

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

TITLE 34 LIQUEFIED GAS CARRIER

**INTERNATIONAL CODE FOR THE
CONSTRUCTION AND EQUIPMENT OF SHIPS
CARRYING LIQUEFIED GASES IN BULK, 2006, AS
AMENDED**

SECTION 3 HULL EQUIPMENT

CHAPTERS

- A FIRE PROTECTION AND FIRE
EXTINGUISHING**
- B MECHANICAL VENTILATION IN THE
CARGO AREA**
- C PERSONNEL PROTECTION**

CONTENTS

PREAMBLE	4
CHAPTER A (11)	5
FIRE PROTECTION AND FIRE EXTINGUISHION	5
A1. FIRE PROTECTION AND FIRE EXTINGUISHION	5
100. 11.1 Fire safety requirements	5
200. 11.2 Fire water main equipment.....	5
300. 11.3 Water spray system	5
400. 11.4 Dry chemical powder fire-extinguishing system 6	
500. 11.5 Cargo compressor and pump rooms	7
600. 11.6 Fire-fighter's outfits	7
CHAPTER B (12)	7
MECHANICAL VENTILATION IN THE CARGO AREA	7
B.1 MECHANICAL VENTILATION IN THE CARGO AREA	7
100. 12.1 Spaces required to be entered during normal cargo handling operations	7
200. 12.2 Spaces not normally entered	8
CHAPTER C (14)	8
PERSONNEL PROTECTION	8
C1. PERSONNEL PROTECTION	8
100. 14.1 Protective equipment.....	8
200. 14.2 Safety equipment.....	8
300. 14.3 First-aid equipment	9
400. 14.4 Personnel protection requirements for individual products.....	9

International Code for The Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1983, as amended 1990, 1992, 1994, 1996, 2006

PREAMBLE

The present Title 34 is a transcription of the International Code for The Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1983, as amended 1990, 1992, 1994, 1996, 2006.

The Code has been divided into Sections numbered according to the RBNA Rules (Part I, Title 01, Section 1, Chapter D), but the original item numbers of the Code have been maintained immediately to the side of the RBNA item numbers.

The correspondence between RBNA Chapters and Code Chapters is given below:

RBNA Section	RBNA Chapter	RBNA Subchapter	RBNA Topic	IGC Code Chapter	IGC Code Topic	
1	A			11.0		AFIRE PROTECTION AND FIRE EXTINGUISHION
		A1	100		11.1	Fire safety requirements
			200		11.2	Fire water main equipment
			300		11.3	Water spray system
			400		11.4	Dry chemical powder fire-extinguishing systems
			500		11.5	Cargo compressor and pump rooms
			600		11.6	Fire-fighter's outfit
	B			12.0		MECHANICAL VENTILATION IN THE CARGO AREA
		B1	100		12.1	Spaces required to be entered during normal cargo handling operations
			200		12.2	Spaces not normally entered
	C			14.0		PERSONNEL PROTECTION
		C1	100		14.1	Protective equipment
			200		14.2	Safety equipment
			300		14.3	First-aid equipment
			400		14.4	Personnel protection requirements for individual products

**CHAPTER A (11)
FIRE PROTECTION AND FIRE EXTINCTION**

CHAPTER CONTENTS

A1. FIRE PROTECTION AND FIRE EXTINCTION

**A1. FIRE PROTECTION AND FIRE
EXTINCTION**

100. 11.1 Fire safety requirements

101. 11.1. The requirements for tankers in SOLAS chapter II-2 should apply to ships covered by the Code, irrespective of tonnage including ships of less than 500 gross tonnage, except that:

- a. regulations 4.5.1.6 and 4.5.10 do not apply;
- b. regulation 10.2 as applicable to cargo ships and regulations 10.4 and 10.5 should apply as they would apply to tankers of 2,000 gross tonnage and over;
- c. regulation 10.5.6 should apply to ships of 2,000 gross tonnage and over;
- d. the following regulations of SOLAS chapter II-2 related to tankers do not apply and are replaced by chapters and sections of the Code as detailed in Table T.A1.101.1 below:

**TABLE T.A1.101.1 – APPLICATION OF SOLAS
CHAPTER II-2**

<i>Regulation</i>	<i>Replaced by</i>
10.10	Part II, Title 34, Section 3, A1.600 (11.6)
4.5.1.1 and 4.5.1.2	Part II, Title 34, Section 1, Chapter C (chapter 3)
4.5.5 and 10.8	Part II, Title 34, Section 3, A1.300 and A1.400 (11.3 and 11.4)
10.9.1	Part II, Title 34, Section 1, A1.500 (1.5)

- e. regulations A1.304 (13.3.4) and A1.403 (13.4.) should apply to ships of 500 gross tonnage and over.

