

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

TITLE 47 SUPPLY VESSELS

SECTION 6 PIPING

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CHAPTER A APPROACH

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A1. APPLICATION

100. Piping Systems

101. The requirements in the present Title 47, Section 6 are additional to those in Part II, Title 11, Section 6 and apply for ships having the service notation supply vessel, requirements for cargo tanks and piping systems, in particular where the additional service notations “**Chemical products**” and “**oil products**” apply.

102. RBNA may, after special analysis, allow changes of these Rules when applied to smaller vessels (< 500 GT).

CHAPTER E CARGO PIPING SYSTEMS

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- E1. CARGO PIPING SYSTEMS IN SHIPS WITH SERVICE NOTATION “OIL CARRIER”
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E1. CARGO PIPING SYSTEMS IN SHIPS WITH SERVICE NOTATION “OIL CARRIER”

100. Loading and unloading piping systems for ships with notation “Oil Carrier”

101. The cargo piping system is to be permanently installed, independent of any other pipe lines, and contained within the cargo area.

102. The systems and their piping (pipes, hoses, etc..) are to be installed so that upon the completion of the operations, they are safely emptied, draining the remaining liquid either to tanks on board or to shore based tanks..

103. The connections for cargo hoses are to be fitted with automatic shutting-off of the cargo line when the hose has been disconnected.

104. In addition quick-release devices are to be provided which may be either a hydraulically controlled hydraulic connection outside the cargo area or a device that will break when subjected to a predetermined pull.

105. The cargo piping system may be installed under the deck inside the cargo tanks provided that the shut-off valves operated from the deck are contained within the tanks. Additionally, within the pump room shut-off valves are to be installed for all piping system leading to the cargo tanks

106. The cargo inlet piping system is to be extended to the bottom of the cargo tank.

107. The piping system will be identified by color-coding to allow distinguishing it from any other systems.

108. Within the cargo tanks, pipes not belonging to the cargo piping loading / unloading system are to be protected against impacts by means of reinforced ducts.

109. Where there are arrangements for loading or unloading with ends outside the cargo zone a blind flange is to be fitted irrespective of the existence of shutoff valves.

110. Expansion curves or other approved devices for expansion are to be fitted where deemed necessary.

200. Level indicators in cargo tanks

201. All cargo tanks are to be provided with a level indicator of the closed type.

202. By "level indicator of the closed type" it is meant a device that is separate from the tank's atmosphere and prevents the contents of the tank from being released, and which can either:

- a. be fitted into the tank, such as systems with buoy, electric probe, magnetic probe and protected glass;
- b. be fitted outside the tank, such as radar or ultrasonic probe.

203. Sounding pipes may be accepted provided they are constructed and installed to minimize the amount of gas released during sounding operations. These pipes cannot be installed within enclosed spaces.

300. Pumps

301. The cargo pumps are to be installed on the deck in the space that goes from the aft bulkhead until the forward bulkhead of the cargo area.

302. The cargo pumps below deck are installed in pump rooms separated from other areas of the ship by gas-tight decks and bulkheads. The openings shall not be located at a distance less than 6 meters from the openings of accommodation and service locations that are outside the cargo zone.

303. The cargo pumps (displacement pumps) are to have protective device against over-pressure. The cargo flowing through such devices is to return to the cargo tank.

304. The cargo pumps are to have shut-off means outside the pump room.

305. The pump's flow is to be controlled from outside the pump room

306. The cargo pumps and filters, in pump rooms located under the deck will be equipped with means for safe drainage at any time.

307. The cargo control panels located on deck are to have pressure indicators. The maximum allowed pressure is to be marked on the manometres.

400. Pump room

401. The Pump Rooms and their entrances shall be located in the cargo zone and may not have access leading to the Engine Room and other spaces containing sources of ignition.

402. The Pump Rooms under deck are to be provided with flooding level and gas detectors with alarm.

500. Bilge and ballast piping systems

501. Bilge and ballast piping system spaces of the cargo area are to be contained within them.

502. The piping system arrangement is such that it can conduct the waste or ballast water in the cargo tanks through dedicated piping, or failing that, by the filling piping system. The following provisions apply to this latter case:

- a. the water suction piping may pass through a cofferdam;
- b. a check valve is to be installed at the junction between the suction pipe duct and the cargo duct.

