

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

TITLE 47 SUPPLY VESSELS

SECTION 2 STRUCTURE

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CHAPTER A APPROACH

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 - A2. DEFINITIONS
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-

A1. APPLICATION

100. Cargo type

101. The present Part II, Title 47 apply to ships engaged in the carriage of materials, equipment and provisions for offshore installations aiming to be granted the notation “Supply” in the mention of class.

102. The vessels that are covered by Part II Title 47 of the Rules may carry dangerous or noxious liquids in limited quantities provided they are in accordance with the requirements of the LHNS Handling of Limited Amounts of Hazardous and Noxious Liquid Substances in Bulk Guideline: Resolution IMO A.763(16) as amended.

A2. DEFINITIONS

100. Terms

101. Strength deck: deck that forms the upper flange of the vessel-beam and extends continuously at least over a distance of $0.4 L \times$ centered at half length L . It is not necessarily the freeboard deck. May be deck of the superstructure.

102. Trunk deck: deck elevated throughout the center line in relation to the deck side strip.

103. Hull girder section modulus: is the strength modulus of the section amidships, with the longitudinal material continuously for $0.4 \times L$, centered at mid-length L . If the shape of the hull taper off at the aft and fore limits, it is to be verified that the modulus is met at the boundary sections at $0.4 \times L$.

CHAPTER B DOCUMENTS, REGULATIONS AND STANDARDS

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- B1. DOCUMENTATION OF THE SECTION STRUCTURE
 - B2. REGULATIONS
 - B3. STANDARDS
-

B1. DOCUMENTATION OF THE SECTION STRUCTURE

100. Ship's documents

101. The following documents of the ship's structure are to be submitted to approval of the RBNA:

- a. scantling profile, with profile in the center line, bottom and double bottom, longitudinal bulkheads and decks, cargo masts, cranes, winches, etc.;
- b. midship section, comprising:
- c. main dimensions
- d. maximum structural draft
- e. spacing between longitudinal and transversal members
- f. CLASS notation selected (with the mention of the navigation zone and the service / activity, equipment numeral of anchoring and mooring and loading, if special);
- g. deck, showing the scantlings of the structure, dimensions of the hatches and scuttles, openings above the Engine Room and other openings. In every deck is to be declared the load attributed to determine the deck scantlings of the deck and its stiffeners.
- h. other longitudinal and transversal sections due to local events or discontinuities;
- i. regular watertight bulkheads, tank bulkheads, tanks and tank diaphragms, indicating the height of overflows and vents, the density of the liquid and the setting of pressure relief valve PV (if any);
- j. - plans of the single and double bottom showing the arrangement of the structure and the watertight and oil tight subdivisions;
- k. side-shell;

- l. plan of the shell expansion, containing details of the location and dimensions of hull openings and drawings of sea chests;
- m. engine and boiler foundations, the bottom structure under the foundations and the type and continuous output of the propulsion machinery;
- n. stern with rudder post, rudder skegs, including the rudder gudgeon, noting that the rudder plans are to contain the ship's speed, the materials of the bearings to be installed. Plans of the propeller shaft and shaft tunnel, if applicable;
- o. bow with hawse pipe, billboards, stern roller, etc.;
- p. superstructures and deckhouses;
- q. structural attachments, as hatchway coamings, masts, bulwark, bedplates of engines and important equipments with adjacent structure and details etc
- r. longitudinal strength, with bending moments, shear forces and hull girder section modulus, showing the several conditions of the intended load, distribution of the section modulus and moments of inertia throughout the ship;
- s. bevelling and welding scheme;
- t. plans containing details of the cargo stowage and lashing, including the cargo stow racks and platforms. The location of the connections and associated structures are to be showed in detail;
- u. plans of the separated cargo tanks (independent) and their bedplates;
- v. plans of the structures below the steering gear, windlass, chain hook, masts and davits with details of the loads transmitted; and
- w. specific plans for ships intended for special service, showing the parts that were considered as necessary to evaluate the structural strength and safety of the ship.

102. Plans and additional documents may be requested at the discretion of RBNA.

103. Any changes in relation to the approved plans are to be submitted to RBNA for approval before they start work.

B2. REGULATIONS

100. Freeboard for the structure

101. The structural design is to be calculated for the maximum design draft specified by the designer or by the applicable freeboard regulations, whichever is greater.

102. For ships with $GT < 500$ under the Brazilian Flag, the RBNA the freeboard calculation shall be according to NORMAM 01, chapter 7.

103. For ships with $GT < 500$ under foreign Flags, the freeboard calculation shall be according to National Standards or, in absence of those, according to the IMO ILLC International Load Lines Convention.

104. For ships with $AB \geq 500$, the freeboard calculation shall be according to the IMO ILLC International Load Lines Convention.