102. 11.1.2 All sources of ignition should be excluded from spaces where flammable vapour may be present except as otherwise provided in Part II, Title 34, Section 7, Chapter A and Part II, Title 34, Section 5, Chapter A (chapters 10 and 16).

103. 11.1.3 The provisions of this section apply in conjunction with Part II, Title 34, Section 1, Chapter C (chapter 3).

104. 11.1.4 For the purposes of fire fighting, any open deck areas above cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forwardmost hold space should be included in the cargo area.

200. 11.2 Fire water main equipment

202. 11.2.1 All ships, irrespective of size, carrying products which are subject to this Code should comply with the requirements of SOLAS regulations II-2/10.2, 10.4 and 10.5, except that the required fire pump capacity and fire main and water service pipe diameter should not be limited by the provisions of regulations II-2/10.2.2.4.1 and II-2/10.2.1.3 when the fire pump and fire main are used as part of the water spray system as permitted by A1.303 (11.3.3). In addition, the requirements of regulation II-2/10.2.1.6 should be met at a pressure of at least 5.0 bar gauge.

202. 11.2.2 The arrangements should be such that at least two jets of water can reach any part of the deck in the cargo area and those portions of the cargo containment system and tank covers above the deck. The necessary number of fire hydrants should be located to satisfy the above arrangements and to comply with the requirements of SOLAS regulations II-2/10.2.1.5.1 and II-2/10.2.3.3, with hose lengths as specified in regulation II-2/10.2.3.1.1.

203. 11.2.3 Stop valves should be fitted in any crossover provided and in the fire main or mains at the poop front and at intervals of not more than 40 m between hydrants on the deck in the cargo area for the purpose of isolating damaged sections of the main.

204. 11.2.4 All water nozzles provided for fire-fighting use should be of an approved dual-purpose type capable of producing either a spray or a jet. All pipes, valves, nozzles and other fittings in the fire-fighting systems should be resistant to the effects of fire and to corrosion by water.

205. 11.2.5 Where the ship's engine-room is unattended, arrangements should be made to start and connect to the fire main at least one fire pump by remote control from the navigating bridge or other control station outside the cargo area.

300. 11.3 Water spray system

301. 11.3.1 On ships carrying flammable or toxic products or both, a water spray system for cooling, fire prevention and crew protection should be installed to cover:

- a. exposed cargo tank domes and any exposed parts of cargo tanks;

- b. exposed on-deck storage vessels for flammable or toxic products;
- c. cargo liquid and vapour discharge and loading manifolds and the area of their control valves and any other areas where essential control valves are situated and which should be at least equal to the area of the drip trays provided; and
- d. boundaries of superstructures and deckhouses normally manned, cargo compressor rooms, cargo pump rooms, store-rooms containing high fire risk items and cargo control rooms, all facing the cargo area. Boundaries of unmanned forecastle structures not containing high fire risk items or equipment do not require water spray protection.

302. 11.3.2 The system should be capable of covering all areas mentioned in A1.301 (11.3.1) with a uniformly distributed water spray of at least 10 l/m² per minute for horizontal projected surfaces and 4 l/m² per minute for vertical surfaces. For structures having no clearly defined horizontal or vertical surfaces, the capacity of the water spray system should be the greater of the following:

- a. projected horizontal surface multiplied by 10 l/m² per minute; or
- b. actual surface multiplied by 4 l/m² per minute.

On vertical surfaces, spacing of nozzles protecting lower areas may take account of anticipated rundown from higher areas. Stop valves should be fitted at intervals in the spray main for the purpose of isolating damaged sections. Alternatively, the system may be divided into two or more sections which may be operated independently provided the necessary controls are located together, aft of the cargo area. A section protecting any area included in A1.301.a and b (11.3.1.1 and .2) should cover the whole of the athwartship tank grouping which includes that area.

303. 11.3.3 The capacity of the water spray pumps should be sufficient to deliver the required amount of water to all areas simultaneously or where the system is divided into sections, the arrangements and capacity should be such as to supply water simultaneously to any one section and to the surfaces specified in A1.301.c and d (11.3.1.3 and .4). Alternatively, the main fire pumps may be used for this service provided that their total capacity is increased by the amount needed for the spray system. In either case, a connection, through a stop valve, should be made between the fire main and water spray main outside the cargo area.

304. 11.3.4 Subject to the approval of the RBNA, water pumps normally used for other services may be arranged to supply the water spray main.

