II-2/19.3.4.2 and its interpretations.

Section 7.17.3.4 - Requirements for individual cargoes

1 Cargoes liable to give off vapours or gases which can form an explosive mixture with air (see the BC Code, Appendix B, e.g. IMO Class 4.3 materials):

Two separate fans should be permanently fitted or being of a portable type adapted for being permanently fitted prior to loading and during voyage. The fans should be either explosion proof or arranged such that the escaping gas flow is separated from electrical cables and components. The total ventilation should be at least six air changes per hour, based upon the empty space. Ventilation should be such that any escaping gases cannot reach living spaces on or under deck.

2 Cargoes liable to spontaneous combustion (only applicable to Seed Cake (b) and (c)):

Two separate fans should be permanently fitted or being of a portable type adapted for being permanently fitted prior to loading and during voyage. The fans should be either explosion proof or arranged such that the escaping gas flow is separated from electrical cables and components. The total ventilation should be at least six air changes per hour, based upon the empty space. Ventilation should be such that any escaping gases cannot reach living spaces on or under deck.

3 For open-top container ships:

Power ventilation should be required only for the lower part of the cargo hold for which purpose ducting is required. The ventilation capacity should be at least two air changes per hour based on the empty hold volume below weather deck.

Section 7.17.3.4.2 - Degree of protection of exhaust fans and use of wire mesh guards

1 Exhaust fans should be of non-sparking type in accordance with IACS Unified Requirement F 29, as revised.

2 The purpose of "suitable wire mesh guards" is to prevent foreign objects from entering into the fan casing. The standard wire mesh guards should have a size of 13 mm x 13 mm.

Section 7.17.3.5 - Arrangements of bilge drainage systems for cargo spaces

1 If the bilge drainage system for cargo spaces is additional to the system served by pumps in the machinery space, the capacity of the system should be not less than 10 m^3/h per cargo space served. If the additional system is a common system, the capacity need not exceed 25 m^3/h. The additional bilge system need not be arranged with redundancy. Whenever flammable or toxic liquids are carried, the bilge line into the machinery space should be isolated either by fitting a blank flange or by a closed lockable valve.

2 If bilge drainage of cargo spaces is arranged by gravity drainage, the drainage should be either lead directly overboard or to a closed drain tank located outside the machinery spaces. The tank should be provided with vent pipe to a safe location on the open deck.

3 Enclosed spaces outside machinery spaces containing bilge pumps serving cargo spaces intended for carriage of flammable or toxic liquids should be fitted with separate mechanical ventilation giving at least six air changes per hour. Electrical equipment in the space should comply with the IACS Unified Interpretation SC 79. If the space has access from another enclosed space, the door should be self-closing.

4 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.

Section 7.17.3.6.1 - Type and suitability of protective clothing

1 When selecting the protective clothing, the danger of the chemicals according to the class and liquid or gaseous state should be taken into account.

2 The required protective clothing is for emergency purposes.

3 For solid bulk cargoes the protective clothing should satisfy the equipment requirements specified in Appendix E of the BC Code for the individual substances. For packaged goods the protective clothing should satisfy the equipment requirements specified in emergency procedures (EmS) of the Supplement to IMDG Code for the individual substances.

Section 7.17.3.6.2 - Spare bottles for breathing apparatus

Spare charges for the breathing apparatus should be provided as required in SOLAS regulation II-2/10.10.2.5.

Section 7.17.3.8 - Fixed fire-extinguishing system

1 Reference is made to IMO resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces.

2 With respect to pumping and drainage arrangement, reference is made to SOLAS regulations II-2/20.6.1.4 and 20.6.1.4.1.3.

Table 7.17-2 - Certification of special dangerous goods

The terminology "solid dangerous goods in bulk" covers only those cargoes listed in Appendix B of the Bulk Cargo Code, except cargoes of Materials Hazardous in Bulk. Other solid dangerous goods in bulk may only be permitted subject to acceptance by the Administrations involved.

Tables 7.17-2 and 7.17-3 - Class

The term "Class" refers to the classification of dangerous goods as specified in the IMDG Code.

Section 7.17.4 - Document of compliance

1 Reference is made to MSC/Circ.1027 - Document of compliance with the special requirements for ships carrying dangerous goods under the provisions of SOLAS regulation II-2/19 of SOLAS regulation II-2/19 of SOLAS 74, as amended.

2 The terminology "solid dangerous goods in bulk" covers only those cargoes listed in Appendix B of the Bulk Cargo Code, except cargoes of Materials Hazardous in Bulk. Other solid dangerous goods in bulk may only be permitted subject to acceptance by the Administrations involved.

3 There are no special requirements in the above- mentioned SOLAS regulation II-2/19 for the carriage of dangerous goods of classes 6.2 and 7 or for the carriage of dangerous goods in limited quantities, as stated in chapter 3.4 of the IMDG Code.

Section 8.1.10.10 - Marine evacuation system (MES)

Mini-slides should be subject to the requirements for MES unless they are used as an alternative means of embarkation to survival craft arrangements that are both covered by 8.7.5 and have been demonstrated to meet the required evacuation time. The definition of MES does not therefore include a device fitted to the craft (e.g. mini-slide) which need not be deployed in order to meet the requirements of 4.8.

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Section 8.4.2 - Muster lists

Attention is drawn to the advice given in the Guidelines for passenger safety instructions on ro-ro passenger ships (MSC/Circ.681).

Section 10.2.4.8 - Safe positions for discharge of air and overflow pipes and relief valves

1 Air and overflow pipes and relief valves should discharge to a position where there is no risk of fire or explosion from the emergence of oils and vapour and should not lead into crew spaces, passenger spaces, special category spaces, ro-ro spaces (other than open ro-ro spaces), machinery spaces or similar spaces.

2 The requirement to provide overpressure protection should be applied only to filling pipes served by pumps on board.

Section 10.2.4.9 - Material of oil fuel pipe valves

For valves fitted to oil fuel tanks and which are under static pressure-head, steel or modular cast iron may be accepted. However, ordinary cast iron valves may be used in piping systems where the design pressure is lower than 0.7 N/mm^2 and the design temperature is below 60ºC.

