GUIDELINES FOR STATUTORY SURVEYS OF SEA-GOING SHIPS ENGAGED ON NON-INTERNATIONAL VOYAGES

PART EIGHT
ADDITIONAL SAFETY REQUIREMENTS FOR RO-RO PASSENGER SHIPS

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Chapter 1 GENERAL

1 General provisions

1.1 Unless provided otherwise, this PART applies to ro-ro passenger ships engaged on domestic voyages, excluding high speed ro-ro passenger ships.
1.2 The class of ro-ro passenger ships is to be in accordance with class of passenger ships of Chapter 1, PART FOUR of the Guidelines.
1.3 In addition to complying with requirements of this PART, ro-ro passenger ships are also to comply with applicable requirements for passenger ships given in other parts of the Guidelines.

2 Definitions

2.1 For the purpose of this PART:
(1) Ro-ro passenger ship means a passenger ship with ro-ro spaces or special category spaces as defined in the Guidelines.
(2) Special category spaces are those enclosed vehicle spaces above and below the bulkhead deck intended for carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck in one horizontal zone provided that the total overall clear height for vehicles does not exceed 10 m.

3 Arrangement of vehicle spaces and passenger spaces

3.1 Ro-ro passenger ships are to be so arranged that passengers can swiftly escape to the survival craft embarkation deck or muster station in emergencies.
3.2 Unless fire protection measures given in Section 3, Chapter 5 of this PART are adopted, accommodation spaces, service spaces, survival craft muster stations and embarkation stations or evacuation stations are not to be arranged on the same deck with special category spaces or ro-ro spaces or weather deck used as ro-ro spaces.
3.3 Survival craft muster stations and embarkation stations or evacuation stations① in general are to be arranged on the weather deck of accommodation spaces and service spaces. Where they can only be arranged in ro-ro spaces of weather deck due to difficulty in arrangement, external escape routes made of steel providing continuous shelter are to be provided from accommodation spaces and service spaces to embarkation stations or evacuation stations.
3.4 Escape routes on board are to be designed and arranged in accordance with the requirements of 3.6, Chapter 4 of this PART.

4 Type of spaces for carriage of vehicles

4.1 For ro-ro passenger ships of class I, spaces for the carriage of vehicles on and below the bulkhead deck are to comply with provisions for closed ro-ro spaces or special category spaces; spaces for the carriage of vehicles on the deck above the bulkhead deck are to comply with provisions for open or closed ro-ro spaces.
4.2 Unless provided otherwise in 4.3, for ro-ro passenger ships of classes II and III, spaces for the carriage of vehicles below the bulkhead deck are to comply with provisions for closed ro-ro spaces or special category spaces; spaces for the carriage of vehicles on the bulkhead deck are to comply with provisions for open or closed ro-ro spaces; deck spaces for the carriage of vehicles above the bulkhead deck may be open ro-ro spaces/weather deck.
4.3 For class III ro-ro passenger ships of service categories 2 and 3, where only one tier of vehicle deck is provided for the ship, the deck for the carriage of vehicles may be the weather deck.

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① Evacuation stations and external escape routes include survival craft stowage area, open deck spaces and enclosed promenades forming lifeboat and life raft embarkation and lowering stations, assembly stations (internal and external), external stairs and open decks used for escape routes, the ship's side to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the life raft and evacuation slide embarkation areas.

5 Arrangement of platforms and stairways for ro-ro passengers ships carrying passenger trains

5.1 Where ro-ro passenger ships carrying rail cars are designed for carriage of passenger trains, the space containing passenger trains is to be provided with platforms. The surface of platform is to be on the same level with the floor of train wagons. A platform only facing one train is not to be less than 900 m in width while a platform facing trains on both sides is not to be less than 1800 mm in width.

5.2 Unless provided otherwise, the location of stairways leading from the platform to the upper level passenger space is to be corresponding to train doors. Stairways are to be used as escape routes and comply with the requirements of 3.6, Chapter 4 of this PART. In addition:

(1) a poster is to be conspicuously displayed at the doorway of passenger space leading to the stairway mentioned above, indicating that "the door is to be kept closed during navigation and passengers are prohibited from entering the space carrying train";

(2) in addition to being provided with emergency lighting, means of access, including platforms and stairway exits are also to be provided with supplementary emergency lighting complying with the requirements of 2.2, Chapter 4 of this PART.

6 Safe operation and alarm devices of ships

6.1 For the purpose of safeguarding navigational safety of ships, personnel on board are to conscientiously abide by the provisions of the Operational Procedures Manual of Ship's Safety and Pollution Prevention, the Muster List and the Training Manual, carry out maintenance of safety equipment, periodical drills and reasonable loading while paying attention to the weather and sea state during navigation and mastering ship situation at all time so that operation complies with regulations and the ship is navigated with caution.

6.2 For ro-ro passenger ships carrying passenger trains, before the ship leaves the berth, the public address system on board is to be connected to the address system of the passenger train so that passengers in the train are informed of safety instructions.

6.3 Vehicles (including rail or road cars) are to comply with limitation of ship design in terms of vehicle length, width, weight, axial load and height of center of gravity of loaded cargoes.

6.4 Indicators are to be provided on the navigation bridge for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could lead to flooding of a special category space or ro-ro space. The indicator system is to show by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked and by audible alarms if such door or closing appliances become open or the securing arrangements become unsecured. The indicator panel on the navigation bridge is to be equipped with a mode selection function "harbour/sea voyage" so arranged that an audible alarm is given on the navigation bridge if the ship leaves harbour with the bow doors, inner doors, stern ramp or any other side shell doors not closed or any closing device not in the correct position.

6.5 Television surveillance and a water leakage detection system is to be arranged to provide an indication to the navigation bridge and to the engine control station of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to flooding of special category spaces or ro-ro spaces.

6.6 Special category spaces and ro-ro spaces are to be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorized access by passengers thereto as well as possible fire can be detected whilst the ship is underway and loading and unloading of vehicles as well as embarkation and disembarkation of passengers are monitored whilst the ship is in harbour.

6.7 For ro-ro passenger ships of class III, if such ship is only provided with one tier of vehicle deck which is open ro-ro space/weather deck, the requirements of 6.4 to 6.6 above may be replaced by the following:

(1) spaces for carriage of vehicles are to be monitored by television surveillance; and

(2) an audible alarm is to be given on the navigation bridge with bow doors and stern doors not closed or not in the correct position.

6.8 Unless it is necessary for work on board, all accesses from the vehicle deck and vehicle

ramps that lead to spaces below the bulkhead deck are to be closed before the ship leaves the berth on any voyage and are to remain closed until the ship is at its next berth. The master is to ensure that effective supervision of the closing and opening of such watertight doors and accesses is implemented and an entry in the logbook is made of the time of closing.

6.9 All transverse or longitudinal bulkheads which are taken into account as effective to confine the seawater accumulated on the vehicle deck are to be in place and secured before the ship leaves the berth and remain in place and secured until the ship is at its next berth.

Chapter 2 SURVEYS

1 General provisions

1.1 Survey and certification of ro-ro passenger ships are to be carried out in accordance with the provisions for passenger ships in Chapters 2 and 7, PART ONE of the Guidelines.
1.2 Survey carried out for the purpose of issuing Seaworthiness Certificate for Passenger Ships at Sea to ro-ro passenger ships is also to comply with the provisions of this Chapter.

2 Initial surveys

2.1 Initial surveys of ro-ro passenger ships are to be carried out in accordance with Section 2, Chapter 7, PART ONE of the Guidelines.
2.2 The following items are to be added to plans and documents submitted for approval:
(1) provision and arrangement of securing devices;
(2) vehicle securing calculations;
(3) cargo securing manual;
(4) arrangement of drainage system of ro-ro or special category spaces;
(5) evacuation analysis calculations;
(6) Operational Procedures Manual of Safety and Pollution Prevention of Ro-ro Passenger Ships (for information);
(7) instructions/system diagram and arrangement of television surveillance, closing appliances of bow doors, inner doors, stern ramp or any other side shell doors, indicators and alarm devices and water leakage detection system.
2.3 Surveys during construction and after installation are to be carried out in accordance with Section 2, Chapter 7, PART ONE of the Guidelines, which are also to include the following items and comply with requirements for plans in 2.2:
(1) confirming the provision and function of vehicle securing arrangements;
(2) confirming the effective closing of bow and stern doors as well as surveillance and alarm devices;
(3) confirming the drainage system and measures of prevention of jamming of discharges for special category and ro-ro spaces;
(4) confirming the provision and testing of AIS;
(5) confirming the fire-resisting properties and laying of cables of ro-ro or special category spaces;
(6) confirming the effectiveness of television surveillance and water leakage detection system;
(7) confirming the effective connection of ship’s public address system to the address system of the passenger train (where applicable).