503. The double side shells and double bottoms, the cofferdams and the cargo tank areas, if flooded, are to be drained by an independent piping system, located within the cargo area. This provision is not applicable where the vents of the ballast tanks are so located that air is drawn from outside the cargo area

504. The cargo tanks must be provided with a bilge system independent of any other system in the vessel.

505. A Pump Room below deck is to be drained, in emergency cases, by a system located in the cargo area

independent of all other systems, discharging into a cargo tank through check valve and with entrance through the top of the tank in order to provide the drainage of these spaces in the event of leakage of cargo without contaminating the environment.

506. Connections between cofferdam piping systems and any other fixed ship's systems are not allowed.

600. Vent and overflow pipes

601. The section area of the vent and overflow pipes is to be calculated on the basis of the nominal loading flow rate multiplied by a factor of at least 1.25 to take into account the evolution of gas, in order to prevent any pressure on the cargo tank to exceed the design pressure during loading and unloading operations.

602. The outlet pipes of the vents of fuel oil tanks are to be located above the deck. The screen openings are to have flame arrester screens. They shall be located at least 2 meters up from the deck.

603. Cargo tank vents and independent piping where safety valves and/or any device where an accidental spillage may possibly occur are to be provided with trays of proper capacity.

604. Each tank or each group of cargo tanks connected to an air vent or collector shall be equipped with:

- a. devices that allow the flow of small volumes of vapor, air or inert gas, caused by temperature variations via pressure-vacuum valves equipped with flame arrester screen;
- b. the transfer of large volumes of vapor, air or inert gas during the loading or unloading, which can be done by:
 - a. a discharge valve at high speed allowing to exhaust the gases expelled;
 - b. an output with throttling device to ensure a velocity of at least 30 m / s.
- c. a connection to a safe return ashore of the gases released during the loading
- d. a gauge whose scale has to be on display with a minimum diameter of 0.14 m. The maximum allowable overpressure or under-pressure is to be indicated by a red line. Pressure gauges are to be read at any time from the point where we can shut off the loading or unloading.

605. The discharge openings of the discharge valves at high speed or of vents for loading and unloading can be located not less than 2 (two) meters above the deck and are to be separated from at least six (6) meters of the accommodations and service locations. The adjustment of these valves is to be such that during the course of the transport operation, they have their first opening in the

maximum permitted service pressure allowed for the cargo tanks. They may be of the port flap type with the proviso that continue to operate in the folded position.

700. Bilge pumps

- See Title 11

800. Size of the suction pipes

- See Title 11

900. Drains and sanitary arrangement for the hull

- See Title 11

**E2. CARGO PIPING SYSTEMS IN SHIPS
WITH SERVICE NOTATION "CHEMICAL
CARRIERS"**

100. General

101. Unless otherwise specified, the special requirements for cargo referred to in Chapter 17 of the IBC Code and IGC Code Chapter 19 are to apply.

200. Segregation

201. For cargoes which react dangerously with other cargo or pumping systems and pipelines cannot pass through tanks containing such cargoes unless they are embedded in a tunnel

300. Cargo transferring system

301. The charge-transfer systems is to comply with the requirements of Chapter 5 of the IBC Code.

302. The remote stop devices for cargo pumps and similar equipment, as required in item 5.6.1.3 of the IBC code are to be activated from a location dedicated to the cargo control, manned at the time of cargo transfer and at least one other location outside the cargo area and a safe distance from it.

303. In the case of transfer operations involving pressures greater than 50 bar manometer means are to be provided for emergency depressurizing and disconnecting the transfer hose. The controls for activating the emergency depressurizing and disconnecting the transfer hose are to comply with the above item E2.302.

400. Cargo tanks

401. Design
- See Title 33

402. Tanks full and independent gravity tanks
- See Title 33

403. Design Pressure
- See Title 33

404. All openings and connections of the tanks are to terminate above the open deck and are to be located at the

top of the tanks, except for the connections to the pump room.