Section 13.12.1 - Fitting of autopilots

High-speed craft employed on short routes in enclosed waters are not required to be fitted with an autopilot. This is because the length and nature of the crossing together with the amount of traffic they may encounter means that an autopilot would not be used. Reference is also made to 13.1.2 of the Code.

Chapter 15 - Operating compartment layout

Reference should be made to:

.1 ISO 8468:1990 Ship's Bridge Layout and Associated Equipment – Requirements and Guidelines; and

.2 Guidelines on ergonomic criteria for bridge equipment and layout (MSC/Circ.982).

Annex 10, Section 3.4 - Same strength and stiffness

"Same strength and stiffness" should be interpreted as "equivalent strength and stiffness".

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ANNEX 2

INTERPRETATION OF PROVISION OF SOLAS CHAPTER X

Regulation 2.2 - Interpretation of "major character"

The following repairs, alterations and modifications should be recognized as being of a "major character":

.1 any change that substantially alters the dimensions of a high-speed craft

Example:
Lengthening by adding new mid-body; new mid-body should comply with 2000 HSC Code;

.2 any change that substantially alters the passenger accommodation

Example:
Vehicle deck converted to passenger accommodation; new accommodation should comply with the 2000 HSC Code; and

.3 any change that substantially increases the service life of a high-speed craft

Example:
Renewal of passenger accommodation on one entire deck; renewed accommodation should comply with the 2000 HSC Code.

MSC/Circ.912

ANNEX

DRAFT INTERPRETATIONS TO STANDARDS FOR FIXED SPRINKLER SYSTEMS FOR HIGH-SPEED CRAFT (RESOLUTION MSC.44(65))

Paragraph 2.1.2

In the case where a manual sprinkler system is fitted, special consideration should be given to the location of the second manually operated switch or break glass station (one being installed in a continuously manned control station). This second switch should be located in a position such that it is readily accessible to crew members but protected from inadvertent actuation by passengers.

Section 8 Hydropneumatic tanks

Hydropneumatic tanks need not be provided for manual sprinkler systems.

MSC/Circ.1166

ANNEX

GUIDELINES FOR A SIMPLIFIED EVACUATION ANALYSIS FOR HIGH-SPEED PASSENGER CRAFT

1 General

1.1 In addition to the relevant requirements for means of escape, escape routes in high-speed passenger craft are required to be evaluated by an evacuation analysis early in the design process, under the International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code), section 4.8.2.

1.2 The purpose of these Guidelines is to provide guidance on how to execute a simplified (hydraulic) evacuation analysis and use its results to plan the evacuation demonstration required in section 4.8.5 of the 2000 HSC Code.

2 Definitions

2.1 *Ideal deployment time (t_M)* is the time needed for the preparation and launching of the marine evacuation system (MES) and the first survival craft in calm water.

2.2 *Ideal travel time (t_I)* is the time needed for the slowest group of people to reach the embarkation point in calm water. Unless otherwise stated in the evacuation procedure, the number of people of the slowest group should be assumed equal to the capacity of the largest survival craft onboard. For the purpose of these Guidelines, t_I is assumed to run concurrently with t_M.

2.3 *Ideal embarkation time (t_E)* is the time needed for all passengers and crew to board the survival craft from the starting situation described in 4.8.7.1 of the Code.

2.4 *Structural fire protection time (SFP)* is the protection time for areas of major fire risk as defined in section 4.8.1 of the 2000 HSC Code.

2.5 *Slowest group of people* is the group of evacuating persons for which the highest travel time is obtained from calculations according to paragraph 3.6.3.3.

3 Method of evaluation

The steps in the evacuation analysis are:

3.1 *Description of the system*

.1 Identification of assembly stations.

.2 Identification of embarkation stations, MES and survival craft.

.3 Description of the evacuation procedure including the role of the crew.

.4 Identification of groups and their escape route.

3.2 *Assumptions*

This method for estimating evacuation time is basic in nature and, therefore, common evacuation analysis assumptions should be made as follows:

.1 passengers and crew should carry out the evacuation in a sequence of groups according to the evacuation procedure;

.2 passengers and crew will evacuate via the primary escape route;

.3 walking speed depends on the type of escape facility, assuming that the flow is only in the direction of the escape route, and that there is no overtaking;

.4 passengers' disabilities or medical conditions that will severely hamper their ability to keep up with the flow are neglected (see paragraph 3.2.8.1 below);

.5 passenger load is assumed to be 100% (full load);

.6 full availability of escape arrangements is considered;

.7 people can move unhindered;

.8 the allowable evacuation time as per section 4.8.1 of the 2000 HSC Code is given by $\frac{SFP - 7}{3}$ (min), where:

.8.1 division by 3 accounts for the safety factor, which includes passengers' ages and disabilities, restricted visibility due to smoke, effects of waves and craft motions on deployment, travel and embarkation time and of violations to the evacuation procedure;

.8.2 subtraction of 7 min accounts for initial detection and extinguishing action (section 4.8.1 of the 2000 HSC Code); and

.8.3 for category B craft, the passenger awareness time, the time needed for passengers to reach assembly stations and the time needed for manning emergency stations is included in the 7 min time (see section 4.8 of the 2000 HSC Code);

.9 as the evacuation procedure is designed to carry out evacuation under controlled conditions (section 4.8.1 of the 2000 HSC Code), no counter flow takes place; and

.10 when using table 3.6 it is assumed that at the beginning of the evacuation, passengers are located at a distance not greater than two decks from the embarkation station.

3.3 *Scenarios to be considered*

3.3.1 For the purpose of calculating the evacuation time in category A craft, passengers should be assumed to be distributed in a normal voyage configuration (section 4.8.4.1 of the 2000 HSC Code).

3.3.2 For the purpose of calculating the evacuation time in category B craft, passengers and the crew should be assumed to be distributed among assembly stations and be ready for embarkation (section 4.8.4.2 of the 2000 HSC Code).