3 Annual and renewal surveys

3.1 Annual surveys of ro-ro passenger ships are to be carried out in accordance with Section 3, Chapter 7, PART ONE of the Guidelines and the following items are to be added:
(1) examining vehicle securing arrangements;
(2) examining closing appliances of bow and stern doors as well as the surveillance;
(3) examining the drainage system and measures of prevention of jamming of discharges for special category and ro-ro spaces and confirming the proper and effective operation;
(4) examining AIS equipment and confirming the proper operation;
(5) examining the integrity of cables of ro-ro or special category spaces;
(6) examining the connection of ship’s public address system to the address system of the passenger train (where applicable), and confirming the proper operation.
3.2 Renewal surveys of ro-ro passenger ships are to be carried out in accordance with Section 4, Chapter 7, PART ONE of the Guidelines

Chapter 3 LOAD LINES

1 General provisions

1.1 Load lines are to be marked in accordance with PART THREE of the Guidelines and additional provisions of this Chapter.

2 Additional provisions for assignment of freeboard

2.1 In addition to complying with the requirements of 2.11, Chapter 2 of PART THREE of the Guidelines, scuppers and discharges of the vehicle deck are also to be designed and arranged in accordance with 3.9.2(5) and 3.9.5(1)④, Chapter 4 of this PART.

2.2 In order to improve the drainage efficiency of the space for carriage of vehicles on the freeboard deck and on the deck above the freeboard deck, discharges complying with the requirements of 2.1 of this Chapter may be allowed in the side outside superstructures or deckhouses complying with the requirements of 2.11.1, Chapter 2 of PART THREE of the Guidelines, provided that weathertight closing appliances are provided and the structural strength is maintained at a level equivalent to that of the side. For open ro-ro spaces enclosed by bulwarks on the freeboard deck, discharges or freeing ports of bulwarks need not be provided with weathertight closing appliances.

2.3 For class I ro-ro passenger ships provided with bow doors of visor type or side hinged type, weathertight inner doors forming part of the collision bulkhead are also to be fitted and permanently sealing and supporting devices are to be fitted behind doors.

Chapter 4 SAFETY OF SHIPS

1 General provisions

1.1 Ro-ro passenger ships are to comply with the provisions for passenger ships in Chapter 2-1, PART FOUR of the Guidelines and the requirements of this Chapter.

2 Construction - subdivision and stability, machinery and electrical installations

2.1 Damage stability

2.1.1 The subdivision and stability of ro-ro passenger ships are to comply with the provisions for passenger ships in Chapter 2-1, PART FOUR of the Guidelines and the requirements of this Section.

2.1.2 When the damage stability is calculated by the deterministic method, the permeability of special category/ro-ro spaces is taken as 0.9.

2.1.3 During the calculation of damage stability, the height of center of gravity of vehicles and carried cargoes is to be calculated in accordance with the following provisions:

(1) The height of center of gravity of empty vehicles (assuming that the tanks are full of fuel oils) is determined in accordance with the design information of vehicles.

(2) The height of center of gravity of cargoes carried on vehicles is taken at 1/2 of limited cargo carrying height above the bottom plate of cargo compartment of vehicles.

2.1.4 Damage prevention and control of ro-ro passenger ships are to comply with the provisions of 7.4 to 7.7 of Chapter 1.

2.1.5 Other than ro-ro passenger ships only provided with one tier of vehicle deck which is the weather deck, the integrity of hull and superstructure is to comply with the following provisions:

(1) Where vehicle ramps are installed to give access to spaces below the bulkhead deck, their openings are to be able to be closed weathertight to prevent ingress of water below, alarmed and indicated to the navigation bridge.

(2) Other than openings of vehicle ramps referred to in (1), all accesses that lead to spaces below the bulkhead deck are to have a lowest point which is not less than 2.5 m above the bulkhead deck. Particular accesses may be fitted to spaces below the bulkhead deck provided they are necessary for the essential working of the ship, e.g., the movement of machinery and stores, subject to such accesses being made watertight, alarmed and indicated on the navigation bridge.

2.2 Supplementary emergency lighting

2.2.1 Supplementary emergency lighting is to comply with the provisions of regulation 42-1, Part D, Chapter II-1 of SOLAS.

2.3 Cables of ro-ro or special category spaces

2.3.1 Cable runs of ro-ro or special category spaces are to avoid mechanical damage. Where it is unavoidable, measures are to be taken to prevent mechanical damage, e.g. fitting metallic doubler or drawing-in installation.

2.3.2 Cables for services, required to be operable under fire conditions in ro-ro or special category spaces, including those for their power supplies, are to be of a fire resistant type or other equivalent fire protection measures are to be taken. Such cables are at least to include power supply cables and control cables for the following safety equipment:

(1) general emergency alarm system;

(2) fire detection and fire alarm system;

(3) fire extinguishing system and fire extinguishing medium release alarm;

(4) public address system;

(5) commanding telephone;

(6) control and power systems of power operated fire doors and status indication systems for all fire doors;

(7) control and power systems of power operated watertight doors and their status indication systems;

(8) emergency lighting;

(9) low location lighting system;

(10) closed circuit television monitoring system;
(11) steering gear system;
(12) emergency fire pump;
(13) electrical propulsion circuit.

3 Construction - fire protection, fire detection and fire extinction

3.1 General provisions

3.1.1 In addition to satisfying requirements for passenger ships of corresponding class of Chapter 2-2 of PART FOUR of the Guidelines, the construction - fire protection, fire detection and fire extinction of ro-ro passenger ships are also to satisfy requirements of this Section.

3.1.2 The construction - fire protection, fire detection and fire extinction of ro-ro passenger ships of class I is also to satisfy the following requirements of this Section:

(1) 3.1.4 of this Chapter;

(2) accommodation spaces, service spaces and stores of ro-ro passenger ships in general are not to be located on vehicle decks. Where it is required by arrangement to be located on vehicle decks, the boundary of such space facing ro-ro spaces is at least to have an "A-60" rating;

(3) 3.6.3 of this Chapter;

(4) 3.9.2(5), (6) and (7) of this Chapter;

(5) 3.9.5(1)②(e), (f) and ⑤ of this Chapter.

3.1.3 Ro-ro passenger ships carrying the number of passengers as follows are to satisfy corresponding requirements for ships of a higher class:

(1) Ro-ro passenger ships of class II carrying 500 passengers or more are to satisfy corresponding requirements for ro-ro passenger ships of class I.

(2) Ro-ro passenger ships of class III carrying 500 passengers or more are to satisfy corresponding requirements for ro-ro passenger ships of class II.

(3) Ro-ro passenger ships of class III carrying 1000 passengers or more are to satisfy corresponding requirements for ro-ro passenger ships of class I.

3.1.4 For ro-ro passenger ships of any class, where open or weather decks and open ro-ro spaces are provided with lifeboat/liferaft (except for a liferaft intended for throw over board launching) and means of evacuation, permanent openings are not to be provided within 3 m forward and aft of the side plating below such arrangement, except for windows and side scuttles required by 2.9.3, Chapter 2-2, PART FOUR of the Guidelines.

3.1.5 For train ferries carrying passenger trains, in addition to satisfying the requirements of 2.12.1, Chapter 2-2 of PART FOUR of the Guidelines, the public address system is also to be harmonized with the address system of the passenger train.

3.2 Pressure water-spraying fire-extinguishing systems

3.2.1 The pressure water-spraying fire-extinguishing systems of special category spaces are to comply with the provisions of 1.9.1 and 1.9.2, Chapter 2-2 of PART FOUR of the Guidelines.

3.3 Ventilation

3.3.1 Ventilation ducts of special category spaces on ro-ro passenger ships are to satisfy the requirements for machinery spaces, galleys, vehicle spaces and ro-ro spaces of 1.16.3 and 1.16.4, Chapter 2-2 of PART FOUR of the Guidelines.

3.4 Structural protection of vehicle decks

3.4.1 Accommodation spaces, service spaces and stores of ro-ro passenger ships in general are not to be located on vehicle decks. Where it is required by arrangement to be located on vehicle decks, the boundary is to satisfy requirements of 3.5 and 3.9 of this Chapter.

3.4.2 Where special category spaces are provided on ship, any such space is to comply with corresponding provisions of 3.9 of this Chapter, which are to prevail in case of contradiction with other requirements of this Chapter.

3.5 Fire integrity of bulkheads and decks

3.5.1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks given in other paragraphs of this Chapter, bulkheads and decks are to respectively satisfy the

requirements for minimum fire integrity given in tables below. Where the use of a space is such that there is a doubt as to its classification, it is to be treated as a space within the relevant category having the most stringent boundary requirements.

3.5.2 The following requirements are to govern application of the tables:

(1) For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories ① to ⑪ below. Smaller, enclosed rooms within a space that have less than 30% communicating openings to that space are considered separate spaces. The fire integrity of the boundary bulkheads and decks of such smaller rooms is to satisfy the requirements of tables below. The title of each category is intended to be typical rather than restrictive. The number preceding each category refers to the applicable column or row in the tables.

① Control stations
Spaces containing emergency sources of power and lighting.
Wheelhouse and chartroom.
Spaces containing the ship's radio equipment.
Fire control stations.
Control room for propulsion machinery when located outside the machinery space.
Spaces containing centralized fire alarm equipment.
Spaces containing navigating equipment.
Spaces containing emergency battery chargers or emergency charging-discharging panels.
Spaces containing emergency batteries (including those used as a reserve source of energy for the radio installations or used for starting emergency generators).
Spaces for storage of fire-extinguishing medium of fixed fire-extinguishing systems.

