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

TITLE 46 FLOATING DOCK

SECTION 1 NAVAL ARCHITECTURE

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CHAPTER A
SCOPE

CHAPER CONTENTS

A1. APPLICATION

100. Configuration

101. These rules apply to floating docks, here considered as vessels consisting of a continuous pontoon or of non-continuous pontoons, detachable or not, with double sides, continuous or not, to lift vessels out of the water.

102. The cranes are classified in compliance with the "Guide for Cranes and Lifting Appliances of the RBNA". The corresponding notation will be part of the Class Mention.

103. The bases and foundations that support the forces arising from the cranes actuating on the deck top deck will be submitted for approval.

A2. DEFINITIONS

100. Terms

101. In addition to the terms defined in Title 11 are used here:

102. Length L – distance from the fore end bulkhead of the forward pontoon and the end bulkhead aft of the aftermost pontoon.

103. Breadth B – molded distance between external edges of frames.

104. Inner breadth Bi - free distance between the vessel inner sides or between inner accessories of the vessel inner side.

105. Depth D – distance from the base line to the deck beam top of the highest deck.

106. Maximum draft - maximum dock immersion when all ballasted, without load.

107. Available draft dd - distance from waterline at maximum draft to the top of the blocks.

108. Top deck D_t - is the highest continuous deck that extends along the length of the double sides.

109. Safety deck D_s – is the watertight deck below the highest deck, which determines air space that assures minimum freeboard indicated in subchapter H1 below.

110. Residual ballast water - is remaining ballast water which the pumps cannot discharge.

111. Compensation ballast water AC - is ballast water for reduction of bending moment in the dock, which can be at different levels in the tanks.

112. **Lifting capacity** CI - difference between the total displacement of the dock at its maximum draft and the weight of the dike with residual ballast water AR.

113. Blocks – docking blocks supporting the docked ship on the deck of the pontoons, on the centerline.

114. Berth – idem, at side areas.

101. These Rules apply to the following dry dock types:

a. one piece dry dock type in which the wing-walls and the pontoon are continuous and inseparable along the dock structure;

b. continuous-wing, sectional-pontoon type in which the wing walls run continuously and the bottom is formed of separable or permanently attached sectional pontoons;

c. continuous pontoons and discontinuous wing-walls;

d. sectional type with discontinuous sections of the wing-walls and the bottom pontoon in which rotation or vertical movement or both is possible between each discontinuous section.

102. Length of the Floating Dock (L_D) defined as the distance between the fore end bulkhead of the forward bottom section and the aft end bulkhead of the aftermost bottom section.

106. Maximum draught d_m is the molded draft, in meters, from the molded baseline to the summer load line.

107. Clear draft - is the distance, in m, from the top of the keel blocks to the waterline corresponding to the wing wall freeboard.

108. Top deck is the deck extending over the length of the wing walls to form the top of the wing walls.

110. Residual water - is remaining ballast water which the pumps cannot discharge.

111. Compensating ballast water - is water that objectiveness to reduce of stress and deflections in the dock structures with the goal for adjustment of the trim and heel of the dock.

112. Lifting capacity - is to be with all dry dock service tanks full and operating equipment in place. In determining the dry dock lifting capacities, account is to be taken of the

residual water defined above , or any ballast water required for longitudinal strength purposes.

CHAPTER B
DOCUMENTS, REGULATIONS AND STANDARDS

CHAPER CONTENTS

B1. NAVAL ARCHITECTURE DOCUMENTS

100. Plans and documents

102. Plans for approval are generally to be submitted in triplicate.

103. In general, these plans and documents are to include the following and topic where applicable.

a. Plans for approval

a.1. General arrangement plan;

a.2. Particulars of indicator systems for tank water level and drafts;

a.3. Particulars of deflection indicating system.

b. Plans for information

b.1. specifications;

b.2. stability calculations and hydrostatic curves;

b.3. Operating manual including ballasting manual;

b.4. Tank arrangements showing also maximum service heads and heights of overflows and air pipes and where used in design, data showing the maximum differential service head;

CHAPTER C
ENVIRONMENT OF NAVEGATION

CHAPER CONTENTS

C1. OCEAN TOW

100. The class of a floating dock will be assigned after it has reached its port of operation and been subjected to a satisfactory General Examination.