3.4 *Performance standards*

3.4.1 The following two performance standards should be complied with for calculating the overall evacuation time:

$$t_M + t_E \leq \frac{SFP - 7}{3} \qquad (3.4.1.1)$$

$$t_I + t_E \leq \frac{SFP - 7}{3} \qquad (3.4.1.2)$$

3.4.2 Both performance standards are derived from section 4.8.1 of the 2000 HSC Code.

3.5 *Calculation of t_E and t_M*

3.5.1 The values of t_E and t_M should be calculated separately based on an appropriate combination of the following documented and independently witnessed trials as is acceptable to the Administration but which may be subject to verification trials:

.1 type approval trials[1] for any inflatable liferafts and marine evacuation systems used for the evacuation of the craft, the relevant deployment and embarkation times being increased by factors of 1.3 and 1.14, respectively; and

.2 full scale shipboard trials on closely similar craft and evacuation systems.

3.5.2 Safety factors on t_E and t_M are accounted for by dividing by 3 in performance standards formulae (3.4.1.1) and (3.4.1.2).

3.6 *Calculation of t_I*

3.6.1 Parameters to be considered:

.1 clear width, W_c , is:

.1 measured off the handrail(s) for corridors and stairways;

.2 the actual passage width of a door in its fully open position;

[1] Refer to the Revised recommendation on testing of life-saving appliances, and in particular the times measured in accordance with 5.17.3.3 and 12.6.1 of that recommendation (as adopted by resolution MSC.81(70)).

.3 the space between the fixed seats for aisles in public spaces; and

.4 the space between the most intruding portions of the seats (when unoccupied) in a row of seats in public spaces;

.2 speed of persons, S (m/s) is the speed of evacuees along the escape route (table 3.6 provides the values of S which should be used for the analysis);

.3 specific flow of persons, F_s (p/(m/s)), is the number of evacuating persons past a point in the escape route per unit time per unit of clear width W_c (table 3.6 provides the values of F_s which should be used for the analysis).

Table 3.6*

Type of facility	Speed of persons S (m/s)	Specific flow Fs (p/(m/s))
Stairs (down)	0.55	1.1
Stairs (up)	0.44	0.88
Corridors, doorways	0.67	1.3

.4 calculated flow of persons, F_c (p/s), is the predicted number of persons passing a particular point in an escape route per unit time. It is obtained from:

$$F_c = F_s \cdot W_c \qquad (3.6.1.4)$$

.5 flow time, t_F (s), is the total time needed for a group of N persons to move past a point in the egress system. It is calculated as:

$$t_F = N / F_c \qquad (3.6.1.5)$$

.6 walking time, t_w (s), is the total time needed for a person to cover the distance between the assembly station and the embarkation station.

3.6.2 Transitions

Transitions are those points in the egress system where the type of a route changes (e.g. from a corridor to a stairway) where routes merge or branch out.

3.6.3 Procedure for calculation of t_I is as follows:

* Data derived from land-based stairs, corridors and doors in civil buildings, and are extracted from the publication "SFPE Fire Protection Engineering Handbook, 2nd edition NFPA 1995".

.1 Groups of people:

For the purposes of evacuation, the total number of persons on board is broken down into one or more groups of people. It should be assumed that all persons in a group carry out the evacuation at the same time, along the same route and towards the same embarkation station. The number of persons in each group, the number of groups and the embarkation station assigned to each group should be in accordance with the evacuation procedure.

.2 Schematic representation:

The escape routes from assembly stations to embarkation stations are represented as a hydraulic network, where the pipes are the corridors and stairways, the valves are the doors and restrictions in general.

.3 For each foreseen group of people:

.1 The walking time, t_w, is calculated by using the speed of persons specified in table 3.6 and the distance between the pertinent assembly and embarkation stations.

.2 The flow time, t_F, of each portion of the escape route is calculated using the specific flow F_s from table 3.6 and the appropriate clear width of that portion of escape route. The total flow time is the largest value obtained.

.3 The travel time is obtained as the sum of the walking time and the total flow time.

3.6.4 Ideal travel time t_I

Calculations as per paragraph 3.6.3.3 should be repeated for each foreseen group of people. The highest resulting travel time is then taken as the ideal travel time for use in performance standard in paragraph 3.4.

4 Corrective actions

If the performance standards under paragraph 3.4 are not fulfilled, corrective actions should be considered at the design stage by either modifying one or more components in the evacuation system (e.g., escape routes, life-saving appliances, passengers load, etc.) or by modifying the evacuation procedure.

5 Documentation

The documentation of the analysis should report the following items:

.1 the basic assumptions for the analysis;

.2 a schematic representation of the layout of the craft;

.3 position and role of the crew during the evacuation, according to the evacuation procedure;

.4 the method for the analysis, if different from these Guidelines;

.5 details of the calculation; and

.6 the resulting overall evacuation time.

APPENDIX

EXAMPLE OF APPLICATION

1 General

The example provides an illustration on the application of the Guidelines. Therefore it should not be viewed as a comprehensive and complete analysis nor as an indication of the data to be used. More specifically, the short description of the evacuation procedure provided in paragraph 3.3 is only an outline, for the purpose of the evacuation analysis, of the complete evacuation procedure the embarkation time and the deployment time used in paragraph 4 below are purely illustrative.

2 Craft characteristics

The high-speed craft considered is a category B craft with a total capacity of 800 persons (784 passengers and 16 crew members). As shown in figure 1, when the order to abandon the craft is given, passengers are distributed in the public spaces on two decks (210 on the upper deck and 574 on the lower deck), the lower deck is equipped with 4 MES. The structural fire protection time (SPF) is 60 min.