② Corridors
Passenger and crew corridors and lobbies.

③ Accommodation spaces
Spaces as defined in 1.2, Chapter 2-2 of PART FOUR of the Guidelines excluding corridors.

④ Stairways
Passenger and crew interior stairways, lifts, totally enclosed emergency escape trunks, and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto. In this connection, a stairway which is enclosed only at one level is to be regarded as part of the space from which it is not separated by a fire door.

⑤ Service spaces (low risk)
Lockers and store-rooms not having provisions for the storage of flammable liquids and having areas less than 4 m^2.
Drying rooms and laundries.
Food storage or refrigeration rooms with non-combustible materials as insulation layer.
Storage rooms of crew work clothes (with oil stains) having areas less than 4 m^2.

⑥ Machinery spaces of category A
Spaces as defined in 1.2, Chapter 2-2 of PART FOUR of the Guidelines.

⑦ Other machinery spaces
Electrical equipment rooms (auto-telephone exchange, air-conditioning duct spaces).
Spaces as defined in 1.2, Chapter 2-2 of PART FOUR of the Guidelines excluding machinery spaces of category A.

⑧ Cargo spaces
All spaces used for cargo (including open ro-ro spaces) and trunk ways and hatchways to such spaces, other than special category spaces.

⑨ Service spaces (high risk)
Galleys, pantries containing cooking appliances, paint lockers and lamp lockers, lockers and store-rooms having areas of 4m^2 or more, spaces for the storage of flammable liquids, saunas and workshops other than those forming part of the machinery spaces.
Food storage or refrigeration room with combustible materials as insulation layer.
Mail rooms.
Storage rooms of crew work clothes (with oil stains) having areas of 4m^2 or more.
Storage rooms of oxygen or ethyne.

⑩ Open decks

Open deck spaces and enclosed promenades having little or no fire risk. To be considered in this category, enclosed promenades are to have no significant fire risk, meaning that furnishing is to be restricted to deck furniture. In addition, such spaces are to be naturally ventilated by permanent openings.

Air spaces (the space outside superstructures and deckhouses).

⑪ Special category and closed ro-ro spaces

Spaces as defined in 2.1, Chapter 1 of this PART and 1.2, Chapter 2-2 of PART FOUR of the Guidelines.

(2) In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is not protected by an automatic sprinkler system complying with the provisions of 1.11, Chapter 2-2 of PART FOUR of the Guidelines or between such zones neither of which is so protected, the higher of the two values given in Tables 3.5.4a and 3.5.4b is to apply.

(3) In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is protected by an automatic sprinkler system complying with the provisions of 1.11, Chapter 2-2 of PART FOUR of the Guidelines or between such zones both of which are so protected, the lesser of the two values given in Tables 3.5.4a and 3.5.4b is to apply. Where a zone with sprinklers and a zone without sprinklers meet within accommodation and service spaces, the higher of the two values given in Tables 3.5.4a and 3.5.4b is to apply to the division between the zones.

(4) Continuous "B" class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

3.5.3 Ro-ro passenger ships of class II are to satisfy the requirements of Tables 3.5.3a and 3.5.3b.

Fire Integrity of Bulkheads Separating Adjacent Spaces Table 3.5.3a

Spaces		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Control stations	①	A-0 [c]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors	②		C [e]	B-0 [e]	A-0 [a] B-0 [e]	B-0 [e]	A-60	A-0	A-0	A-0	*	A-15
Accommodation spaces	③			C [e]	A-0 [a] B-0 [e]	B-0 [e]	A-60	A-0	A-0	A-0	*	A-15
Stairways	④				A-0 [a] B-0 [e]	A-0 [a] B-0 [e]	A-60	A-0	A-0	A-0	*	A-15
Service spaces (low risk)	⑤					C [e]	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	⑥						*	A-0	A-0 A-60 [g]	A-60	*	A-60
Other machinery spaces	⑦							A-0 [b]	A-0	A-0	*	A-0
Cargo spaces (including open ro-ro spaces)	⑧								*	A-0	*	A-0
Service spaces (high risk)	⑨									A-0 [b]	*	A-30
Open decks	⑩										—	A-0
Special category and closed ro-ro spaces	⑪											A-30

Fire Integrity of Decks Separating Adjacent Spaces Table 3.5.3b

Space above **Space below**		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Control stations	①	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
Corridors	②	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	③	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-15
Stairways	④	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30

Service spaces (low risk)	⑤	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	⑥	A-60	A-60	A-60	A-60	A-60	*	A-60[f]	A-30 A-60[g]	A-60	*	A-60
Other machinery spaces	⑦	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces (including open ro-ro spaces)	⑧	A-60	A-0	A-0	A-0	A-0	A-0 A-60[g]	A-0	*	A-0	*	A-0
Service spaces (high risk)	⑨	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-30
Open decks	⑩	*	*	*	*	*	*	*	*	*	*	A-0
Special category and closed ro-ro spaces	⑪	A-60	A-30	A-15	A-30	A-0	A-60	A-0	A-0	A-30	A-0	A-30

Notes: To be applied to both Tables 3.5.3a and 3.5.3b as appropriate

a For clarification as to which applies, see 2.3 and 2.6, Chapter 2-2 of PART FOUR of the Guidelines.

b Where spaces are of the same numerical category and superscript "b" appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose (e.g., in category ⑨). A galley next to a galley does not require a bulkhead, but a galley next to a paint room requires an "A-0" bulkhead.

c Bulkheads separating the wheelhouse and chartroom from each other may have a "B-0" rating.

e Where the division is the boundary of main vertical zone or horizontal zone, "B-0" and "C", where appearing in Table 3.5.3a, are to be read as "A-0".

f Fire insulation need not be fitted if the machinery space in category ⑦ has little or no fire risk.

g Applicable when the space is open ro-ro space.

* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material, but is not required to be of "A" class standard. However, where a deck, except in a category ⑩ space, is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations are to be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-extinguishing system is fitted.
Where the division is the boundary of horizontal zone, an asterisk, where appearing in Table 3.5.3a, except for categories ⑧ and ⑩, is to be read as "A-0".

— No special requirements for materials or integrity of boundary.

3.5.4 Ro-ro passenger ships of class III are to satisfy the requirements of Tables 3.5.4a and 3.5.4b.

Fire Integrity of Bulkheads Separating Adjacent Spaces Table 3.5.4a

Spaces		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Control stations	①	A-0[c]	A-0	A-15	A-0	A-15	A-30[p] A-15	A-15	A-30	A-30	*	A-30
Corridors	②		C	B-0	A-0[a] B-0	B-0	A-30[p] A-15	A-0	A-0	A-15 A-0[d]	*	A-15 A-0[d]
Accommodation spaces	③			C	A-0[a] B-0	B-0	A-30[p] A-15	A-0	A-0	A-15 A-0[d]	*	A-15 A-0[d]
Stairways	④				A-0[a]	A-0[a]	A-30[p] A-15	A-0	A-0	A-15 A-0[d]	*	A-15 A-0[d]
Service spaces (low risk)	⑤					C	A-0	*	*	A-0	*	A-0
Machinery spaces of category A	⑥						*	A-0	A-0 A-30[g]	A-30	*	A-30
Other machinery spaces	⑦							*	*	A-0	*	A-0
Cargo spaces (including open ro-ro spaces)	⑧								*	*	*	A-0
Service spaces (high risk)	⑨									*[k]	*	A-15
Open decks	⑩										—	A-0
Special category and closed ro-ro spaces	⑪											A-0

Fire Integrity of Decks Separating Adjacent Spaces Table 3.5.4b

Space above→ / Space below↓	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Control stations ①	A-0	A-0	A-0	A-0	A-0	A-30[p] A-15	A-0	A-0	A-0	*	A-15
Corridors ②	A-0	*	*	A-0	*	A-30[p] A-15	A-0	A-0	A-0	*	A-15 A-0[d]
Accommodation spaces ③	A-15	A-0	*	A-0	*	A-30[p] A-15	A-0	A-0	A-0	*	A-15 A-0[d]
Stairways ④	A-0	A-0	A-0	*	A-0	A-30[p] A-15	A-0	A-0	A-0	*	A-15 A-0[d]
Service spaces (low risk) ⑤	A-15	A-0	A-0	A-0	*	A-15	A-0	A-0	A-0	*	A-0
Machinery spaces of category A ⑥	A-30[p] A-15	A-30[p] A-15	A-30[p] A-15	A-30[p] A-15	A-15	*	A-0	A-15 A-30[g]	A-30	*	A-30
Other machinery spaces ⑦	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces (including open ro-ro spaces) ⑧	A-30	A-0	A-0	A-0	A-0	A-0 A-30[g]	A-0	*	A-0	*	A-0
Service spaces (high risk) ⑨	A-30	A-15 A-0[d]	A-15 A-0[d]	A-15 A-0[d]	A-0	A-15[P] A-0	A-0	A-0	*	*	A-15
Open decks ⑩	*	*	*	*	*	*	*	*	*	*	A-0
Special category and closed ro-ro spaces ⑪	A-30	A-15 A-0[d]	A-15 A-0[d]	A-15 A-0[d]	A-0	A-15	A-0	A-0	A-15	A-0	A-0

Notes: To be applied to both Tables 3.5.4a and 3.5.4b as appropriate

a For clarification as to which applies, see 2.3 and 2.6, Chapter 2-2 of PART FOUR of the Guidelines.

c Bulkheads separating the wheelhouse and chartroom from each other may have a "B-0" rating.

d See 3.5.2(2) and (3) of this Chapter.

g Applicable when the space is open ro-ro space.

k A bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose. E.g. a galley next to a galley does not require a bulkhead, but a galley next to a paint room requires a bulkhead made of steel or other equivalent material.

p Rating of division for internal-combustion machinery used for main propulsion where such machinery has in the aggregate a total power output of greater than 375 kW.