101. Where it is intended that the dock be towed at sea from its port of construction to port of operation or from one port of operation to another, the aspects specified in the prescriptions that follow will need to be investigated at an initial stage of design development:

102. The longitudinal strength must satisfy the requirements of RBNA and will require that the longitudinal strength be sufficient to accommodate its estimate of the design voyage wave bending moment in association with the Rule stress. Estimates of design voyage bending moment will be based on the following information which in such a case is to be submitted for consideration:

a. draught in towage condition;

b. towage route;

c. departure date.

103. In order to minimize the design voyage wave bending moment, it is recommended that the delivery voyage be undertaken as close to the light draught as possible.

104. Particular attention should be given to the buckling capability of transversely framed bottom structure when the dock is subjected to wave induced hogging moments, since this part of the structure will not normally experience longitudinal compressive loading during floating dock operations.

105. In addition, where a Towage Certificate is to be issued by RBNA, the following will be required:

a. the aprons/working platforms are to be removed from the ends of a dock prior to an ocean tow.

b. where the travelling crane(s) are to be mounted on the wing walls prior to towage then the proposed sea fastenings should be submitted for approval. The secur-

ing arrangements for any items carried on the pontoon deck should be to the Surveyor's satisfaction.

c. emergency anchoring arrangements should be provided to the Surveyor's satisfaction. Anchors are normally mounted on sloping ramps at the end of the dock and provided with a means of quick release. Consideration should be given to the method by which the dock could be boarded during the tow by the personnel required to release the anchors.

d. all additional information which may be pertinent for the issuance of the Towage Certificate will require to be submitted such as:

d.1. details of the tug and the towing gear

d.2. details of the towing attachments;

d.3. bridle recovery arrangements;

d.4. secondary towing gear, etc.

CHAPTER G
CAPACITIES AND SUBDIVISION

CHAPTER CONTENT

G1. CAPACITIES

100. Volumes and center of volumes

101. The capacities of all tanks are showed in form of plans and tables, indicating the tank properties with the localization of volumes, centers of gravities and free surfaces for any quantities and levels motions of sounding and ullage.

G2. SUBDIVISION

100. Compartments, tanks and empty spaces

101. The partition bulkheads of compartments, tanks and empty spaces take into account their natures and contents, in view of the provisions of this Rules and applicable Regulations.

CHAPTER H
LOAD CONDITIONS, BUOYANCY AND STABILITY

CHAPTER CONTENTS

H1. FREEBOARD

100. Freeboard reserves

100. The safety freeboard of the completely immerged dock is at no point to be less than 1,0 m.

102. Openings for cables etc. in way of the safety freeboard are to be so designed that they can be made watertight, or they are to be arranged and designed such as to prevent outside water from penetrating into the wing compartments.

200. Freeboard to the respectively upper deck

201. The free board to the pontoon deck at the center line of de dock when supporting a ship having a displacement equal to the lifting capacity is to be not less than 300 mm. When the pontoon deck at the inner side walls is lower than at the centre, the freeboard to the pontoon deck at the inner side walls is to be not less than 75 mm and the freeboard at the center line is to be not less than 300 mm.

202. The above limits however, assume the travelling crane(s) are positioned so as to give no trim.

203. The freeboard at the level trim is to be such that when crane(s) are moved to the forward end or to the after end of the dock, the pontoon deck is not submerged. The above freeboard limits assume sheltered water operation. In another area it is recommended that they are suitably increased.

H2. LIGHT SHIP

100. Determination of the lightship

101. The magnitude of the weight of the dock floating and the each equipment that are itself with the respective location of the center of gravity of the individual position to the respective reference are to be showed for reference.

102. At the construction completion the lightweight and the position of its centre of gravity are to be determined by an inclining test.

103. Every vessel shall undergo an inclining test upon its completion and the actual displacement and position of the centre of gravity shall be determined for the light ship condition.

