Contents

RULES FOR FLOATING DOCKS

Chapter 1 GENERAL RULES

1.1 General

1.1.1 Application

1 The survey and construction of floating docks to be registered in accordance with the Regulation for classification and Registry are to be as prescribed in the Rules.

2 The Rules are framed on the understanding that floating docks will be properly loaded and handled in sheltered waters; they do not provide for special distributions or concentrations of loading. The Society may also require additional strengthening to be fitted in any floating dock which in their opinion, may be subjected to severe stresses due to particular features in her design or when it is desired to make provision for exceptional loaded or ballasted conditions. In these cases particulars are to be submitted for consideration.

3 The relevant portions of the **Regulations for the Classification and Registry of Ships** apply to essential constructions, machinery and equipment not specified in the Rules, as may be required.

1.1.2 Equivalency

Alternative hull construction equipment, arrangement and scantlings will be accepted by the Society, provided that the Society is satisfied that such construction, equipment, arrangement and scantlings are equivalent to those required Rules.

1.1.3 Other Regulations

While these Rules cover the requirements for the Classification of new docks the attention of owners, builders, and designers is directed to the regulations of national or local governments, or other organizations which may contain safety, health, or other standards applicable to the dock.

1.1.4 Towage Certificate

Where the Society's Towage Certificate is requested by a Builder/Owner to enable a dock to be towed at sea special consideration may be required to be given to the strength, freeboard and stability, and other items as considered necessary.

1.1.5 Cranes

When the assignment of safe working load of cranes is requested by the builders or the owners, the Society will assign the safe working load in accordance with the **Rules for Cargo Handling Appliances**.

1.1.6 Class Notations

For docks complying with the provisions of this Rules, the notation of "*Floating Dock*" (abbreviated to *FD*) is affixed to the Classification Characters in accordance with the provisions of **Chapter 2 of the Regulations for the Classification and Registry of Ships**.

1.2 Definition

1.2.1 Length

The length (L) is the distance, in meters, measured on water line when supporting a ship whose displacement is the lifting capacity between the aft end and the fore end of the bulkheads of the floating structures of the dock.

1.2.2 Breadth

The breadth (B) is the moulded breadth in metres measured at the greatest horizontal distance between the inner surfaces of the outer side plating of wing walls.

1.2.3 Depth

The Depth (D) is the moulded breadth in metres measured at the centerline from the inner surface of the bottom plating to the inner surface of the top deck plating.

1.2.4 Safety Deck

The safety deck is a watertight deck extending over the length of the wing walls and located below the top deck.

1.2.5 Top Deck

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

1.2.6 Pontoon

The pontoon is the structure that extends between and under the wing walls to from the bottom of the dock.

1.2.7 Rest Water

The rest water is water which can not be discharged by pumps from ballast compartments.

1.2.8 Compensating Ballast Water

The compensating ballast water is ballast water for reduction of stresses and deflections in the dock structures and for adjustment of the trim and heel of the dock.

1.2.9 Lifting Capacity

The lifting capacity (Q) is the displacement of the heaviest ship it is, intended that the dock shall lift in normal service.

1.2.10 Light Displacement

The light displacement of the dock is its complete weight including all machinery, cranes, equipment, full supply of consumables for operation of the dock (fuel oil, fresh water etc.), compensating ballast water (if necessary) and rest water.

Chapter 2 CLASSIFICATION SURVEYS

2.1 Classification Surveys during Construction

2.1.1 General

1 In the Classification Survey during Construction, the hull and equipment, machinery, fire protection and detection, fire extinction, electrical installation, stability and load lines are to be examined in order to ascertain that they meet the relevant requirements of the Rules.

2 Surveyors are to confirm that materials which contain asbestos are not being used.

2.1.2 Plans and Documents

When a dock is intended to be classed with the Society, plans and documents showing the scantlings, arrangements and details of the principal parts of the structure, and relevant data are to be submitted for review or approval. Plans for approval are generally to be submitted in triplicate. In general, these plans and documents are to include the following **(1)** and **(2)** where applicable.

(1) Plans for approval
  (a) General arrangement plan
  (b) Transverse section scantlings at mid-length of dock
  (c) Structural plans of the wing walls and pontoons
  (d) Structural plans of the decks and bulkheads
  (e) Pumping arrangements
  (f) Machinery and electrical plans
  (g) Piping systems (diagram)
  (h) Fire extinguishing arrangements
  (i) Particulars of indicator systems for tank water level and drafts
  (j) Particulars of deflection indicating system

(2) Information
  (a) Specifications
  (b) Stability calculations and hydrostatic curves
  (c) Calculations and date for longitudinal, transverse and local strength
  (d) Operating manual including ballasting manual
  (e) 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
  (f) Coating specifications
  (g) Testing schemes
  (h) Asbestos-free declarations and supporting documents

2.1.3 Survey during Construction

From the commencement of the work until the completion, of the dock, the Surveyors are to examine the materials, workmanship and arrangements. The surveys are required at;

(1) When the material tests prescribed in **Part K** and **Part L of the Rules for the Survey and Construction of Steel Ships** are carried out.