305. 11.3.5 All pipes, valves, nozzles and other fittings in the water spray systems should be resistant to corrosion

by seawater, for which purpose galvanized pipe, for example, may be used, and to the effect of fire.

306. 11.3.6 Remote starting of pumps supplying the water spray system and remote operation of any normally closed valves in the system should be arranged in suitable locations outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected.

400. 11.4 Dry chemical powder fire-extinguishing system

401. 11.4.1 Ships in which the carriage of flammable products is intended should be fitted with fixed dry chemical powder type extinguishing systems for the purpose of fighting fire on the deck in the cargo area and bow or stern cargo handling areas if applicable. The system and the dry chemical powder should be adequate for this purpose and satisfactory to the Administration.

402. 11.4.2 The system should be capable of delivering powder from at least two hand hose lines or combination monitor/hand hose lines to any part of the above-deck exposed cargo area including above-deck product piping. The system should be activated by an inert gas such as nitrogen, used exclusively for this purpose and stored in pressure vessels adjacent to the powder containers.

403. 11.4.3 The system for use in the cargo area should consist of at least two independent self-contained dry chemical powder units with associated controls, pressurizing medium fixed piping, monitors or hand hose lines. For ships with a cargo capacity of less than 1,000 m³ only one such unit need be fitted, subject to approval by the RBNA. A monitor should be provided and so arranged as to protect the cargo loading and discharge manifold areas and be capable of actuation and discharge locally and remotely. The monitor is not required to be remotely aimed if it can deliver the necessary powder to all required areas of coverage from a single position. All hand hose lines and monitors should be capable of actuation at the hose storage reel or monitor. At least one hand hose line or monitor should be situated at the after end of the cargo area.

404. 11.4.4 A fire-extinguishing unit having two or more monitors, hand hose lines, or combinations thereof, should have independent pipes with a manifold at the powder container, unless a suitable alternative means is provided to ensure proper performance as approved by the RBNA. Where two or more pipes are attached to a unit the arrangement should be such that any or all of the monitors and hand hose lines should be capable of simultaneous or sequential operation at their rated capacities.

405. 11.4.5 The capacity of a monitor should be not less than 10 kg/s. Hand hose lines should be non-kinkable and be fitted with a nozzle capable of on/off operation and discharge at a rate not less than 3.5 kg/s. The maximum discharge rate should be such as to allow operation by one

man. The length of a hand hose line should not exceed 33 m. Where fixed piping is provided between the powder container and a hand hose line or monitor, the length of piping should not exceed that length which is capable of maintaining the powder in a fluidized state during sustained or intermittent use, and which can be purged of powder when the system is shut down. Hand hose lines and nozzles should be of weather-resistant construction or stored in weather-resistant housing or covers and be readily accessible.

406. 11.4.6 A sufficient quantity of dry chemical powder should be stored in each container to provide a minimum 45 seconds discharge time for all monitors and hand hose lines attached to each powder unit. Coverage from fixed monitors should be in accordance with the following requirements:

TABLE T.A1.306.1 – FIXED MONITORS

Capacity of fixed monitors (kg/s) each	10	25	45
Maximum distance of coverage (m)	10	30	40

Hand hose lines should be considered to have a maximum effective distance of coverage equal to the length of hose. Special consideration should be given where areas to be protected are substantially higher than the monitor or hand hose reel locations.

407. 11.4.7 Ships fitted with bow or stern loading and discharge arrangements should be provided with an additional dry chemical powder unit complete with at least one monitor and one hand hose line complying with the requirements of A1.401 to A1.406 (11.4.1 to 11.4.6). This additional unit should be located to protect the bow or stern loading and discharge arrangements. The area of the cargo line forward or aft of the cargo area should be protected by hand hose lines.

500. 11.5 Cargo compressor and pump rooms

501. 11.5.1 The cargo compressor and pump rooms of any ship should be provided with a carbon dioxide system as specified in SOLAS regulation II-2/10.9.1.1. A notice should be exhibited at the controls stating that the system is only to be used for fire-extinguishing and not for inerting purposes, due to the electrostatic ignition hazard. The alarms referred to in SOLAS regulation II-2/10.9.1.1.1 should be safe for use in a flammable cargo vapour-air mixture. For the purpose of this requirement, an extinguishing system should be provided which would be suitable for machinery spaces. However, the amount of carbon dioxide gas carried should be sufficient to provide a quantity of free gas equal to 45% of the gross volume of the cargo compressor and pump-rooms in all cases.

502. 11.5.2 Cargo compressor and pump rooms of ships which are dedicated to the carriage of a restricted number

of cargoes should be protected by an appropriate fire-extinguishing system approved by the RBNA.