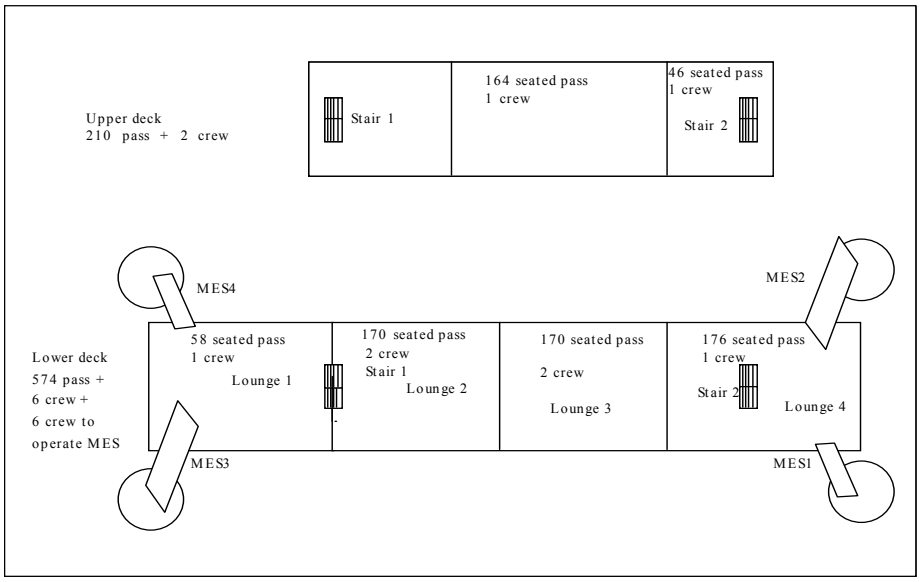

Figure 1 – Sketch of the considered high-speed craft

3 Description of the system

3.1 *Identification of assembly stations*

Assembly stations coincide with the public spaces where passengers are located (seated). Passengers are wearing life jackets.

3.2 *Identification of embarkation stations, MES and liferafts*

.1 Embarkation stations (4, one for each MES) are located at the lower deck.

.2 Each MES consists of an inflatable slide with an attached platform.

.3 Liferafts (8), 135 persons capacity each, are stowed in racks on the lower deck, in the proximity of the MES. The aggregate capacity of liferafts is therefore 1,080 persons, or of 810 persons if one embarkation station is not available in accordance with the 2000 HSC Code.

.4 Two rescue boats are available for marshalling the liferafts.

3.3 *Description of the evacuation procedure*

.1 When the order to abandon the craft is given, crew members start operating the MES (total 6 crew members), the rescue boats (1 crew member per boat) and to direct the passengers (as shown in figure 1: two crew members on the upper deck and 6 crew members on the lower deck); and all these activities progress in parallel.

.2 PHASE 1: For each MES, the slide is inflated and the first liferaft launched, inflated and connected to the slide's platform. In the mean time the first 4 groups of passengers are formed and directed to the 4 MES, each group is assisted by 1 crew member, for a total of 400 persons, as follows (see figure 2):

.2.1 164 passengers, marshalled by 1 crew member, move from upper deck through stair 1 down to the lower deck and join with 34 passengers and 1 crew member coming from lounge 2. They then move along the central aisle of lounge 1 (corridor 2); at the end of corridor 2 two groups are formed, each composed by 99 passengers and 1 crew member, and move to MES 3 and 4 through doors 2A and 2B respectively;

.2.2 46 passengers marshalled by 1 crew member move from upper deck, through stair 2, down to lower deck, where they merge with 152 passengers and 1 crew member; two groups are then formed, each composed by 99 passengers and 1 crew member, and move to MES 1 and 2 respectively;

.2.3 in the meantime the remaining passengers stay in lounges 1 to 4 assisted by 4 crew members.

.3 PHASE 2: Once the first liferaft is ready for boarding, the first group for each MES descends to the liferaft using the slide and platform. When boarding is completed, the liferaft is detached from the slide and floated away by the rescue boat. In the

mean time, the second liferaft is launched, inflated and connected to the platform and the second 4 groups of persons move to the embarkation stations.

.4 PHASE 3: Once the second liferaft is ready for boarding, the second group for each MES descents to the liferaft through the slide and platform. Finally, the 6 crew members operating the MES board. When boarding is completed, the liferaft is detached from the slide. The evacuation is now completed.

3.4 *Identification of groups and their escape routes*

In total 8 groups, each composed of 100 persons, are considered. Their (primary) escape routes are shown in figure 2 for the first 4 groups and in figure 3 for the second 4 groups.