(2) When the welding procedure test and radiographic test prescribed in **Part M of the Rules for the Survey and Construction of Steel Ships** are carried out.

(3) When designated by the Surveyors during shop work, sub-assembly work or assembly of blocks.

(4) When a part of dock is completed.

(5) When tests specified in **2.1.3** are carried out.

2.1.4 Testing

In the classification surveys, the following tests are to be carried out.

(1) Tank testing

All tanks including those used for void tanks and cofferdams are to be separately tested by a head of water to the highest point to which the liquid will rise in service. Where the scantlings of a tank boundary are based on the maximum differential head in service, care is to be taken to ensure test heads do not exceed the design differential head. On submission of all necessary detail, air testing or hose testing may be considered as an alternative to the foregoing.

(2) Completion trials

On the completion of the dock, trials are to be carried out to ascertain:

(a) The freeboard to top deck with the dock flooded.

(b) The light displacement and the lifting capacity of the dock corresponding to the minimum freeboard.

(c) The position of the centre of gravity by an inclining test.

(d) Any built-in permanent deflection in the initial condition. The initial condition is a condition that all tanks for consumables (fresh water, fuel oil etc.) are completely filled, but all other tanks are empty, only rest-water remaining in the ballast tanks. The travelling cranes may be parked in positions giving equal draughts forward and aft.

(e) Correct calibration of deflection metres, by simulating the most severe intended loading condition as far as practicable.

(3) General systems

The machinery pumps, piping remote control/automatic control instrumentation and fire-extinguishing system are to be tested at the makers in accordance with the Rules for the Survey and Construction of Steel Ships as applicable. The Society may, however, omit the surveys or inspection in the presence of the Surveyor at the makers, subject to submission of the maker's certificate and satisfactory performance witnessed by the Surveyor after installation. All machinery and systems relating to the classification of the dock are to be functionally tested after installation in the presence of the Surveyor.

(4) Electrical equipment

The following tests and inspections are to be carried out for electrical equipment after installation on the docks.

(a) Insulation resistance test

(b) Operation test of the essential electrical equipment

(c) Other tests and inspections as considered necessary by the Society.

2.2 Classification Survey Not Build under Survey

2.2.1 Submission of Plans and Documents

Plans showing the main scantlings and arrangements of the actual dock and documents specified in **2.1.1** are to be submitted for approval. Records and reports relating to the construction of the dock should be submitted as may be required by the Society.

2.2.2 Survey

In all cases the full requirements of **2.3.3** are to be carried out. During the survey, the Surveyors are to satisfy themselves regarding the workmanship and verify the approved scantlings and arrangements. For this purpose, and in order to ascertain the amount of any deterioration, parts of the structure will require to be drilled as necessary. Docks of recent construction will receive special consideration.

2.3 Periodical Survey, Occasional Survey and Unscheduled Survey

2.3.1 General

1 To retain its class with the Society, a dock in normal service is to be subjected to periodical surveys, survey of alternations, damages and repairs and unscheduled surveys in accordance with the provisions in the following **2.3.2** to **2.3.5**.

2 The requirements of **Part B of the Rules for the Survey and Construction of Steel Ships** also apply as may be relevant to docks, unless otherwise specified in **2.3** of this Chapter.

2.3.2 Intermediate Surveys

1 Intermediate Surveys are to be carried out within six *months* either way of the date 30 *months* after completion of the Registration Survey or the previous Special Survey.

2 At each intermediate survey the following parts are to be examined and placed in good condition.

(1) Pontoon, safety and top decks, wing wall plating above the light waterline, keel and side blocks and their foundations.

(2) Vents and overflow pipes, air pipes extending below decks to form air cushions and overboard scuppers.

(3) Companionways, ladders, and guardrails and other means of protection that might be provided for access to all spaces.

(4) Deflection indicating system

(5) Arrangement of fire protection and extinguishing.

(6) Machinery, pumps and other equipment.

3 The boilers are to be examined at each intermediate survey in accordance with the provisions of **Chapter 7, Part B of the Rules for the Survey and Construction of Steel Ships**.

2.3.3 Special Survey

1 Special Surveys are to be carried out within 3 *months* before or on the expiry date of the Classification Certificate. Special Surveys may be postponed until maximum 3 *months* after the expiry date, subject to the approval by the Society.

2 Special survey is to include compliance with all Intermediate Survey requirements, and the Surveyor is to satisfy himself, by examination, that all means of protection to openings are in good condition and are readily accessible. Effect is also to be given to the following requirements.

(1) Pontoon and wing wall thanks are to be cleaned, examined internally, and water tested to the satisfaction of the Surveyor. At the discretion of the Surveyor, fuel oil tanks forming part of the main structure need not be examined internally until the dock is more than 15 *years* old.

(2) Spaces above safety deck are to be examined internally, removing linings, etc. where necessary for inspection. Air pipes extending below deck to form air cushions are also to be examined.