500. Systems-level indication and alarm

501. Every cargo tank is to have a system level indication and, where required by Chapter 17 of the IBC Code, an alarm level. Such devices are to comply with the requirements of Title 33.

502. The requirements of the item E2.501 above can be mitigated by RBNA according to the type of loading arrangement and loading and unloading procedures, to be analyzed in each case.

**CHAPTER F
HULL PIPING**

CHAPTER CONTENTS

F1 FIRE PREVENTION AND FIGHTING

F2. ADDITIONAL REQUIREMENTS FOR VESSELS WITH SERVICE NOTATION "OIL CARRIER"

F3. ADDITIONAL REQUIREMENTS FOR VESSELS WITH SERVICE NOTATION "CHEMICALS CARRIER"

F4. POLLUTION PREVENTION

F1. PREVENTION AND FIRE FIGHTING

100. Principles
- See Title 11

200. Fire pumps

201. Vessels covered by this Title, with gross tonnage greater than 20, are to have two non-manually independent fire pumps, with minimum flow of 10 m³/h and enough pressure to throw a stream of water from any fire outlet at a distance never less than 15 m, using a nozzle of 12 mm. The two pumps are to be installed in different locations. One of them has to be always ready to operate.

202. Vessels covered by this Title, greater than 300 gross tonnage are to be equipped with two non-manually independent fire pumps, with a minimum flow of 15 m³/h, which may be driven by the main engine. The two pumps are to be installed in different locations.

203. Vessels covered by this Title, with greater than 500 gross tonnage are to be equipped with two independent non-manual fire pumps, with a minimum

flow of 25 m³ / h. Each flow should not have less than 45% of the total required. The second pump is to be driven independently of the propulsion engine. One of them is to be always ready to operate.

204. 209. - See Title 11

210 The pumps are to be capable of providing, from any point of the vessel, jets of length at least equal to the breadth of the vessel, from two spray nozzles simultaneously.

300. Main line and fire hydrants

301. The diameter of the main line of fire and water service is to be adequate to ensure the effectiveness of the distribution of the maximum required flow of fire pumps operating simultaneously, and enough to launch, through nozzles and specified conditions in paragraphs that follow, two jets of water at a distance not less than 15 m.

302. to 304. - See Title 11

305. The amount and location of the hydrants are such that at least two solid water jets, not from the same hydrant, one of which' from a single section of hose, can reach any part of the vessel normally accessible to the crew during the vessel sailing, as well as any part of the cargo compartment, when empty. A fire station shall be visible from each hydrant. A minimum of three fire hydrants are to be installed on the main deck in the cargo area.

306. to 309. - See Title 11

310. Spring check valves are to be fitted, in order to prevent gas escaping from the cargo zone and reaching the accommodation and service spaces, passing through the firefighting system.

400. Fire hoses

- See Title 11

500. Unions and nozzles

501. to 504. - See Title 11

505. In accommodation or service spaces one may accept nozzle with a diameter not exceeding 12 mm.

506. All nozzles are to be fitted with a shut off device, of an approved type and be of dual use in spray and solid mode jets.

600. Fixed firefighting systems

601. The installation of fixed firefighting systems is mandatory at the following locations:

- a. Engine Room;
- b. Rooms containing essential equipment, such as diesel generators, switchboards, compressors etc.;

c. Refrigerating facilities

602. The fixed CO₂ systems are to meet the requirements that follow.

a. The amount of carbon dioxide on board is to be sufficient to provide a minimum amount of free gas according to the highest of the following volumes:

b. 40% of the total volume of the largest machinery space are to be protected, except that part of the hatch's skylight above the level at which the horizontal area of the skylight is 40% or less of the total horizontal area of the space considered;

- 35% of the total volume of the largest machinery space, including the hatch's skylight.