600. 11.6 Fire-fighter's outfits

601. 11.6.1 Every ship carrying flammable products should carry fire-fighter's outfits complying with the requirements of SOLAS regulation II-2/10.10 as follows:

TABLE T.A1.601.1 – FIRE-FIGHTER'S OUTFIT

<i>Total cargo capacity</i>	<i>Number of outfits</i>
5 000 m ³ and below	4
above 5 000 m ³	5

602. 11.6.2 Additional requirements for safety equipment are given in Part II, Title 34, Section 3, Chapter C (chapter 14).

603. 11.6.3 Any breathing apparatus required as part of a fireman's outfit should be a self-contained air-breathing apparatus having a capacity of at least 1,200 l of free air.

CHAPTER B (12) MECHANICAL VENTILATION IN THE CARGO AREA

CHAPTER CONTENTS

B.1 MECHANICAL VENTILATION IN THE CARGO AREA

B.1 MECHANICAL VENTILATION IN THE CARGO AREA

The requirements of this chapter should be substituted for SOLAS regulations II-2/4.5.2.6 and II-2/4.5.4.

100. 12.1 Spaces required to be entered during normal cargo handling operations

101. 12.1.1 Electric motor rooms, cargo compressor and pump rooms, other enclosed spaces which contain cargo handling equipment and similar spaces in which cargo handling operations are performed should be fitted with mechanical ventilation systems capable of being controlled from outside such spaces. Provision should be made to ventilate such spaces prior to entering the compartment and operating the equipment and a warning notice requiring the use of such ventilation should be placed outside the compartment.

102. 12.1.2 Mechanical ventilation inlets and outlets should be arranged to ensure sufficient air movement through the space to avoid the accumulation of flammable or toxic vapours and to ensure a safe working environment, but in no case should the ventilation system have a capacity of less than 30 changes of air per hour based upon the total volume of the space. As an exception, gas-safe cargo control rooms may have eight changes of air per hour.

103. 12.1.3 Ventilation systems should be fixed and, if of the negative pressure type, permit extraction from either the upper or the lower parts of the spaces, or from both the upper and the lower parts, depending on the density of the vapours of the products carried.

104. 12.1.4 In rooms housing electric motors driving cargo compressors or pumps, spaces except machinery spaces containing inert gas generators, cargo control rooms if considered as gas-safe spaces and other gas-safe spaces within the cargo area, the ventilation should be of the positive pressure type.

105. 12.1.5 In cargo compressor and pump rooms and in cargo control rooms if considered gas-dangerous, the ventilation should be of the negative pressure type.

106. 12.1.6 Ventilation exhaust ducts from gas-dangerous spaces should discharge upwards in locations at least 10 m in the horizontal direction from ventilation intakes and openings to accommodation spaces, service spaces and control stations and other gas-safe spaces.

107. 12.1.7 Ventilation intakes should be so arranged as to minimize the possibility of re-cycling hazardous vapours from any ventilation discharge opening.

108. 12.1.8 Ventilation ducts from gas-dangerous spaces should not be led through accommodation, service and machinery spaces or control stations, except as allowed in Part II, Title 34, Section 5, chapter A (chapter 16).

109. 12.1.9 Electric motors driving fans should be placed outside the ventilation ducts if the carriage of flammable products is intended. Ventilation fans should not produce a source of vapour ignition in either the ventilated space or the ventilation system associated with the space. Ventilation fans and fan ducts, in way of fans only, for gas-dangerous spaces should be of non-sparking construction defined as:

- a. .1 impellers or housing of nonmetallic construction, due regard being paid to the elimination of static electricity;
- b. .2 impellers and housing of nonferrous materials;
- c. .3 impellers and housing of austenitic stainless steel; and

- d. .4 ferrous impellers and housing with not less than 13 mm design tip clearance.

Any combination of an aluminium or magnesium alloy fixed or rotating component and a ferrous fixed or rotating component, regardless of tip clearance, is considered a sparking hazard and should not be used in these places.

110. 12.1.10 Spare parts should be carried for each type of fan on board referred to in this chapter.

111. 12.1.11 Protection screens of not more than 13 mm square mesh should be fitted in outside openings of ventilation ducts.

200. 12.2 Spaces not normally entered

12.2 Spaces not normally entered. Hold spaces, interbarrier spaces, void spaces, cofferdams, spaces containing cargo piping and other spaces where cargo vapours may accumulate, should be capable of being ventilated to ensure a safe environment when entry into the spaces is necessary. Where a permanent ventilation system is not provided for such spaces, approved means of portable mechanical ventilation should be provided. Where necessary owing to the arrangement of spaces, such as hold spaces and interbarrier spaces, essential ducting for such ventilation should be permanently installed. Fans or blowers should be clear of personnel access openings, and should comply with B1.109 (12.1.9).