* The division is required to be of steel or other equivalent material, but is not required to be of "A" class standard.

－ No special requirements for materials or integrity of boundary.

3.5.5 For ro-ro passengers ships of classes II and III carrying 100 passengers or more, where the open deck above the ro-ro space or special category space is used as the lifeboat and liferaft embarkation area, the fire-resisting division of deck between such space and adjacent ro-ro space and special category space is at least to have an "A-30" rating.

3.5.6 For ro-ro passengers ships of classes II and III carrying 100 passengers or more, where the weather deck is used as ro-ro space for the carriage of vehicles, the fire-resisting division of bulkhead between fore and aft part of such space and adjacent space is at least to have an "A-30" rating.

3.6 Means of escape

3.6.1 Means of escape from special category spaces are to satisfy the following requirements:

(1) The safety of the means of escape both below and above the bulkhead deck is to be at least equivalent to that provided for under 2.5.2(1), (2), (5) and (6), Chapter 2-2 of PART FOUR of the Guidelines.

(2) One of the escape routes from the machinery spaces where the crew is normally employed is to avoid direct access to any special category space.

3.6.2 At least two means of escape are to be provided in ro-ro spaces where the crew are normally employed. The escape routes with a net breadth of at least 600 mm are to provide a safe escape to the lifeboat and liferaft embarkation decks (including during cargo loading and unloading) and are to be located at the fore and aft ends of the space.

3.6.3 In special category and open ro-ro spaces to which any passengers carried can have access, the number and locations of the means of escape both below and above the bulkhead deck are to

satisfy the requirements of 2.5.2(1) and (2), Chapter 2-2 of PART FOUR of the Guidelines and, in general, the safety of access to the embarkation deck is to be at least equivalent to that provided for under 2.5.2(1), (2), (5) and (6), Chapter 2-2 of PART FOUR of the Guidelines. Such spaces are to be provided with designated walkways to the means of escape with a breadth of at least 600 mm transversely on the vehicle deck. The spacing between such walkways is not to exceed 40 m. Such walkways and the protected work patrol routes with a breadth of at least 600 mm arranged on both sides form the arrangement giving access to the means of escape. Such walkways and work patrol routes are to be clearly marked. The parking arrangements for the vehicles are to maintain the walkways clear at all times.

3.6.4 Escape routes are to be provided from every normally occupied space on the ship to an assembly station. These escape routes are to be arranged so as to provide the most direct route possible to the assembly station, and are to be marked with symbols recommended in IMO resolution A.760(18) on Symbols Related to Life-saving Appliances and Arrangements.

3.6.5 The escape route from cabins to stairway enclosures are to be as direct as possible, with a minimum number of changes in direction. It is not to be necessary to cross from one side of the ship to the other to reach an escape route. It is not to be necessary to climb more than two decks up or down in order to reach an assembly station or open deck from any passenger space.

3.6.6 External routes are to be provided from open decks, as referred to in 3.6.5 above, to the survival craft embarkation stations.

3.6.7 Where enclosed spaces adjoin an open deck, openings from the enclosed space to the open deck are, where practicable, to be capable of being used as an emergency exit.

3.6.8 Escape routes are not to be obstructed by furniture and other obstructions. With the exception of tables and chairs which may be cleared to provide open space, cabinets and other heavy furnishings in public spaces and along escape routes are to be secured in place to prevent shifting if the ship rolls or lists. Floor coverings are also to be secured in place. When the ship is under way, escape routes are to be kept clear of obstructions such as cleaning carts, bedding, luggage and boxes of goods.

3.6.9 Decks are to be sequentially numbered, starting with "1" at the tank top or lowest deck. The numbers are to be prominently displayed at stair landings and lift lobbies. Decks may also be named, but the deck number is always to be displayed with the name.

3.6.10 Simple "mimic" plans showing the "you are here" position and escape routes marked by arrows are to be prominently displayed on the inside of each cabin door and in public spaces. The plan is to show the directions of escape and is to be properly oriented in relation to its position on the ship.

3.6.11 Handrails or other handholds are to be provided in corridors along the entire escape route so that a firm handhold is available at every step of the way, where possible, to the assembly stations and embarkation stations. Such handrails are to be provided on both sides of longitudinal corridors more than 1.8 m in width and transverse corridors more than 1 m in width. Particular attention is to be paid to the need to be able to cross lobbies, atriums and other large open spaces along escape routes. Handrails and other handholds are to be of such strength as to withstand a distributed horizontal load of 750 N/m applied in the direction of the centre of the corridor or space, and a distributed vertical load of 750 N/m applied in the downward direction. The two loads need not be applied simultaneously.

3.6.12 The lowest 0.5 m of bulkheads and other partitions forming vertical divisions along escape routes are to be able to sustain a load of 750 N/m to allow them to be used as walking surfaces from the side of the escape route with the ship at large angles of heel.

3.6.13 Escape routes are to be evaluated by an evacuation analysis in accordance with IMO MSC/Circ.1238 early in the design process of ro-ro passenger ships. The analysis is to be used to identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, including the possibility that crew may need to move along these routes in a direction opposite to the movement of passengers. In addition, the analysis is to be used to demonstrate that escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may not be available as a result of a casualty. For passenger ships carrying less than 100 passengers, the arrangement of means of escape is to satisfy relevant requirements of 3.6 of this Chapter and the means of escape required in 3.6.4 are to be at least 600 mm in width for which an evacuation analysis and calculation may be dispensed with.

3.7 Protection of stairways and lift cars in accommodation and service spaces

3.7.1 For ro-ro passenger ships of class II, in addition to satisfying the requirements of 2.6.1, Chapter 2-2 of PART FOUR of the Guidelines, special category spaces are also allowed to be provided with direct access to stairway enclosures.

3.8 Openings in "A" class divisions

3.8.1 In addition to satisfying the requirements of 2.7.1, Chapter 2-2 of PART FOUR of the Guidelines, ro-ro passenger ships of class II are also to satisfy the following requirements:
Except for hatches between cargo, special category, store, and baggage spaces, and between such spaces and the weather decks, openings are to be provided with permanently attached means of closing which are to be at least as effective for resisting fires as the divisions in which they are fitted.

3.9 Protection of special category and ro-ro spaces

3.9.1 General requirements

(1) The basic principle underlying the provisions of this paragraph is that the main vertical zoning provided conventionally may not be practicable in special category and ro-ro spaces and, therefore, equivalent protection must be obtained in such spaces on the basis of a horizontal zone concept and by the provision of an efficient fixed fire-extinguishing system. Based on this concept, a horizontal zone for the purpose of this paragraph may include special category and ro-ro spaces on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.

(2) The requirements of ventilation systems, openings in "A" class divisions and penetrations in "A" class divisions for maintaining the integrity of vertical zones in Chapter 2-2 of PART FOUR and this Section are to be applied equally to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship.

3.9.2 Precaution against ignition of flammable vapors in closed ro-ro spaces and special category spaces

(1) Ventilation systems

① Capacity of ventilation systems: there is to be provided an effective ventilation system sufficient to give at least the following air changes:

Special category spaces	10 air changes per hour
Closed ro-ro spaces other than special category spaces	6 air changes per hour

An increased number of air changes is required when vehicles are being loaded and unloaded.

② Performance of ventilation systems

(a) The power ventilation system required in ① above is to be separate from other ventilation systems and is to be in operation at all times when vehicles are in such spaces. Ventilation ducts serving such cargo spaces capable of being effectively sealed are to be separated for each such space. The system is to be capable of being controlled from a position outside such spaces.

(b) The ventilation system is to be such as to prevent air stratification and the formation of air pockets.

③ Indication of ventilation systems

Means are to be provided on the navigation bridge to indicate any loss of the required ventilating capacity, which may be satisfied by fitting an alarm activated by disconnection of starter relay of ventilation fans.

④ Closing appliances and ducts

(a) Arrangements are to be provided to permit a rapid shutdown and effective closure of the ventilation system from outside of the space in case of fire, taking into account the weather and sea conditions.