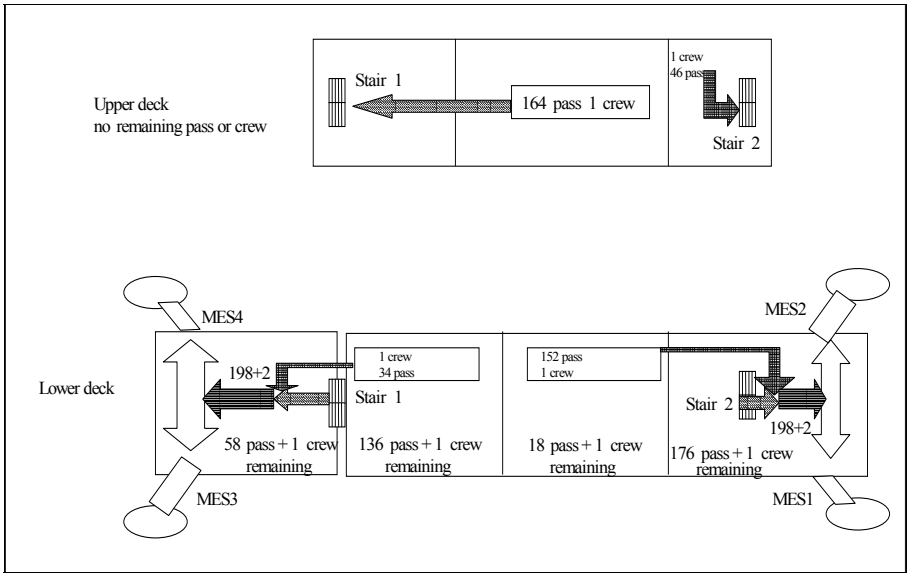

Figure 2 – First 4 groups of persons

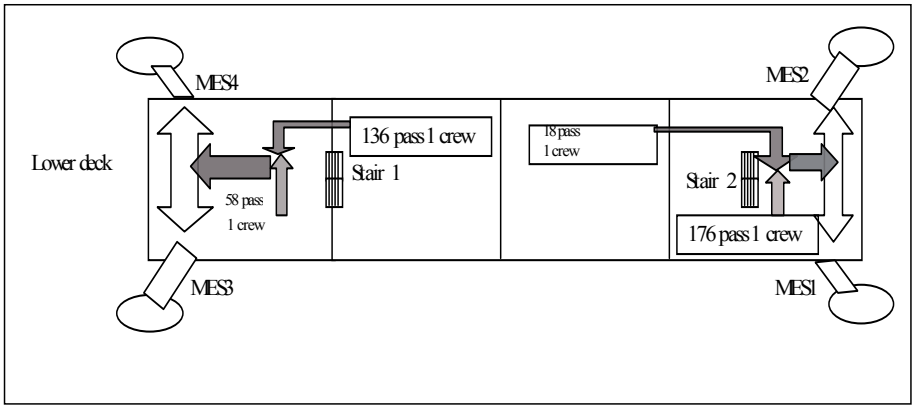

Figure 3 – Second 4 groups of persons

4 Calculation of t_E and of t_M

4.1 *Embarkation time t_E*

According to the evacuation procedure, each MES is used by 200 persons, if all four MES are available. Based on full scale trials on craft having similar arrangements and using the same MES and same number of crew, the total time needed to deploy, inflate and mooring the liferaft and to embark 100 persons is 330 s (5 min and 30 s). Accordingly, the total embarkation time is 660 s (11 min).

4.2 *Deployment time t_M*

Based on full scale trials on craft having similar arrangements and using the same MES, the total time needed to deploy and inflate an MES is 150 s (2 min and 30 s).

5 Calculation of t_I

5.1 For the purposes of this example, it is assumed that calculations have been carried out for all the 8 groups of people into which the evacuation is organized, according to the evacuation procedure described in paragraph 3.3 above. It is further assumed that the highest travel time is obtained for the group of people moving (phase 1) from the afterward passenger area in the upper deck down to MES 3 and 4 respectively on the lower deck.

5.2 The schematization of the escape route is shown in figure 4. As it may be seen, the elements composing the escape path are 2 doors, 2 corridors and 1 stairway.

5.3 The characteristics of the escape path's elements are as follows:

Table 5.3

Element	L (m)	W_c (m)	F_s	S (m/s)	F_c (p/s)	N people
Door 1	N.A.	1.4	1.3	N.A.	1.82	165
Corridor 1	14	4.2	1.3	0.67	5.46	165
Stairway 1	4.7	3.5	1.1	0.55	3.85	165
Corridor 2	14	3.0	1.3	0.67	3.90	200
Door 2A	N.A	1.4	1.3	N.A	1.82	100
Door 2B	N.A	1.4	1.3	N.A	1.82	100

The values of specific flow (F_s) and speed (S) are taken from table 3.6 of the guidelines; the value of calculated flow (F_c) is obtained by $F_c = F_s W_c$ (see paragraph 3.6.1.4 of the guidelines).

5.4 The resulting walking time (t_w) and flow time (t_F), calculated according to paragraphs 3.6.1.5 and 3.6.1.6 of the guidelines are as follows:

Table 5.4

Element	L (m)	W_c (m)	N people	t_w (s)	t_F (s)
Door 1	N.A.	1.4	165	N.A.	91
Corridor 1	14	4.2	165	21	30
Stairway 1	4.7	3.5	165	9	43
Corridor 2	14	3.0	200	21	51
Door 2A	N.A	1.4	100	N.A	55
Door 2B	N.A	1.4	100	N.A	55

5.5 The resulting total walking time is the sum of the walking time of each element in the escape path and totals 51 s. The flow time is the highest among all the elements in the escape path and corresponds to 91 s. Accordingly, the ideal travel time is where, t_I = 142 s.

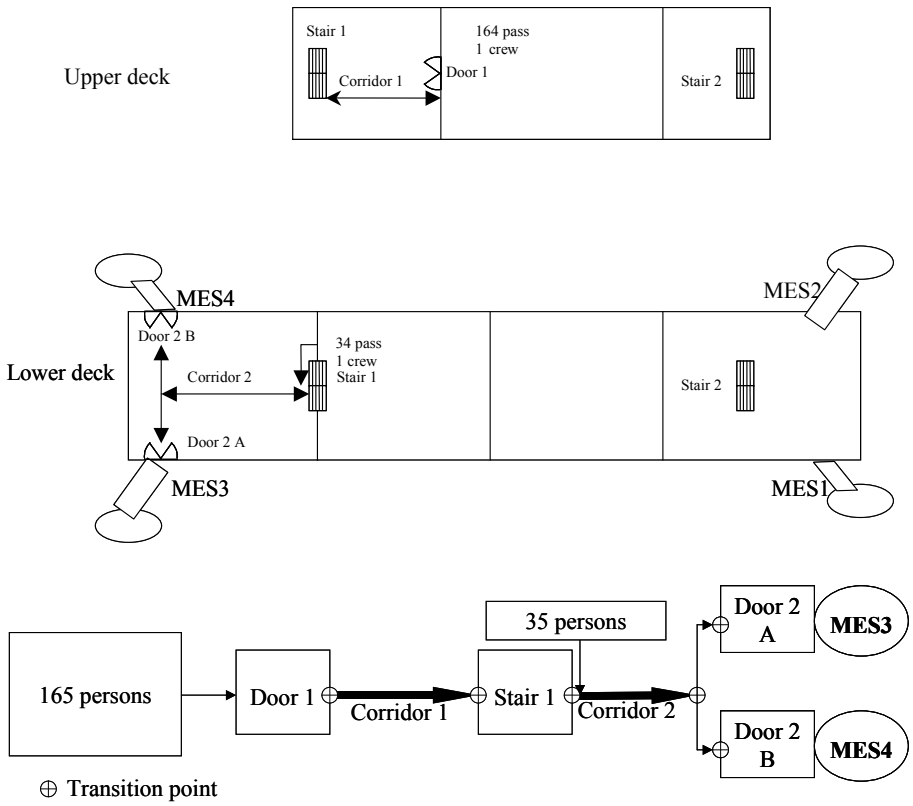

Figure 4 – Sketch of the evacuation path and its schematization

6 Performance standard

The calculated overall evacuation time: $t_M + t_E = 150 + 660 \leq \frac{SFP - 7}{3}$ min = 1059 s

$t_I + t_E = 142 + 660 \leq \frac{SFP - 7}{3}$ min = 1059 s

The requirements are fulfilled.