104. Where alterations are made to a dock floating affecting its light ship condition and the position of the centre of gravity, the vessel shall, if the Administration considers this necessary, be re-inclined and the stability information revised.

H3. LOAD CONDITIONS

100. Application

100. Configurations of loadings and combinations

101. The loading conditions of full and partial loads, or temporary loadings that generate maximum stresses are submitted for approval, taking into account the conditions listed as follows.

200. Loadings to the transverse structure

201. The transverse structural strength is to be assessed for the following conditions:

a. the ship being supported by the blocks (in the Center line) only;

b. emersion of the dock with the ship(s) type(s) and the height of the water pressure at the level of the top of the blocks.

300. Loading to the longitudinal structure

301. The following loading conditions will be assessed:

a. lightweight;

b. at the maximum draft, as by the definition above;

c. loading at the total lifting capacity with non distributed rest-water (the remaining ballast water which the pumps cannot discharge);

d. loading of the type ships so considered:

e. in sagging condition with loading of only one ship with weight corresponding to the lifting capacity in half-length amidships;

f. in hogging condition with the load of two vessels with total weight equal to lifting capacity and with the load of one ship with full weight equal to lifting capacity and length equal to 1.2 L.

302. The loadings above will be combined with the conditions of weights of tanks, cranes and other existing loadings.

303. The lightweight of the docked ships are estimated by the following forms:

a. for the condition of sagging: symmetric distribution along the length, consisting of a rectangle with a parable on top, so that the area of the rectangle is twice the area of the parabola (using the height of the parabola being three-quarters of the height of the rectangle);

b. for the condition of hogging: symmetric distribution along the length, consisting of a rectangle with two rectangles on top at the ends of the bottom rectangle, so that the area of the bottom rectangle is twice the sum of the area of rectangles and that each of these has a third of the length of the ship.

304. Special docking conditions are to be submitted for approval, if previewed or previously when there is the possibility of occurrence.

400. Operation Manual

401. An Operation Manual is to be written up with information about the dock operations, docking conditions and maximum allowable deflections, to be maintained in the dock's control room.

H4. STABILITY AND BUOYANCY

100. Stability and buoyancy

101. Operational limitations for a particular ship docking, building or launching in conjunction with RBNA may impose additional operational limitations on a certified facility if considered necessary to ensure the safety on the ship.

200. Stability and buoyancy criteria

201. The dock shall meet the intact damaged stability and reserve of buoyancy criteria specified below:

a. Buoyancy requirements the available buoyancy shall be determined on the basis of rated freeboard requirements:

a.1. Open – ended docks the minimum rated freeboard at the lowest point of the pontoon deck of the dock (excluding pits) with the ship lifted shall be as graphically depicted as described as follows:

i. For docks of 12.000 tons of capacity or less, 305 mm (12 inches) of freeboard.

ii. For docks of 18,000 tons capacity or more, 457 mm (18 inches) of freeboard.

iii. For docks with capacity of between 12.000 and 18.000 tons, defined by a linear progression of between 305 and

457 mm (12 and 18 inches), respectively, of freeboard.

202. Closed- ended docks minimum freeboard with the ship lifted shall be 305 mm, measured form the sill of stern (or bow) gates.

203. Docks in the fully ballasted – down condition the minimum freeboard in the fully ballasted- down condition measured form the margin line shall be 1000 m (3 feet). "Fully ballasted- down" shall mean.

a. tanks of 100 percent full in docks where the bottom of the tank vent terminates at the level terminates of top of the tank.

b. in docks designed on the isothermal compression principle, to the ballast free surface level in the compressed state.

c. calculations shall be provided to prove the setting of the vent bottoms will limit submergence.

d. the condition of the maximum submergence test required by H3.206.

204. The static stability shall be determined for all modes of operation, including the five phases longitudinal

205. Free surface effects must be determined and included in the calculations.

a. GM in the phase of minimum stability shall meet the requirement in accordance with the figures F.H4.402.1 and H4.402.2

b. The dock shall withstand the effects of the beam winds stated below without heeling more than 15 degrees or submerging the margin line showed in the figure H4.402.2.

b.1. Determine the angle of heel under 90 –knot beam wind, when the ship is fully docked.

b.2. Determine the angle of heel under 20 –knot beam wind, when the ship and dock system is in its minimum-stability phase.

b.3. Determine the wind velocity which would cause 15 degree heel when the ship and dock system is in its minimum stability phase.