The calculation shall be based on a volume of CO₂ of 0.56 m³ per kgf.

c. The fixed CO₂ system is to allow:

b.1. 85% of gas can be discharged within 2 minutes;

b.2. The number, type and location of discharge outlets allow uniform distribution throughout the protected space.

d. All valve controls are to be located outside the protected space, in a location where they will not be liable to be shut off by the fire in the space.

e. All valves, piping and fittings are to have a burst pressure of not less than 422 kgf/cm².

f. The CO₂ cylinders are to be located outside the protected space, in a location where they will not be subject to having their operation shut off by fire in space.

g. The distribution system is to be equipped with a delay device so that the alarm will sound 30 seconds before tripping.

h. To comply with the requirements on means of shut off and muffling provided in Part 2, Title 32, Chapter D5, sub-chapters. 300 and 400.

F2. ADDITIONAL REQUIREMENTS FOR VESSELS WITH SERVICE NOTATION "OIL CARRIER "

100. Protection in the deck area over the cargo tanks

101. In vessels covered by this Title, a fixed foam fire-extinguishing system is to be installed on deck to protect the cargo tanks. Special cases will be reviewed by

RBNA. A distinction is made between the foam systems that follows.

- a. System of low expansion foam, produced by addition of 3% to 6% of concentrate, where the expansion ratio (ratio between the volume of foam produced and provided) is not to exceed 12:1. This system is used to protect the deck in the area of the cargo tanks, but may also be used in the Engine Room.
- b. System of high-expansion foam: 1% to 3% of foam solution, and the expansion rate of 100:1 to 1000:1, for use only in the engine room.

102. In this Title, it is considered the use of low-expansion foam firefighting system. Such systems, for protection of the deck in the area of the cargo tank, is to be in compliance with the requirements that follow.

- a. they are to be available in the whole area of the cargo tanks on the deck, as well as any cargo tank, whose deck may be at risk of failure.
- b. The control system will be located outside the cargo area:
- c. In case of fire in protected areas, the system control is to be easy to access and provide for quick and easy operation.
- d. The flow of the foam system is to be calculated according to the formulas that follow, adopting the highest value.
 - i. 0.6 liters per minute per square meter of cargo of the deck, being that the cargo area means the maximum beam of the vessel multiplied by the longitudinal length of the location area of the cargo tanks:

$$V = 0.6 \times B \times L_c \text{ in l / min}$$

Where:

V = flow rate in l / min; L_c = length of the cargo area, comprising the cargo tanks.

- ii. 6 liters per minute per square meter of horizontal area of the cargo tank having the largest area: $V = 6 \times B \times L_t$, in l / min

where:

L_t = length of the cargo tank which has the largest area.
- iii. 3 liters per minute per square meter of the area to be protected by the largest monitor and fully in front of it, subject to at least 1250 l / min:

$$V = 3 \times B \times L_m \times 0.75 \text{ in l / min}$$

where:

L_m = range of the monitor.

B = breadth of largest cargo tank

- e. the minimum supply of foam solution is to be such that, based on the greater of the values calculated in i., ii. or iii. the production of foam be ensured by at least 30 minutes to Tanker vessels type, without an inert gas system, and 20 minutes for vessels with an inert gas system:

$$V_t = V \times R_e \times t \text{ in l}$$

where:

V_t = total minimum foam capacity in liters;
V = flow rate in l / min, as calculated in i., ii. or iii.;
R_e = dosage rate of the foam (for synthetic foam, usually R_e = 0.03).

- f. The foam produced by the fixed system will be launched by monitor cannons and / or applicators (launchers).
- g. The monitor cannons are to meet the requirements that follow.
 - i. supply at least 50% of the flows of foam solution calculated on items i and ii;
 - ii. the amount and position of monitors are to meet the item 102.a) above, the minimum capacity of each monitor is to be 3 liters per minute per square meter of area covered by the monitor, and always in front of the monitor, but never less than 1250 l / min.

103. In vessels of this title, the monitors may be replaced by portable foam applicators, which are to meet the requirements that follow:

- a. the capacity of each applicator is not to be less than 400 liters per minute and reach not less than 15 meters;
- b. each applicator will have at least 25% of the flow of foam solution calculated by items and 604.i and ii.;
- c. the minimum amount of applicators is 4 (four).