CHAPTER F DESIGN OF STRUCTURAL SYSTEMS

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F1. BOTTOM AND DOUBLE BOTTOM
– See Title 11

F2. BULKHEADS
– See Title 11

F3. SIDE SHELL

F4. DECK

F5. STRUCTURE OF STERN

F6. STRUCTURE OR BOW

F7. SUPERSTRUTURES AND DECKHOUSES

F8. SUMMARY OF FORMULAS FOR
LOCAL DESIGN

F3. SIDE SHELL

100. Side shell with longitudinal structure

101. Throughout the whole area of the side shell exposed to shocks web frames shall be provided in mid-span for load distribution, of the same height as the common stiffeners.

102. Intermittent welding is prohibited in the strengthened areas.

200. Side shell with transversal structure

201. Throughout the whole area of the side shell exposed to shocks an intercoastal a web frame shall be provided in mid-span for load distribution, of the same height as the common stiffeners.

202. The section modulus of the stringer for the load distribution required in F2.201 above is to be at least twice the section modulus calculated for the longitudinal frames.

203. Intermittent welding is prohibited in the strengthened areas

300. Shell plating thickness

301. The shell plating thickness shall not to be less than:

Side shell below the freeboard deck:

$$e = 2,1 + 0,031 * L * k^{0,5} + 4,5 \text{ s}$$

or

$$e = 8 * k^{0,5}$$

whichever is greater.

Side shell among the freeboard deck and the strength deck:

$$e = 2,1 + 0,013 * L * k^{0,5} + 4,5 \text{ s}$$

or

$$e = 8 * k^{0,5}$$

300. Structural elements in the region exposed to shocks

301. In the area exposed to shocks, the section modulus for the longitudinal structure has to be increased by 15% in relation to the calculated by part II Title 11 Section 2 Chapter F3 of these Rules.

302. In the area exposed to shocks, the section modulus for the side shell transversal structure shall be increased by 25% in relation to the calculated by part II Title 11 Section 2 Chapter F3 of these Rules.

400. Gunwales

401. Efficient gunwales, adequately supported by the structural elements of the side shell are to be provided including the forecastle area, in the total extent of areas exposed to shock.

F4. DECK

100. Minimum thickness of the upper deck plating

101. The minimum thickness of the upper deck plating shall be calculated by Part II Title 11 Section 2 Chapter F4 of these Rules, but is to be at least 7 mm.

102. Within the cargo zone, the thickness of the strength deck shall be increased by 1.5 mm in relation to the calculated by Part II Title 11 Section 2 Sub-chapter F4.200 of these Rules.

200. Structure of the deck

201. Local reinforcements are to be installed in specific areas exposed to concentrated loads.

202. In vessels where carrying heavy loads or pipes on deck, the open deck shall be provided with protection and means of lashing the load.

203. For the deck plating supporting wheeled loads see the Part II, Title 15 of these Rules.

204. The deck plating and vertical structure are to follow the scantlings of the strength deck.

F5. STRUCTURE OF STERN

100. Stern rollers

101. The structure in the region of the stern rollers and the adjacent deck area will be considered by RBNA on a case by case basis, taking into account the relevant loads as specified by the designer

200. Propeller protection

201. Means to protect the propeller against underwater cables are recommended.

F7. SUPERSTRUCTURES AND DECKHOUSES

100. Forecastle

101. The forecastle's length is not to exceed 0.3 to 0.4 times the length L.

200. Superstructures and deckhouses

201. Due to their location on the ship's bow, the deckhouses and superstructures are to be reduced to the essential and specific care has to be taken to assure that the scantlings are sufficient to support the wave loads.

202. The minimum thickness of the forecastle and superstructures located on the forecastle deck is not to be less than:

Aft end of the forecastle:

$$e = 1.04 + (5 + 0.01 L)$$

Forward part of the superstructure located on the forecastle deck:

$$e = 1.44 + (4 + 0.01 L)$$

Side of the superstructure deck located on the forecastle:

$$e = 1.31 + (4.5 + 0.01 L)$$

Aft end of the superstructure located on the forecastle deck:

$$e = 1.22 + (4 + 0.01 L)$$

300. Structure aft of forecastle and of superstructures located on the forecastle deck

301. Aft forecastle and forward of the superstructure located on the forecastle deck: 3 times that calculated under Part II, Title 11, Section 2, Sub-Chapter F7.300.

302. Sides and aft end of the superstructures located on the forecastle deck:

0.75 times that of the forecastle's tween-deck

303. The stiffeners of the forward superstructure located in forecastle are to provided with brackets at their ends.

304. The stiffeners of the side and aft end of the superstructures located on the forecastle deck are to have their ends welded to the deck.

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