(b) Ventilation ducts, including dampers, within a common horizontal zone are to be made of steel. Ventilation ducts that pass through other horizontal zones or machinery spaces are to be "A-60" class steel ducts constructed in accordance with 1.16.3, Chapter 2-2 of PART FOUR of the Guidelines.

⑤ Permanent openings

Permanent openings in the side plating, the ends or deckhand of the space are to be so

situated that a fire in the ro-ro and special category spaces does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces.

(2) Electrical equipment and wiring

① Except as provided below, electrical equipment and wiring are to be of a type suitable for use in an explosive petrol and air mixture.

② In case of other than special category spaces below the bulkhead deck, notwithstanding the provisions in ①, above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, electrical equipment of a type so enclosed and protected as to prevent the escape of sparks is to be permitted as an alternative, on condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board.

③ Electrical equipment and wiring required in this sub-paragraph are also to satisfy the requirements of 2.4 of this Chapter.

(3) Electrical equipment and wiring in exhaust ventilation ducts

Electrical equipment and wiring, if installed in an exhaust ventilation duct, are to be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct is to be sited in a safe position, having regard to other possible sources of ignition.

(4) Other ignition sources

Other equipment which may constitute a source of ignition of flammable vapours is not to be permitted.

(5) Scuppers and discharges

① Scuppers are not to be led to machinery or other spaces where sources of ignition may be present.

② The deck drainage system is to be so arranged that water between both sides or that of one side will not interfere with each other and the accumulated water in such space can be drained quickly and timely. Special attention is to be given to the design and arrangement of discharges (or inlets), i.e. consideration is to be given to sufficient flow area and measures of prevention of jamming by sundries or quick removal of jamming.

(6) Restricted use of combustible materials

Collision guard plates used for side walls of ro-ro and special category spaces as well as non-skid coating of deck are to be of non-combustible material which will not give rise to smoke or toxic or explosive hazards at elevated temperatures.

(7) Protection of trunk of lift car

Where a lift car used for accommodation and service spaces passes through several decks and has a gateway facing ro-ro and special category spaces, the following requirements are to be satisfied:

① In any case, the ventilation fans in the trunk of lift car are to maintain ventilation with a minimum positive pressure of 25 Pa (wind speed close to 3.5 m/s). The ventilation fans are to be in operation at all times and satisfy at least the requirement for number of air changes when vehicles are being loaded and unloaded in ro-ro and special category spaces.

② One portable flammable gas detector is to be provided to show that flammable vapour has been removed from ro-ro and special category spaces.

3.9.3 Detection and alarm

(1) Fixed fire detection and fire alarm systems

Except as provided in (3) below, there is to be provided a fixed fire detection and fire alarm system complying with the requirements of 1.12, Chapter 2-2 of PART FOUR of the Guidelines. The fixed fire detection system is to be capable of rapidly detecting the onset of fire. The type of detectors and their spacing and location are to be satisfactory, taking into account the effects of ventilation and other relevant factors. After being installed, the system is to be tested under normal ventilation conditions and is to give an overall response time which achieves the intended purpose.

(2) Sample extraction smoke detection systems

A sample extraction smoke detection system complying with the requirements of 1.13, Chapter 2-2 of PART FOUR of the Guidelines may be used as an alternative for the fixed fire detection and fire alarm system required in (1) above.

(3) Special category spaces

① An efficient fire patrol system is to be maintained in special category spaces. If an efficient fire patrol system is maintained by a continuous fire watch at all times during the voyage, a fixed fire detection and fire alarm system is not required.

② Manually operated call points are to be spaced so that no part of the space is more than 20 m from a manually operated call point, and one is to be placed close to each exit from such spaces.

3.9.4 Structural fire protection

(1) The boundary bulkheads and decks of special category spaces and closed ro-ro spaces are to be insulated in accordance with the requirements for category ⑪ spaces in 3.5.2(1) and the open ro-ro spaces are to be insulated in accordance with the requirements for category ⑧ spaces in 3.5.2(1). Especially for ships carrying 100 passengers or more, the boundary bulkheads and decks of special category spaces and open/closed ro-ro spaces are to be insulated to "A-30" class standards; for ships carrying 500 passengers or more, the boundary bulkheads and decks of special category spaces and closed ro-ro spaces are to be insulated to "A-60" class standards while the open ro-ro spaces may be "A-30" class standards. Where category (5) open deck spaces (not used as means of escape and embarkation deck), category (9) sanitary and similar spaces or category (10) tanks, voids and auxiliary machinery spaces having little or on fire risk as defined in SOLAS regulation II-2/9.2.2.3 are on one side of the division, the standard may be reduced to "A-0".

(2) Indicators are to be provided on the navigation bridge to show if any fire door leading to the special category space is closed.

3.9.5 Fire extinction

(1) Fixed fire-extinguishing systems

① Vehicle spaces and ro-ro spaces which are not special category spaces and are capable of being sealed from a location outside of the cargo spaces are to be fitted with one of the following fixed fire-extinguishing systems:

(a) fix gas fire-extinguishing system complying with the requirements of 1.4, Chapter 2-2 of PART FOUR of the Guidelines;

(b) fixed high-expansion foam fire-extinguishing system complying with the requirements of 1.8, Chapter 2-2 of PART FOUR of the Guidelines; or

(c) fixed water-based fire-fighting systems for ro-ro spaces and special category spaces complying with the requirements of 1.9 and 3.9.5(1)②(a)~(f), Chapter 2-2 of PART FOUR of the Guidelines.

② Ro-ro and vehicle spaces not capable of being sealed and special category spaces are to be fitted with a fixed water-based fire-fighting systems for ro-ro spaces and special category spaces complying with the requirements of 1.9, Chapter 2-2 of PART FOUR of the Guidelines which are to protect all parts of any deck and vehicle platform in such spaces. Such water-based fire-fighting systems are to have:

(a) a pressure gauge on the valve manifold;

(b) clear marking on each manifold valve indicating the spaces served;

(c) instructions for maintenance and operation located in the valve room;

(d) a sufficient number of drainage valves to ensure complete drainage of system;

(e) a distance of at least 0.5 m from the nozzle to the top of vehicle; and

(f) a sufficient number of spare nozzles.

③ The use of any other fixed fire-extinguishing system (refer to IMO guidelines[①]) is permitted. Such system is to be a fixed water-based fire-fighting system for special category spaces that has been shown, by a full-scale test in conditions simulating a flowing petrol fire in a vehicle space or a ro-ro space, to be not less effective than the pressure water-spraying system in controlling fires likely to occur in such a space.

④ When fixed pressure water-spraying fire-extinguishing systems are provided, in view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks during the operation of the water-spraying system, the following arrangements are to be provided:

(a) in the spaces above the bulkhead deck, scuppers are to be fitted so as to ensure that such

① Refer to the Revised Guidelines for the Design and Approval of Fixed Water-Based Fire-Fighting Systems for Ro-Ro Spaces and Special Category Spaces (MSC.1/Circ.1430).

water is rapidly discharged directly overboard and the requirements of IMO guidelines[①] are to be satisfied. Discharge valves for scuppers are to be kept open while the ships are at sea and the drainage system is to comply with the requirements for load lines of the Guidelines;

(b) in the spaces below the bulkhead deck, pumping and drainage facilities need to be provided additional to the requirements of 2.4, Chapter 2-1 of PART FOUR of the Guidelines. In such case, the drainage system is to be sized to remove no less than 125% of the combined capacity of both the water-spraying system pumps and the required number of fire hose nozzles and is to satisfy the requirements of IMO guidelines referred to in (a) above. The drainage system valves are to be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells are to be of sufficient holding capacity and are to 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.

⑤ Where closed ro-ro and special category spaces are provided with fixed pressure water-spraying fire-extinguishing system, precautions are to be taken to prevent jamming of discharges and the requirements of IMO guidelines referred to in ④(a) and (b) above are to be satisfied.

(2) Portable fire extinguishers

① Portable fire extinguishers are to be provided at each deck level in each hold or compartment where vehicles are carried, spaced not more than 20 m apart. At least one portable fire extinguisher is to be located at each access to such a cargo space.

② In addition to the provision of ① above, the following fire-extinguishing appliances are to be provided in ro-ro and special category spaces:

(a) at least three water-fog applicators; and

(b) one portable foam applicator unit complying with the provisions of 1.5.5, Chapter 2-2 of PART FOUR, provided that at least two tanks of foam making liquid are available in the ship for use in such spaces.

3.9.6 Weather deck as ro-ro space

Where the weather deck is used as ro-ro space on the ship, the fire protection is to satisfy the requirements of 3.9.7.

3.9.7 Protection where only one tier of vehicle deck is provided for the ship and such deck is weather deck

(1) Fire extinction

The fixed pressure water-spraying system is not required for such space provided that water fire-extinguishing systems complying with the provisions of 1.3, Chapter 2-2 of PART FOUR of the Guidelines are provided. In addition to being provided with 4 nozzles, the vehicle deck is also to be provided with:

① at least two water fog applicators complying with the provisions of 1.6.3, Chapter 2-2 of PART FOUR of the Guidelines;

② at least two portable foam applicator unit complying with the provisions of 1.5.5, Chapter 2-2 of PART FOUR of the Guidelines, provided that at least four tanks of foam making liquid are available in the ship for use in such spaces;

③ at least four portable dry powder extinguishers or extinguishers of other type complying with the provisions of 1.5.1, Chapter 2-2 of PART FOUR of the Guidelines.