MSC/Circ.1177

ANNEX

UNIFIED INTERPRETATION OF THE 2000 HSC CODE

CHAPTER 9

MACHINERY

PART A – GENERAL

Paragraph 9.1.5 - Machinery installations: dead craft condition

"Means shall be provided to ensure that machinery can be brought into operation from the dead craft condition without external aid."

Interpretation

Dead craft condition for the purpose of paragraph 9.1.5 should be understood to mean a condition under which the main propulsion plant and auxiliaries are not in operation and, in restoring the propulsion, no stored energy is assumed to be available for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries. It is assumed that means are available at all times to start the emergency generator or one of the main generators when the main source is arranged according to paragraph 12.7.2.

Where the emergency source of power is an emergency generator which complies with section 12.4, or a main generator meeting the requirements of paragraph 12.7.2, it is assumed that means are available to start this generator and, consequently, this generator may be used for restoring operation of the main propulsion plant and auxiliaries where any power supplies necessary for engine operation are also protected to a similar level as the starting arrangements.

Where there is no emergency generator installed or an emergency generator does not comply with section 12.4, the arrangements for bringing main and auxiliary machinery into operation should be such that initial charge of starting air or initial electrical power and any power supplies for engine operation can be developed on board the craft without external aid. If for this purpose an emergency air compressor or electric generator is required, these units should be powered by a hand-starting oil engine or a hand-operated compressor. The arrangements for bringing main and auxiliary machinery into operation should have a capacity such that the starting energy and any power supplies for engine operation are available within 30 min of a dead craft condition.

MSC.1/Circ.1195

ANNEX

GUIDELINES FOR MODEL TESTING

1 INTRODUCTION

1.1 The exemption from the requirement to fit an inner bow door now incorporated in the 2000 HSC Code (paragraph 2.2.3.2.2) may be invoked if a craft can be shown to comply with certain residual stability criteria even if water accumulates on the vehicle deck(s) as a result of failure of the bow shell door. Model testing is one option for determining the quantity of water that accumulates.

1.2 These Guidelines are intended to ensure that such model tests would be sufficient and adequate so that the exemption would be applied safely and consistently, and so that the safety of the craft would not be endangered.

1.3 Terms used in these Guidelines are as defined in the 2000 HSC Code.

1.4 The aim of the model tests is to determine the answers to two questions:

.1 whether waves reach the bow loading door; and, if so,

.2 what volume of water would accumulate.

1.5 To meet these aims, the following is described in these Guidelines:

.1 the use of towed or self-propelled models;

.2 physical tests at heading increments of 45° relative to the waves at zero and at forward speed;

.3 tests to establish whether water reaches the bow openings, and if so tests to determine the amount of water that may accumulate; and

.4 direct measurement of the accumulated volume of water at the end of each test run, or determination of the volume by calculation from measurements of relative water level within the vehicle space.

2 MODEL DESIGN AND CONSTRUCTION

2.1 Type and size

2.1.1 *Type of test facility*

2.1.1.1 The tests described by these Guidelines are intended to be undertaken in either a manoeuvring basin or in head and following waves in a conventional towing tank. The model may either be:

.1 towed from a carriage (preferably equipped with the capability for free-to-surge under constant towing force), with freedom to heave, pitch and roll; or

.2 self-propelled and remotely controlled, either by radio or by a lightweight umbilical attachment.

2.1.1.2 The wave making facility should be capable of generating the requisite specific wave spectra with accuracy within + 2.5% on significant height, ±2.5% on T_P, and ± 5% on T_Z.

2.1.2 ***Scale***

The model scale should be as large as practicable with respect to the test facility employed, but the model should not be less than 1.5 m in length, and be:

.1 appropriate to enable the requisite full scale significant wave height to be generated; and

.2 capable of providing the equivalent of at least 1 min duration of operation at full scale per tank run at the maximum speed to be tested.

2.2 Construction

2.2.1 ***General***

The model should comply with the following:

.1 be capable of operating in both displacement mode and where appropriate in the non-displacement mode at a running attitude (trim and sinkage) appropriate to the full scale craft;

.2 any lift devices (e.g., fans, foils, flaps, flexible seals, wings, etc.) should generate forces, pressures and volumetric flows resulting in the same running attitude in calm water, as specified above, ensuring a bow height accuracy within 5%. Actively controlled stabilizing or ride-control devices should be assumed to be in a fixed pre-set or passive mode;

.3 the hull should be suitably thin ($0.01L_{model}$ with a minimum of 2 mm is recommended) in floodable spaces;

.4 be equipped with all main design features such as watertight bulkheads, air escapes, freeing ports, access trunks, etc corresponding to the full scale vehicle spaces, and modelled properly to represent the real situation as far as practicable;

.5 be constructed with superstructures to the extent needed to ensure a realistic response in waves;

.6 be suitably constructed to permit monitoring of the interior of the floodable spaces, using video cameras;

.7 be equipped with external appendages such as bilge keels, spray rails, lift devices or fendering as may reasonably be expected to influence the results of the tests;

.8 be provided with a bow aperture to accurately model the full scale craft after the bow loading door(s) may have been lost, special attention being paid to the freeboard at the lowest point;

.9 be equipped with fast-closing watertight shutters to the bow aperture(s) and any drainage openings that can be remotely opened and closed at the beginning and end of the test period during each run;

.10 prior to ballasting, the model should be equipped with all the necessary instrumentation; and

.11 freeing ports and other means of drainage should be closed at all times during the tests.

2.2.2 ***Permeability of vehicle spaces***

The reduction of permeability of the vehicle spaces due to the presence of cargo should not be represented.

2.2.3 ***Accuracy***

2.2.3.1 The mass of the model after ballasting to the directly scaled design waterline should be within ±1% of that representing the full scale craft.

2.2.3.2 The longitudinal centre-of-gravity after ballasting to the directly scaled design waterline should result in a static trim attitude within 0.2° of that representing the full scale craft.

2.2.3.3 The volume of the vehicle spaces to the first downflooding opening derived when the craft is at the designed trim attitude should be within ±2% of that representing the full scale craft. Where open vehicle spaces are modelled, the volume should be measured up to the level at which water might first begin to spill out, or alternatively the deck area should be within ± 2% of that representing the full scale craft (commensurate with hull thickness as specified in 2.2.1.3).