104. For the foam system, the following pumps are to be installed

- a. one or more water pumps in order to meet the requirements of items 603.i and ii above, having sufficient gauge height to obtain, in the monitor cannons and / or applicators, enough pressure to meet specifications of such equipment - if be used the fire pump, it is to be able to keep the simultaneous use of the foam system and two

water jets, at the system pressure required by the firefighting system;

- b. at least a concentrate pump, having flow and gauge height sufficient to the required amount of foam, such pumps are to be constructed of materials resistant to the corrosive action of the foam (for systems with low flow, after analysis, RBNA may not require the concentrate pumps); water-foam proportionners adequate of type approved by RBNA are to be installed.

200. Protection of the deck areas where cargo storage tanks to be installed

201 For ships provided with cargo storage tanks installed in the open deck, in addition of the requirements of item F2.100 above a portable fire-extinguishing foam system equipped with portable generation tank of foam and a reserve storage tank is to be installed, each of which having a capacity of 100 liters.

202. The RBNA is to approve the system as capable of delivering foam to the top of the cargo storage tanks.

203. The above unit may be replaced by portable applicators required in item F2.100 above, provided that the amount of liquid foam generator be increased by 200 liters and that such applicators are capable of delivering foam on top of the tanks installed on the open decks.

300. Protection against fire in the cargo pump space

301. Each cargo pump compartment is to be equipped with two portable foam extinguishers or equivalent.

400. Ventilation of compartments

- See Title 32

F3. ADDITIONAL REQUIREMENTS FOR VESSELS WITH SERVICE NOTATION "CHEMICALS CARRIER"

100. Protection of the deck areas

101. The ship is to be equipped with a fixed deck foam system or a fixed system using chemical powder meeting the following requirements:

- a. The system is to be located so as to protect the deck within the cargo zone;
- b. The system is to be able to cover the deck area within the cargo area without being moved;
- c. When a fixed foam system has been installed it is to comply with the requirements of 11.3.3 to 11.3.12 of the IBC Code. It is to be used only foam suitable for products to be transported.

102. An alternative system may be approved provided that the RBNA be satisfied that it will not be less effective than F3.101 described above.

103. A fixed system may be adopted provided that:

- a. in a deck area of no more than 45 m² are provided two or more chemical powder extinguishers whose capacity is not less than 135 kg;
- b. in a deck area greater than 45 m² be provided three or more powder extinguisher whose capacity is not less than:

$$C = 3 * A$$

where A is the area in m² of the deck;

200. Protection against fire in the cargo pump

201. Each compartment cargo pumps is to be provided with a fixed fire fighting in accordance with 11.2 of the IBC Code.

F4. POLLUTION PREVENTION

100. Ships with service notation "Oil Carrier"

101. The discharge of substances in the effluent is regulated by MARPOL Annex II.

200. Ships with service notation "Chemicals Carrier"

201. The discharge of substances in the effluent is regulated by MARPOL Annex II.

300. Personal Protection

- See Title 34

CHAPTER G PIPES MACHINERY

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- See Title 11
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- See Title 11
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- See Title 11
- G8 HYDRAULIC POWER TO ESSENTIAL
SERVICES AND MACHINERY
- See Title 11
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G4. EXHAUST GAS

100. Arrangement

101. to 104. - See Title 11

105. The outputs of exhaust gas system from engine or boiler room shall be located:

More than 2 meters above the deck;

Over 2 meters of the cargo area

More than 3 meters of flammable vapor or gas source.

106. The exhaust ducts are to be insulated or cooled with water.

200. Protection against fire

201. See Title 11

202. The exhaust ducts are to be provided, after the muffler, with flame arrester screen, discharge turbines or wet discharging into water tank.

300. Mufflers

- See Title 11

400. Thermal insulation

- See Title 11

CHAPTER T TESTS

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- T5. SPECIAL TESTS FOR CHARGE AND
DISCHARGE PIPING SYSTEMS
-

T5. SPECIAL TESTS FOR CHARGE AND
DISCHARGE PIPING SYSTEM

100. Periodic testing

101. All charge and discharge piping systems and their respective hoses are to be submitted to documented tests, with 1.5 times the normal working pressure in periods of a maximum of 12 months.

102. The date of last test is to be painted in a visible spot of the piping system.

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