(2) Others

① Scuppers and discharges of such space are to satisfy the requirements of 3.9.2(5) and 3.9.5(1)⑤ of this Chapter;

② The drainage system are to satisfy the requirements of 3.9.5(1)④ of this Chapter;

③ Restricted use of combustible materials for ro-ro spaces is to satisfy the requirements of 3.9.2(6) of this Chapter;

④ Structural fire protection of such space is to satisfy the requirements of 3.9.4 of this Chapter.

(3) Carriage of dangerous goods

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① Refer to Guidelines for the Drainage of Fire-Fighting Water from Closed Vehicle and Ro-Ro Spaces and Special Category Spaces of Passenger and Cargo Ships (MSC.1/Circ.1320).

Where the space is used for carriage of dangerous goods, relevant requirements of 3.10, Chapter 2-2 of PART FOUR of the Guidelines are to be complied with. Four nozzles complying with the provisions of 1.3, Chapter 2-2 of PART FOUR of the Guidelines may be used in lieu of the fixed pressure water-spraying system on the vehicle deck. The arrangement is to be such as to ensure that when nozzles are supplied with water at specified pressure, water can be directed on to any part of the vehicle deck. In addition, an efficient fire patrol system is to be implemented in such space.

4 Life-saving appliances

4.1 Life-saving appliances of ro-ro passenger ships are to be in accordance with the provisions for passenger ships in Chapter 3, PART FOUR of the Guidelines and the provisions of this Section.

4.2 Class I ro-ro passenger ships of 130 m in length and upwards are to be fitted with a helicopter pick-up area① or landing area②.

4.3 Every liferaft is to be provided with float-free stowage arrangements complying with the requirements of SOLAS regulation III/13.4 and fitted with a boarding ramp complying with the requirements of paragraph 4.2.4.1 or 4.3.4.1 of the International Life-Saving Appliance (LSA) Code issued by the International Maritime Organization (IMO), as appropriate.

4.4 Every liferaft on ro-ro passenger ships is to either be automatically self-righting or be a canopied reversible liferaft.

5 Intact stability

5.1 The intact stability of ro-ro passenger ships is to be in accordance with the provisions for passenger ships in Chapter 7, PART FOUR of the Guidelines and the provisions of this Section.

5.2 During the calculation of intact stability, the height of center of gravity of vehicles and carried cargoes is to be taken in accordance with the provisions of 2.1.3 of this Chapter.

5.3 For any loading condition of ro-ro passenger ships where vehicles are carried, the metacentric height *GM* after correction of free surface is not to be less than 0.3 m.

5.4 Where a ship is only provided with one tier of vehicle deck which is ro-ro space deck or open/weather deck, the buoyancy of the deckhouse on the vehicle deck may be taken into account during the calculation of intact stability provided that its doors and windows comply with weather tightness requirements.

6 Radiocommunications and navigational equipment

6.1 The radiocommunications of ro-ro passenger ships are to satisfy the requirements of Chapter 4, PART FOUR of the Guidelines and the navigational equipment is to satisfy the requirements of Chapter 5, PART FOUR of the Guidelines.

6.2 Liferafts carried on ro-ro passenger ships are to be fitted with a search and rescue locating device in the ratio of one search and rescue locating device for every four liferafts. The search and rescue locating device is to be mounted inside the liferaft so its antenna is more than one metre above the sea level when the liferaft is deployed, except that for canopied liferafts the search and rescue locating device is to be so arranged as to be readily accessed and erected by survivors. Containers of liferafts fitted with search and rescue locating devices are to be clearly marked.

① Refer to the International Aeronautical and Maritime Search and Rescue Manual (IAMSAR Manual) or 4.2 and 4.3 of ICS Guide to Helicopter-Ship Operation.

② Refer to Recommendation on Helicopter Landing Areas on Ro-Ro Passenger Ships (MSC/Circ.895).

Chapter 5 LOADING AND SECURING OF VEHICLES

1 General provisions

1.1 The Vehicle and Cargo Securing Manual should be developed by operators of ro-ro passenger ships and submitted for approval.
1.2 The Vehicle and Cargo Securing Manual should be provided on ro-ro passenger ships to facilitate inspection.
1.3 The Vehicle and Cargo Securing Manual provides guidance to the master and crew on the loading and securing of vehicles. It is the responsibility of the master to carry out effective loading and securing of vehicles loaded on ships in accordance with the Securing Manual, which does not exclude and replace the good seamanship and experience in loading and securing of the master and crew. For ro-ro passenger ships of class III, the master may decide on the effective means of lashing and securing as appropriate.
1.4 The Vehicle and Cargo Securing Manual should contain guidance on provision of securing devices, assessment of the efficiency of securing arrangements of vehicles, selection of strength and number of securing devices.
1.5 Guidance on selection of strength and number of securing devices should be exhibited in conspicuous places throughout the ship.
1.6 The provision and arrangement of fixed securing devices on ro-ro passenger ships should satisfy relevant requirements of Section 2 of this Chapter.
1.7 The number of portable securing devices required under typical design loading conditions should be calculated for ro-ro passenger ships and 125% of that number should be provided on the ship.
1.8 The loading and securing of vehicles on the ship should be such as to prevent damage or harm to the ship and personnel on board throughout the voyage.
1.9 The packaging and securing of cargoes loaded on vehicles on the ship should be such as to prevent damage or harm to the ship and personnel on board throughout the voyage.

2 Securing arrangements

2.1 Securing arrangements on ro-ro passenger ships of classes I, II and III

2.1.1 Securing points on vehicle decks
(1) The distance between securing points in the longitudinal direction should in general not exceed 2.5 m. The thwartships spacing of securing points should not be less than 2.8 m and not more than 3 m. However, there may be a need for the securing points in the forward and after parts of the ship to be more closely spaced than they are amidships.
(2) The arrangement of securing points on vehicle deck of a train should be specially considered in accordance with the size of vehicle.
(3) The maximum securing load (MSL) of each securing point on ro-ro passenger ships of class I should be not less than n×120 kN, and the maximum securing load (MSL) of each securing point on ro-ro passenger ships of classes II and III should be not less than n×90 kN, where n is the number of lashings accommodated by the securing point.
(4) Securing points should be arranged in way of hull strength members insofar as practicable, otherwise hull structures in the area of securing points should be locally strengthened as appropriate.
2.1.2 Securing points on vehicles
(1) Vehicles should be provided with securing points of sufficient number and strength, otherwise they should not be loaded on ro-ro passenger ships. Securing points on vehicles should be designed for securing the vehicles to the ship and should have an aperture capable of accepting only one lashing. The securing point and aperture should permit varying directions of the lashing to the ship's deck.
(2) The same number of not less than two nor more than six securing points should be provided on each side of the vehicle in accordance with the provisions of Table 2.1.2(2), where n is the total number of securing points on each side of the vehicle.

Minimum Number and Minimum Strength of Securing Points

Table 2.1.2(2)

Gross vehicle mass (GVM) tonnes			Minimum number of securing points on each side of the vehicle	Maximum securing load (MSL) of each securing point (kN)		
Ro-ro passenger ships of class I	Ro-ro passenger ships of class II	Ro-ro passenger ships of class III		Ro-ro passenger ships of class I	Ro-ro passenger ships of class II	Ro-ro passenger ships of class III
3.5≤GVM≤20	GVM≤37.5	GVM≤70.5	2	GVM×12/n	GVM×6.4/n	GVM×3.2/n
20<GVM≤30	37.5<GVM≤56.25	70.5<GVM≤105.5	3			
30<GVM≤40	56.25<GVM≤75	105.5.5<GVM≤140.5	4			

Notes: 1 For trains, the Table applies to each component, i.e. to the motor vehicle and each trailer, respectively.

2 Semi-trailer towing vehicles are excluded from the table above. They should be provided with two securing points at the front of the vehicle, the strength of which should be sufficient to prevent lateral movement of the front of the vehicle. A towing coupling at the front may replace the two securing points.

3 If the towing coupling is used for securing vehicles other than semi-trailer towing vehicles, this should not replace or be substituted for the above-mentioned minimum number and strength of securing points on each side of the vehicle.

(3) Each securing point on the vehicle should be marked in a clearly visible colour.

(4) Securing points on vehicles should be so located as to ensure effective restraint of the vehicle by the lashings.

(5) Securing points should be capable of transferring the forces from the lashings to the chassis of the vehicle and should never be fitted to bumpers or axles unless these are specially constructed and the forces are transmitted directly to the chassis.

(6) Securing points should be so located that lashings can be readily and safely attached particularly where side-guards are fitted to the vehicle.

(7) The internal free passage of each securing point's aperture should be not less than 80 mm but the aperture need not be circular in shape.