2.2.3.4 The freeboard from the directly scaled design waterline (at zero speed) to the lowest point of the bow loading opening should be within +0 to -1% of that representing the full scale craft.

2.3 Model loading

2.3.1 Ballasting particulars should be developed for one loading condition prior to testing, viz: maximum operational weight (as defined in the 2000 HSC Code), combined with the most onerous bow down running trim or the condition with the bow aperture closest to the water in the running trim.

2.3.2 The ballasting particulars should be such as to achieve:

.1 a mass corresponding to the loading conditions defined above;

.2 a vertical centre-of-gravity position corresponding to the maximum allowable in service (limiting KG) for the respective operational weight, or alternatively the maximum predicted operational KG plus a margin of 10%;

.3 longitudinal centre-of-gravity positions corresponding to the nominal and most forward and most aft positions envisaged by the loading restrictions contained in the craft operating manual;

.4 a longitudinal radius of gyration equivalent to that calculated for the full-scale craft ±8%, or (where this information is not available) within the range 0.23 to 0.27L, where L is as defined in the 2000 HSC Code; and

.5 a roll radius of gyration equivalent to that calculated for the full-scale craft ±8%, or (where this information is not available) within the range 0.35 to 0.4 B, where B is as defined in the 2000 HSC Code,

after ballasting for each condition:

.6 the total model mass should be verified by weighing;

.7 the actual vertical centre-of-gravity and longitudinal trim should be verified by physical inclining in air and/or water;

.8 the longitudinal and roll radii of gyration should be verified in air; and

.9 the natural roll period should be measured by a roll decrement test with the model at rest in calm water.

3 ENVIRONMENTAL CONDITIONS

3.1 Waves

3.1.1 Two sea states should be used. The model should be tested in a long-crested irregular seaway at maximum significant wave steepness of $H_s/(gTp^2/(2\pi))=0.05$. In the absence of information on specific spectrum data, JONSWAP type spectra should be used with a peak enhancement factor $\gamma=3.3$. In the first sea state, H_s should be the maximum significant wave height for the area of operation, which is not exceeded by a probability of more than 10% on a yearly basis, but limited to a maximum of 4 m. In the second sea state H_s should represent the significant wave height corresponding to the most onerous relative bow motion (worst intended conditions).

3.1.2 Generation of the waves should be such that each wave realization results in a non-repeating wave train during the model test.

3.2 Wind

Wind should not be represented during the tests.

4 INSTRUMENTATION, CALIBRATION AND DATA RECORDING

4.1 Model instrumentation

4.1.1 The following model instrumentation should be provided as a minimum: one relative water level sensor located in front of the opening at the port and starboard extremities of the opening (i.e. 2 sensors).

4.1.2 If the water volume is to be estimated using water height measurements, 15 water level sensors should be used at the following locations (where l = the length of the floodable vehicle space):

.1 at 10% of l from the bow loading opening, at the watertight boundary on the port and starboard sides and centreline (h_{FP}, h_{FS} and h_{FC} respectively);

.2 at 30% of l from the bow loading opening, at the watertight boundary on the port and starboard sides and centreline (h_{FMP}, h_{FMS} and h_{FMC} respectively);

.3 at 50% of l from the bow loading opening, at the watertight boundary on the port and starboard sides and centreline (h_{MP}, h_{MS} and h_{MC} respectively);

.4 at 30% of l from the aft limit of the vehicle space, at the watertight boundary on the port and starboard sides and centreline (h_{AMP}, h_{AMS} and h_{AMC} respectively); and

.5 at 10% of l from the aft limit of the vehicle space, at the watertight boundary on the port and starboard sides and centreline (h_{AP}, h_{AS} and h_{AC} respectively).

4.1.3 A drawing of the positions of the water height sensors should be provided.

4.1.4 Instrumentation to measure roll and pitch angles and heave motion is recommended.

4.1.5 If the testing is conducted solely to demonstrate that water does not reach the bow loading opening, then all items except 4.1.1 may be omitted.

4.1.6 As an alternative to the use of water level sensors described in 4.1.2 above, the volume of water accumulated during a test run may be determined by direct collection and weighing of the water inside the model.

4.2 Facility instrumentation

The following instrumentation should be provided in the model basin:

.1 one static wave height probe located clear of tank end effects;

.2 one moving wave height probe mounted so that it approximately matches the mean model position;

.3 mean forward speed of the model;

.4 video camera(s) to monitor the interior of the vehicle spaces; and

.5 video camera(s) to monitor the exterior of the model, especially the bow aperture.

4.3 Data recording

Continuous records should be obtained for all the media required by 4.1 and 4.2 for each test run, with a sampling rate at model scale of not less than 25 Hz.

5 TEST PROCEDURE

5.1 Preparation

5.1.1 The model should be prepared in accordance with 2.2, 2.3 and 4.1 above, and all verification checks required by 2.1 to 2.3 should be completed before testing commences.

5.1.2 The wave spectra should be run and verified for compliance with the requirements in 2.1.1.

5.2 Craft speed and operating mode

5.2.1 Where a craft normally operates in a non-displacement mode, tests should be conducted in both zero speed (displacement mode) and maximum operating forward speed (non-displacement mode). Where a non-displacement mode is tested, any lift devices should be employed as specified in 2.2.1.1.

5.2.2 Prior to the testing, an estimate should be made by the owner and/or builder as to the maximum speed of the full scale craft into head seas (V_W) that would be practically attainable in the specific loading condition (powering considerations) or be structurally permissible (e.g.: by the classification society). Where a craft may be operated in both displacement and non-displacement modes, separate values of V_W should be derived for the two modes.

5.2.3 In head seas the speed of the model should not exceed V_W, but may be reduced to not less than 65% of V_W, provided that if a reduced speed is necessary to satisfy the terms of the exemption, the maximum permissible speed in the relevant wave height is incorporated in the Permit to Operate and in the craft operating manual.