206. The submergence test shall be conducted and witnessed by the survey firm and the results obtained shall be included in the survey results.

207. The dock shall be ballasted down to maximum submergence for 45 minutes to determine the maximum draft of the dock, to verify the minimum freeboard in this submergence condition, and to check the watertight integrity of the dock. In the case of docks designed to attain the maximum allowable design draft by means of an air cushion system under the safety deck, the distance of the ballast tank vents below the safety deck and the location of these vents with respect to the center of area of the tank top.

208. If the maximum submerged draft cannot be attained or if the dock cannot be submerged to the margin line because of an insufficient amount of available ballast water or a limited basin depth, but will not govern certification capacity.

300. Free surface

301. It should be included in the intact stability curves the effect of free surface of the tanks of the dock and typical ships. The calculation is to take into account the liquid level in tanks and angle of heel.

400. Wind consideration

401.The wind heeling moment is to be calculated to the exposed parts of the dock, typical docked ships, cranes and other parts else, if significant.

402. In order to calculate may be used the wind tunnel or applied the following formula:

$Fv = 0,5 \times S \; Ch \; Cs \; r \; v^2 \; A$

where:

Ch = coefficient of height, consider = 1,05

Cs = coefficient of form, = 1,0 for dock double sides and the ship; =1,5 : for cranes, trusses and the like

z = height above the waterline of the center of gravity of each part exposed to wind in accordance with the figure F.H4.302.1. below, in m

r = air specific mass, consider 1,225 kg/m³

v = wind speed, in m/s

A = The projected area of wind-exposed parts in the dire-ing normal to the direction of the wind, in m²

401. The calculated stability and buoyancy characteristics shall be provided as part of the initial facility certification, and need only updated in the case of changes.

402. The principal dimensions, displacement, and centers of gravity of the assumed "maximum ship" used in the calculations shall be provided.

403. These calculations shall be by an approved method, such as the ship hull Characteristics Program.

404. This does not obviate the preparation of stability calculations and a pumping plan for a docking a particular ship.

405. When preparing individual the ship pumping plans where the blocking heights differ from the standard, the light

dock weight and center of gravity shall be modified as necessary in the calculations.

406. Procedures for preparation of a pumping Plan required ensuring the stability the stability of the ship-dock combination, and a sample format shall be included in the certification document.

FIGURE F.H4.402.1.– CALCULUS OF THE CENTROID SAIL AREA

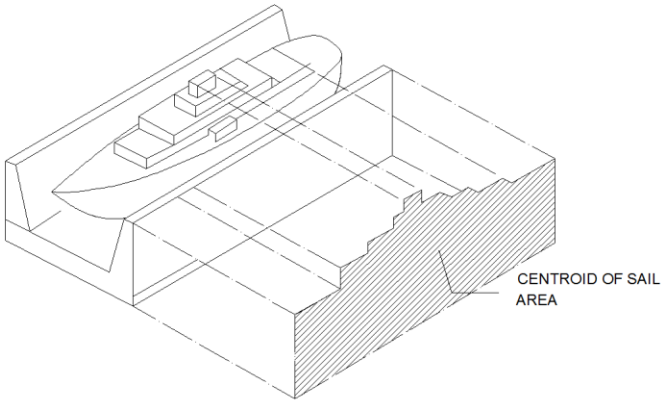
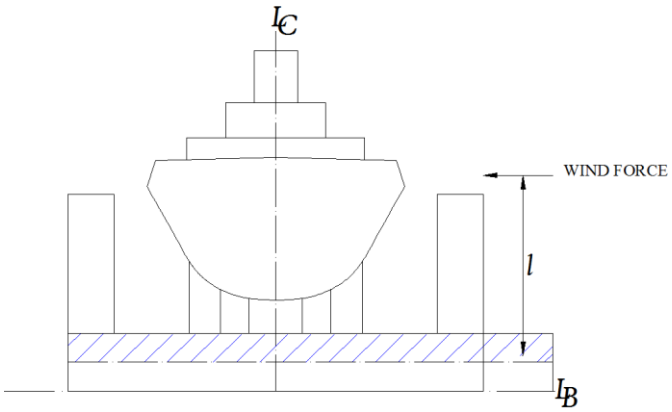