(8) Equivalent or superior securing arrangements may be considered for vehicles for which the provisions of Table 2.1.2(2) are unsuitable, which should be approved by the ship survey organization.

2.1.3 Lashings

(1) Lashings should consist of chain or any other device and be made of material having strength and elongation characteristics at least equivalent to those of steel chain.

(2) Lashings should be so designed and attached that, provided there is safe access, it is possible to tighten them if they become slack. Where practicable and necessary, the lashings should be examined at regular intervals during the voyage and tightened as necessary.

(3) Lashings should be attached to the securing points with hooks or other devices so designed that they cannot disengage from the aperture of the securing point if the lashing slackens during the voyage.

(4) Only one lashing should be attached to any one aperture of the securing point on the vehicle.

(5) Lashings should only be attached to the securing points provided for that purpose.

(6) Lashings should be attached to the securing points on the vehicle in such a way that the angle between the lashing and the horizontal and vertical planes lies preferably between 30 °and 60 °.

(7) Bearing in mind the characteristics of the ship and the weather conditions expected on the intended voyage, the master should decide on the number of securing points and lashings to be used for each voyage.

(8) Where there is doubt that a vehicle complies with the provisions of Table 2.1.2(2), the master may, at his discretion, load the vehicle on board, taking into account the apparent condition of the vehicle, the weather and sea conditions expected on the intended voyage and all other circumstances.

2.1.4 Loading of vehicles

(1) The chassis should be kept as static as possible by not allowing free play in the suspension of the motor vehicle and each trailer.

(2) Where jacks are used, the chassis of the motor vehicle and each trailer should be strengthened in way of the jacking-up points and the position of the jacking-up points should be clearly marked. The jacking-up points should be arranged in way of hull strength members insofar as practicable, otherwise hull structures in the area should be locally strengthened as appropriate.

(3) The parking brakes of each vehicle should be applied and locked. Packing blocks should be

provided in way of wheels. Vehicles with diesel engines should not be left in gear during the voyage.

3 Securing calculation of vehicles

3.1 The calculation of assessing the efficiency of securing arrangements for loading of vehicles on ro-ro passenger ships should be carried out in accordance with the Appendix or other accepted methods.

3.2 A check should be carried out to the strength and number of securing devices with regard to typical vehicles in typical loading positions for different wind scales.

4 Inspection of securing devices

4.1 Maximum securing load

4.1.1 Fixed and portable securing devices should be furnished with certificates to show their maximum securing load.

4.2 Inspection and examination

4.2.1 Necessary inspections should be carried out to fixed securing devices in connection with routine inspections of ro-ro passenger ships.

Appendix Methods to Assess the Efficiency of Securing Arrangements for Vehicles

1 The forces absorbed by appropriate loading and securing arrangements for the purpose of preventing sliding and tipping of vehicles consist of longitudinal, transverse and vertical forces.

2 The performance of ship in wind and wave may be improved by using anti-rolling devices, which should not be considered in calculating the force of vehicle securing.

3 The strength of securing devices may be determined in accordance with the following requirements:

(1) Maximum Securing Load (MSL) of securing devices may be determined based on the breaking strength provided by manufacturers in accordance with Table 3(1). Safe Working Load (SWL) used for securing purpose may replace MSL provided that it equals to or exceeds the strength defined by MSL.

MSL Determined from Breaking Strength **Table 3(1)**

Securing arrangements	MSL
Shackles, rings, deck eyes, turnbuckles of mild steel	50％of breaking strength
Fibre rope	33％of breaking strength
Lashing band	50％of breaking strength
Wire rope (single use)	80％of breaking strength
Wire rope (re-usable)	30％of breaking strength
Steel band (single use)	70％of breaking strength
Chains	50％of breaking strength

(2) A working load of securing device which has been approved should be taken as MSL.

(3) When the components of a lashing device are connected in series, for example, a wire to a shackle to a deck eyes, the MSL in the series is to apply to that device.

4 Safety factor

Within the assessment of strength of a securing arrangement by a balanced calculation method, the calculation strength (*CS*) may be calculated by the following formula:

$$CS = \frac{MSL}{\text{Safety factor}}$$

5 Calculation methods

(1) External forces to a vehicle in longitudinal, transverse and vertical direction F_x, F_y and F_z may be calculated by the following formulae:

$$F_x = ma_x k_1 k_2 k_3 + A_x q \quad \text{kN}$$

$$F_y = ma_y k_1 k_2 k_3 + A_y q \quad \text{kN}$$

$$F_z = ma_z k_1 k_3 \quad \text{kN}$$

where: m — mass of vehicle, in t;

a_x — longitudinal basic acceleration, in m/s^2, see Table 5(1);

a_y — transverse basic acceleration, in m/s^2, see Table 5(1);

a_z — vertical basic acceleration, in m/s^2, see Table 5(1);

k_1 — correction factor of basic acceleration for ships of a length other than 100 m and a service speed other than 15 knots, see Table 5(1);

L — length between perpendiculars, in m;

k_2 — correction factor of transverse acceleration for B/GM_0<13, see Table 5(1);

B — breadth of ship, in m;

GM_0 — metacentric height, in m;

A_x — longitudinal windage area, in m^2;

A_y — transverse windage area, in m^2;

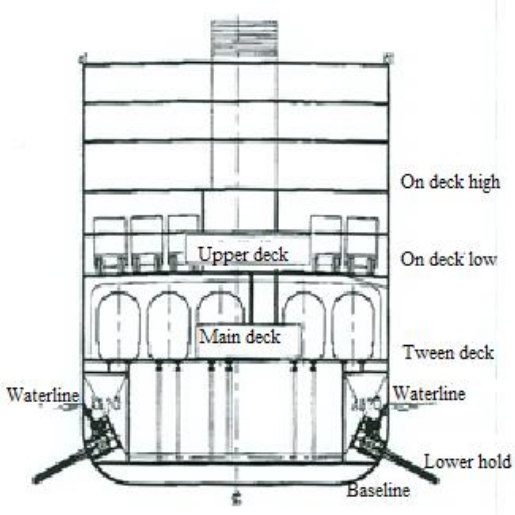
q — wind pressure, in kN/m^2, see Table 5(4).

Basic Acceleration Data a_x, a_y and a_z **Table 5(1)**

Transverse acceleration a_y in m/s^2										Longitudinal acceleration a_x in m/s^2
On deck high	7.1	6.9	6.8	6.7	6.7	6.8	6.9	7.1	7.4	3.8
On deck low	6.5	6.3	6.1	6.1	6.1	6.1	6.3	6.5	6.7	2.9
Tween deck	5.9	5.6	5.5	5.4	5.4	5.4	5.6	5.9	6.2	2.0
Lower hold	5.5	5.3	5.1	5.0	5.0	5.1	5.3	5.5	5.9	1.5
X/*L*	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
Vertical acceleration a_z in m/s^2										
	7.6	6.2	5.0	4.3	4.3	5.0	6.2	7.6	9.2	

Note: The given transverse acceleration figures include components of gravity, pitch and heave parallel to the deck. The given vertical acceleration figures do not include the static weight component. *X* is the distance from center of gravity of vehicle to A.P., in m.

When determining the basic acceleration of a typical ro-ro passenger ship, the vehicle loading positions are shown in Figure 5(1).



(2) The correction factor k_1 of basic acceleration for ships of a length other than 100 m and a service speed other than 15 knots is given in Table 5(2).

Correction Factor k_1 **Table 5(2)**

L (m) / *v* (kn)	50	60	70	80	90	100	120	140	160	180	200
9	1.20	1.09	1.00	0.92	0.85	0.79	0.70	0.63	0.57	0.53	0.49
12	1.34	1.22	1.12	1.03	0.96	0.90	0.79	0.72	0.65	0.60	0.56
15	1.49	1.36	1.24	1.15	1.07	1.00	0.89	0.80	0.73	0.68	0.63
18	1.64	1.49	1.37	1.27	1.18	1.10	0.98	0.89	0.82	0.76	0.71
21	1.78	1.62	1.49	1.38	1.29	1.21	1.08	0.98	0.90	0.83	0.78
24	1.93	1.76	1.62	1.50	1.40	1.31	1.17	1.07	0.98	0.91	0.85

Note: The correction factor k_1 for *L*/*v* not included in the table is calculated by the following formula:

$$k_1 = \frac{0.345v}{\sqrt{L}} + \frac{58.62L - 1034.5}{L^2}$$

where: v — ship speed, in kn;
L— length between perpendiculars, in m, the formula does not apply to ships of less than 50 m or greater than 300 m in length.

(3) The correction factor k_2 of transverse acceleration for B/GM_0<13 is given in Table 5(3).

Correction Factor k_2 **Table 5(3)**

B/GM_0	7	8	9	10	11	12	13
On deck high	1.56	1.40	1.27	1.19	1.11	1.05	1.00
On deck low	1.42	1.30	1.21	1.14	1.09	1.04	1.00
Tween deck	1.26	1.19	1.14	1.09	1.06	1.03	1.00
Lower hold	1.15	1.12	1.09	1.06	1.04	1.02	1.00

(4) The correction factor based on different routes, classes of ships and design conditions as well as wind pressure is given in Table 5(4).