5.3 Test run procedure

5.3.1 Once the craft has reached the required test speed during a tank run, the watertight bow aperture(s) are to be rapidly opened and are to remain open until the point at which the model is decelerated at the end of the run. At that point the watertight shutters are to be rapidly closed to trap the water collected inside the model. This water is to be measured directly after the tank run (5.5.3 refers) and the water is to be removed from the model after each run.

5.3.2 A weight made of high density material, such as lead or steel, equal to the mass of water collected at the end of each tank run is then to be placed on the vehicle deck, on the centreline of the craft and at the longitudinal mid point of the vehicle deck. This weight should be cuboid in shape, with length and beam selected to fit the available deck space, aiming not to restrict the water flow on the vehicle deck. This may allow for more water to accumulate on the ro-ro deck than what would be the case in one continuous run but this error is likely to be small and on the side of safety.

5.3.3 This process is to be repeated for each run of a test case.

5.4 Test programme

5.4.1 ***General***

5.4.1.1 The test programme should be witnessed by an Administration (whenever known, this should be the flag Administration), surveyors nominated by them for the purpose or by organizations recognized by them.

5.4.1.2 The test programme should be conducted for the craft operating in each of the sea states stipulated in 3.1 above through direct physical testing at zero and forward speed on five headings relative to the wave direction, between head and following seas in 45 degrees increments.

5.4.2 ***Duration and repetition of test runs***

5.4.2.1 For test runs at zero speed, each run should have a duration of 10 min (full scale). Each test case at each heading should consist of a set of three tank runs with different wave realizations.

5.4.2.2 Each tank run at forward speed should be of the maximum practical duration, in any case not less than the equivalent of 1 min at full scale, with the bow opening shutter being opened and closed at the beginning and end of the test period of each run. Each test run should comprise successive tank runs to represent not less than 10 min of continuous full scale operation in one wave realization at a given heading angle.

5.4.2.3 Each test case per heading angle (at forward speed) should consist of an ensemble of test runs with different wave realizations. The number of associated wave realizations should depend on the heading angle as follows:

.1 three wave realization trains in head and bow quartering seas;

.2 four wave realization trains in beam seas; and

.3 five separate wave realization trains in following and stern quartering seas.

5.4.2.4 Each wave realization train will be of at least 10 min full scale total duration, each such wave train being taken from the required wave spectrum.

5.4.3 ***Tests in waves at all heading angles***

5.4.3.1 As a minimum the following tests should be conducted: at a speed of V_W and design LCG, tests in waves specified in 3.1.

5.4.3.2 If the craft does not comply with the water volume required to meet the exemption, then the tests can be repeated at lower speed to a minimum of 65% V_w.

5.5 Test results

5.5.1 ***General***

The tests are required to determine the answers to two questions:

.1 whether the bow loading door is reached by the waves; and, if so,

.2 what volume of water would accumulate.

5.5.2 ***Determination of whether water reaches the bow opening***

If, during the constant speed portion of ANY of the test runs required by these guidelines, water is observed or measured as having exceeded the lower edge of the bow opening, then the requirement of the 2000 HSC Code, paragraph 2.2.3.2.2.1 (objective 5.5.1.1) should be deemed NOT to have been satisfied. In the event this is not satisfied, then an exemption may still be possible by further tests to demonstrate compliance with the 2000 HSC Code, paragraph 2.2.3.2.2.2 (objective 5.5.1.2).

5.5.3 ***Determination of volume of water***

From the model tests the accumulated volume of water for each heading angle may be determined by:

.1 direct measurement of the accumulated volume of water by collecting the trapped water on the vehicle deck in a measurement receptacle (preferred method). The water volume collected during each (10 min) test run should be based on the sum of volumes recorded for each successive tank run. For each test case at a given heading angle the volume should be averaged over the volumes of the different test runs (wave realizations) to give a collected volume for a 10 min (full scale) time period; or

.2 determination of the volume by calculation from measurements of water level within the vehicle space, using the method of 5.5.4 below. The position of the solid weight after each run should be positioned to minimize interference with the water height measurement probes.

5.5.4 ***Calculation of volume of water accumulating on the vehicle deck***

5.5.4.1 When the volume of water accumulated on the vehicle deck is estimated from water height sensors, it should be calculated as follows. The mean volume of water during each successive tank run should be determined from the fifteen sensors as defined in 4.1.2.1 to 4.1.2.2. The mean heights of water measured at these locations should be scaled to full scale before calculating the volume of water as follows (where the symbol *h'* denotes the water height scaled as described above).

5.5.4.2 Volume of water during tank run i:

$$Vol_i = A_{VD}\,(h'_{FS} + 2h'_{FC} + h'_{FP} + h'_{FMS} + 2h'_{FMC} + h'_{FMP} + h'_{MS} + 2h'_{MC} + h'_{MP} + h'_{AMS} + 2h'_{AMC} + h'_{AMP} + h'_{AS} + 2h'_{AC} + h'_{AP}) / 20 \qquad (m^3)$$

Where: A_{VD} = plan area of vehicle deck capable of being flooded (m^2 at full scale).

5.5.4.3 The volume of water accumulated during a test run is given by the sum of Vol_i for each successive tank run.

5.5.5 ***Volume of water to be used in calculating residual stability***

The volume of water resulting from the most onerous condition (i.e., heading angle) obtained from 5.5.3.1 or .2 is to be used for calculating the stability properties for demonstrating compliance with the 2000 HSC Code, paragraph 2.2.3.2.2.2.

5.6 Test report

The test report should include the following information as a minimum:

.1 general arrangement drawing of the craft, showing the spaces that might be flooded as a result of failure of the bow loading door;

.2 general arrangement drawing of the model, showing the scale ratio and details of the construction and instrumentation;

.3 calculations to show the derivation of the maximum operational and minimum operational weights and corresponding limiting KG positions;

.4 tests conducted to verify the mass, centre-of-gravity position and radii of gyration;

.5 where appropriate, calculations to show that the elements necessary to achieve the non-displacement mode have been appropriately scaled;

.6 the nominal and measured wave spectra (at the fixed wave probe location); and

.7 records for each test case:

.7.1 wave elevation at model position;

.7.2 relative wave height at the opening; and

.7.3 internal water volume measurements.

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