CHAPTER C (14) PERSONNEL PROTECTION

CHAPTER CONTENTS

C1. PERSONNEL PROTECTION

C1. PERSONNEL PROTECTION

100. 14.1 Protective equipment

101. Suitable protective equipment including eye protection should be provided for protection of crew members engaged in loading and discharging operations, taking into account the character of the products.

200. 14.2 Safety equipment

201. 14.2.1 Sufficient, but not less than two complete sets of safety equipment in addition to the firemen's outfits required by A1.601 (11.6.1) each permitting personnel to enter and work in a gas-filled space, should be provided.

202. 14.2.2 One complete set of safety equipment should consist of:

- a. .1 one self-contained air-breathing apparatus not using stored oxygen, having a capacity of at least 1,200 l of free air;
- b. .2 protective clothing, boots, gloves and tight-fitting goggles;
- c. .3 steel-cored rescue line with belt; and
- d. .4 explosion-proof lamp.

203. 14.2.3 An adequate supply of compressed air should be provided and should consist either of:

- a. .1 one set of fully charged spare air bottles for each breathing apparatus required by C1.201 (14.2.1); a special air compressor suitable for the supply of high-pressure air of the required purity; and a charging manifold capable of dealing with sufficient spare breathing apparatus air bottles for the breathing apparatus required by C1.201 (14.2.1); or
- b. .2 fully charged spare air bottles with a total free air capacity of at least 6 000 l for each breathing apparatus required by C1.201 (14.2.1).

204. 14.2.4 Alternatively, the Administration may accept a low-pressure air line system with hose connection suitable for use with the breathing apparatus required by C1.201 (14.2.1). This system should provide sufficient high-pressure air capacity to supply, through pressure reduction devices, enough low-pressure air to enable two men to work in a gas-dangerous space for at least 1 h without using the air bottles of the breathing apparatus. Means should be provided for recharging the fixed air bottles and the breathing apparatus air bottles from a special air compressor suitable for the supply of high-pressure air of the required purity.

205. 14.2.5 Protective equipment required in C1.100 (14.1) and safety equipment required in C1.201 (14.2.1) should be kept in suitable, clearly marked lockers located in readily accessible places.

206. 14.2.6 The compressed air equipment should be inspected at least once a month by a responsible officer and the inspection recorded in the ship's log-book, and inspected and tested by an expert at least once a year.

300. 14.3 First-aid equipment

301. 14.3.1 A stretcher which is suitable for hoisting an injured person from spaces below deck should be kept in a readily accessible location.

302. 14.3.2 The ship should have on board medical first-aid equipment, including oxygen resuscitation equipment

and antidotes for cargoes to be carried, based on the guidelines developed by the Organization*.

* Reference is made to the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), which provides advice on the treatment of casualties in accordance with the symptoms exhibited as well as equipment and antidotes that may be appropriate for treating the casualty.

400. 14.4 Personnel protection requirements for individual products

401. 14.4.1 Provisions of C1.400 (14.4) are applicable to ships carrying products for which those paragraphs are listed in column "i" in the table of Annex 3 (chapter 19).

402. 14.4.2 Respiratory and eye protection suitable for emergency escape purposes should be provided for every person on board subject to the following:

- a. .1 filter type respiratory protection is unacceptable;
- b. .2 self-contained breathing apparatus should normally have a duration of service of at least 15 min;
- c. .3 emergency escape respiratory protection should not be used for fire-fighting or cargo handling purposes and should be marked to that effect;
- d. .4 two additional sets of the above respiratory and eye protection should be permanently located in the navigating bridge.

403. 14.4.3 Suitably marked decontamination showers and an eyewash should be available on deck in convenient locations. The showers and eyewash should be operable in all ambient conditions.

404. 14.4.4 In ships of a cargo capacity of 2,000 m³ and over, two complete sets of safety equipment should be provided in addition to the equipment required by A1;601 and C1.402.a (11.6.1 and 14.2.1). At least three spare charged air bottles should be provided for each self-contained air-breathing apparatus required in this paragraph.

405. 14.4.5 Personnel should be protected against the effects of a major cargo release by the provision of a space within the accommodation area designed and equipped to the satisfaction of the RBNA.

406. 14.4.6 For certain highly dangerous products, cargo control rooms should be of the gas-safe type only.

Rgmm14en-PIIT34S3-abc-00