Correction Factor of Basic Acceleration and Wind Pressure **Table 5(4)**

Wind scale	Ro-ro passenger ships of class I	Ro-ro passenger ships of class II	Ro-ro passenger ships of class III	Wind pressure q in kN/m^2
Greater than 8	1.0	-	0.5	1.0
7－8	0.9	0.7		0.4
5－6	0.75	0.6		0.2
Less than 5	0.75	0.5		0.1

(5) The effect of friction force may be considered in the strength calculation of securing devices. The friction coefficient μ is selected in accordance with Table 5(5).

Friction Coefficient μ **Table 5(5)**

Materials in contact	Friction coefficient μ
Wet or dry timber-timber	0.4
Steel-timber or steel-rubber	0.3
Dry steel-steel	0.1
Wet steel-steel	0.0

(6) Balance of forces and moments is calculated by the following formulae and calculation example is shown in Figure 5(6):

For transverse sliding balance: $F_y \le \mu mg + \sum_{i=1}^{n} CS_1 f_1$ kN

For transverse tipping balance: $F_y a \le bmg + \sum_{i=1}^{n} CS_i c_i$ kN m

For longitudinal sliding balance: $F_x \le \mu(mg - F_z) + \sum_{i=1}^{n} CS_i f_i$ kN

where: F_x — longitudinal force calculated in accordance with 5(1), in kN;

F_y — transverse force calculated in accordance with 5(1), in kN;

F_z — vertical force calculated in accordance with 5(1), in kN;

n — number of lashings being calculated; for vertical securing angle of greater than 60°, such securing device is excluded from the sliding balance calculation; for horizontal securing angle of greater than 30°, such lashing should not be included in the transverse sliding balance calculation;

μ — friction coefficient selected in accordance with Table 5(5);

m — mass of vehicle, in t;

g — acceleration of gravity, taken as 9.81m/s^2;

CS — calculated strength of securing devices, *CS*=*MSL*/safety factor, where safety factor is taken as 1.5. For calculation of longitudinal sliding balance, longitudinal components of transverse securing devices should not be assumed greater than 0.5*CS*;

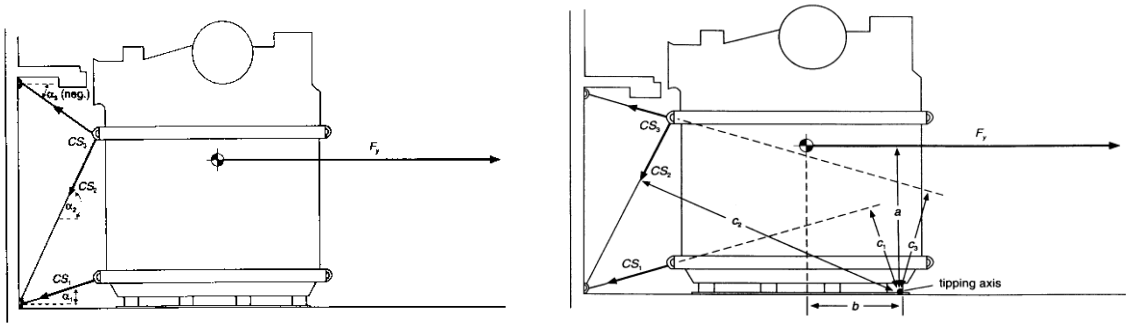
a — lever-arm of tipping, in m, see Figure 5(6);

b — lever-arm of stableness, in m, see Figure 5(6);

c — lever-arm of securing force, in m, see Figure 5(6);

f — function of μ and vertical securing angle α, $f = \mu \sin\alpha + \cos\alpha$;

α — vertical securing angle, see Figure 5(6).



Transverse sliding balance　　Transverse tipping balance

Figure 5(6)　Calculation Example

(7) Having considered the transverse and longitudinal components of lashings, the following alternative method of force balance calculation may be used:

For transverse sliding balance: $F_y \le \mu mg + \sum_{i=1}^{n} CS_i f_{yi}$ kN

For transverse tipping balance: $F_y a \le bmg + 0.9\sum_{i=1}^{n} CS_i c_i$ kN·m

For longitudinal sliding balance: $F_x \le \mu(mg - F_z) + \sum_{i=1}^{n} CS_1 f_{x1}$ kN

where: F_x — longitudinal force calculated in accordance with 5(1), in kN;

F_y — transverse force calculated in accordance with 5(1), in kN;

F_z — vertical force calculated in accordance with 5(1), in kN;

n— number of lashings being calculated; securing devices with vertical securing angle α less than 45° and horizontal securing angle β greater than 45° should not be used for calculation of transverse tipping balance, where α and β are shown in Figure 5(7);

μ — friction coefficient selected in accordance with Table 5(5);

m — mass of vehicle, in t;

g — acceleration of gravity, taken as 9.81m/s^2;

CS — calculated strength of securing devices, *CS*=*MSL*/safety factor, where safety factor is taken as 1.35;

a — lever-arm of tipping, in m, see Figure 5(6);

b — lever-arm of stableness, in m, see Figure 5(6);

c — lever-arm of securing force, in m, see Figure 5(6);

f_x — function of μ and vertical securing angle α and horizontal securing angle β, $f_x = \cos\alpha \sin\beta + \mu \sin\alpha$;

f_y — function of μ and vertical securing angle α and horizontal securing angle β, $f_y = \cos\alpha \cos\beta + \mu \sin\alpha$;

α — vertical securing angle, see Figure 5(7);

β — horizontal securing angle, see Figure 5(7).

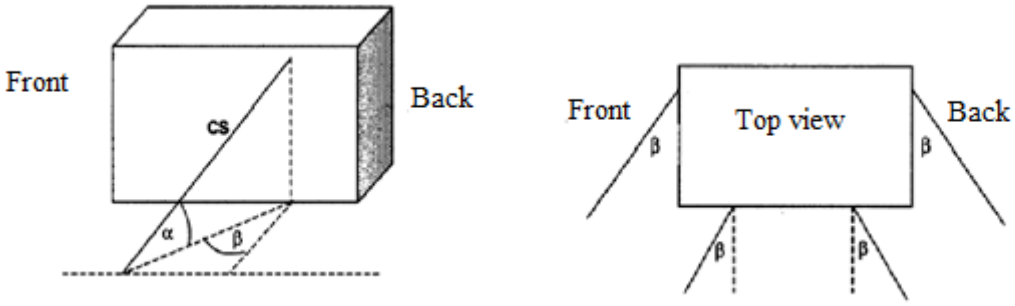


Figure 5(7) Vertical Securing Angle α and Horizontal Securing Angle β

Chapter 6 PASSENGER QUOTAS AND ACCOMMODATION EQUIPMENT

1 General provisions

1.1 In addition to complying with the provisions of PART SEVEN of the Guidelines, passenger quotas and accommodation equipment of ro-ro passenger ships are also to satisfy the following requirements:

(1) Permanent seat or berth is to be provided in cabins for every passenger.

(2) Seats in public spaces (e.g. mess rooms and recreational spaces) are not included in the passenger seat quotas.

Chapter 7 REQUIREMENTS FOR SHIPS IN SERVICE

1 General provisions

1.1 In addition to ship certificates required by the Guidelines, ro-ro passengers ships are also to be provided with the following documents:
(1) Muster List;
(2) Training Manual;
(3) Operational Procedures Manual of Ship's Safety and Pollution Prevention.
1.2 In case of any accident, the crew members are to immediately use on-board facilities to eliminate or control the consequence of accident, report to the local port or base port and make preparations for evacuation of passengers as necessary.

2 Operational procedures manual of ship's safety and pollution prevention

2.1 The Operational Procedures Manual of Ship's Safety and Pollution Prevention is at least to contain the following information:
(1) particulars of ship;
(2) description of ship and its equipment;
(3) description and operation of survival crafts and their davit-launched and embarkation arrangements;
(4) description and operation of fire detection and fire-extinguishing appliances;
(5) arrangement of fire-extinguishing appliances;
(6) arrangement of structural fire protection and means of escape;
(7) description and operation of radiocommunications and navigational equipment;
(8) safe navigation in special weather condition and huge wind and wave, including use of stabilizers, lateral thrusters and steering gears, strengthening patrol of vehicle compartment, selection of course, speed and anchorage, etc.;
(9) maintenance instructions of relevant equipment, including life-saving and launching appliances, fire detection and fire-extinguishing appliances, shell doors, loading doors and their closing appliances;
(10) ro-ro operation procedures and restrictions, including maximum operating weight, position of center of gravity and load distribution, as well as securing arrangement and procedure for cargoes and vehicles required by the worst condition of operating restrictions;
(11) operating procedures for pollution prevention, including bunkering, garbage and sewage treatment, etc.;
(12) means of alarm to indicate emergencies or failure endangering the safety and measures to be taken (including evacuation procedure for abandonment);
(13) procedures for induction training and post training of crew.