FIGURE F.H4.402.2.– SAIL AREA DUE THE SHIP AND THE DOCK



407. The lever of the wind overturning force should be taken vertically from the center of gravity of all surfaces exposed to the wind to the center of the lateral resistance of the underwater body of the dock, assumed floating free of mooring restraint.

408. The effect of the wind heeling moment is assumed to vary as function of the cosine of the heel of the dock.

409. Ship transfer system: the system for transferring a hip from building way to launch pontoon and the method by which pontoon stability and ship alignment are maintained during transfer shall be described, if applicable.

410. The design and load carrying capacity of the system shall be provided.

411. The method by which the pontoon is moved to and from the submergence site shall be described.

500. Assessment of the stability

501. In addition to the prescription of Subchapter H1 above, the point of intersection between the intact stability curve and the wind heeling moment curve shall under no circumstance exceed the angle where any part of the deck of the pontoons submerges.

600. Damaged stability and reserve buoyancy requirements

601. The intent of the damaged stability and reserve buoyancy requirements is to provide the dock with the capability to withstand a moderate level of damage and resultant flooding, such could be the result of improper operation, system failure, physical injury from external hazards and so forth, without unduly endangering the ship.

502. The dock shall withstand the following damage and resulting flooding for the worst combination of sinkage, heel, and trim without heeling more than 15 degrees, trimming more than the lesser 3 degrees or 20 feet, or submerging the margin line see figure H4.402.2.

a. In the fully ballasted condition, phase 1 phase shown on figure F.H4.402.1.–, the following two types of casualties and resultant flooding shall be assumed:

a.1. Side shell damage:

i. Side shell damage to occur between main transverse bulkheads with penetrations up to but not through the inner wing wall. The safety deck may be assumed to be ruptured.

CAPÍTULO T
INSPECTIONS AND TESTS

CHAPTER CONTENTS

T2. AT THE COMPLETION OF THE CONSTRUCTION

100. Inclining test

101. The measurements are performed according to the procedures of NORMAM 01, in the presence of the Surveyor.

102. The procedures are approved in advance by RBNA and are to cover:

a. loading condition in the test;

b. calculation of weights to be used;

c. indication of the previewed heeling angle;

d. placement of test weights;

e. placement of pendulums or hoses, with estimated lengths and shift that reach angle of about 2 to 2.5 degrees, with shift of about 10 centimeters.

103. As initial condition, all tanks for consumables (fresh water, fuel oil etc.) shall be completely filled, but all other tanks shall be empty, only rest-water remaining AR in the ballast tanks. The travelling cranes may only be parked in positions giving equal drafts forward and aft of the dock. On this basis the light displacement of the dock is established, adding the weight of any compensating ballast water AC.

104. The test report with the light displacement and centers determined are submitted to RBNA for approval.

200. Draft measurement and calibration of weights used during the test

201. The calibration of the weights to be used and the reading of the dock drafts and soundings of tanks are to be undertaken before the Surveyor.

300. Tolerances

301. Commenced with the initial condition (see subchapter T2.103), move ballast water in amount and distribution to such longitudinal extent and distribution as to produce a sagging moment and then a hogging on the values for which the structure of the dock was designed and measure the deflections.

400. Lifting Test

401. A Test Program should be prepared for lifting operations, with the possible settings of ballast to be undertaken before the Surveyor. These should include the following assessments:

a. freeboard referred to the top deck Dt with the flooded dock;

b. Lightweight and lifting capacity corresponding to minimum freeboard;

c. inclining test;

d. eventual permanent deflection of initial condition;

e. calibration of deflection meters, by simulation of the more severe condition of operation previewed.

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