(3) Where the surface of plating is covered with cement, composition, or wood sheathing, the covering is to be removed as may be required for examination of the plating

(4) The thickness of any part of the structure where wastage is evident may be required by the Surveyor to be determined by an approved method. Where necessary the structure is to be renewed

3 At the Special Survey after the dock is 20 *years* old, and at 10 *years* intervals thereafter, in addition to the requirements of the preceeding **-2**, the thicknesses of the structure are to be determined by an approved method to assess the general condition. Two belts of gaugings are to be made within the 0.4*L* mid-length of the dock.

4 Survey of the outer bottom below the light waterline is to be carried out at each special survey. The inspection may be carried out by some combination of:

(1) Heeling of the dock for partial examination of the bottom.

(2) Ultrasonic measurement of plate thickness.

(3) Underwater photography.

(4) Underwater television.

(5) Examination by diver.

For the extension of intervals of the examination below the waterline, special consideration may be given by the Society taking into account the dock's conditions.

5 Surverys of boilers are to be in accordance with the requirements of **Chapter 7, Part B of the Rules for the Survey and Construction of Steel Ships**. Surveys of machinery, piping, valves, pumps, and electrical equipment are to be in accordance with the relevant requirements of **Chapter 5, Part B of the Rules for the Survey and Construction of Steel Ships** as far as applicable.

2.3.4 Damage and Alteration

Damage or alteration to structure, machinery, or equipment, which affects or may affect classification, is to be submitted by the owners or their representatives for examination by the Surveyor.

2.3.5 Unscheduled Surveys

The classed docks may be subject to Unscheduled Surveys when the confirmation of the status of the dock by survey is deemed necessary in cases where the Society considers the dock to be subject to **1.4-3 of the Conditions of Service for Classification of Ships and Registration of Installations**. At Unscheduled Surveys, investigations, examinations or tests are to be made to the satisfaction of the Surveyor with respect to the matters concerned.

2.4 Preparation for Surveys and Others

2.4.1 Preparation for Surveys and Others

1 All such preparations as required for the survey to be carried out as well as those which may be required by the Surveyor as necessary in accordance with the requirements in the Rules are to be made by the applicant of the survey. The preparations are to include provisions of an easy and safe access, necessary facilities and necessary records for the execution of the survey. Inspection, measuring and test equipment, which Surveyors rely on to make decisions affecting classification are to be individually identified and calibrated to a standard deemed appropriate by the Society. However, the Surveyor may accept simple measuring equipment (*e.g.* rulers, measuring tapes, weld gauges, micrometers) without individual identification or confirmation of calibration, provided they are of standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces. The Surveyor may also accept equipment fitted on board a dock and used in examination of equipment on board a dock (*e.g.* pressure, temperature or rpm gauges and meters) based either on calibration records or comparison of readings with multiple instruments.

2 The applicant for the survey is to arrange a supervisor who is well conversant with the survey items intended for the preparation of the survey to provide the necessary assistance to the Surveyor according to his requests during the survey.

3 Prior to the commencement of survey and measurement, a survey planning meeting is to be held by the surveyor(s), the dock's owner or an appropriately qualified representative appointed by the dock's owner and the thickness measurement company representative, where involved, so as to ensure the safe and efficient conduct of the survey and measurement work to be carried out.

4 The survey may be suspended where necessary preparations have not been made, any appropriate attendant mentioned in the previous **-2** is not present, or the Surveyor considers that the safety for execution of the survey is not ensured.

5 Where repairs are deemed necessary as a result of the survey, the Surveyor will notify his recommendations to the applicant of the survey. Upon this notification, the repair is to be made to the satisfaction of the Surveyor.

6 Replacement of fittings, equipments and parts, etc.

In where it is necessary to replace any fittings, equipment or parts, etc. used onboard, replacements are to comply with the regulations to be applied during ship construction. However, in cases where new requirements are specified or where deemed necessary by the Society, the Society may require that such replacements comply with any new requirements in effect at the time the relevant replacement work is carried out. In addition, replacements are not to use any materials which contain asbestos.

7 Unless otherwise specified, third parties engaged in thickness measurements, in-water surveys by divers or remote operated vehicles, or tightness testing of closing appliances such as hatches, doors, etc., with ultrasonic equipment are to comply with **Chapter 2**, **3** or **8**, **Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society.

8 Unless otherwise specified, third parties engaged in inspections and maintenance of fixed fire extinguishing systems, portable fire extinguishers, self contained breathing apparatuses, emergency escape breathing devices or fire detection and alarm systems are to be any of the following: firms complying with **Chapter 6**, **Part 3 of the Rules for Approval of Manufacturers and Service Suppliers** and approved by the Society; firms approved by the Administration; firms approved by duly authorized organizations acting on behalf of the Administration; or firms approved by other organizations which are acceptable to the Administration.

2.5 Others

2.5.1 Class Survey by Means of Remote Survey

Although the survey method for class maintenance survey is generally attendance on site by a Surveyor, the Society may approve survey methods different from the traditional ordinary survey with attendance by a Surveyor, provided that survey is carried out in accordance with the requirements specified in **Annex 1.5.3 "CLASS MAINTAINANCE SURVEY BY MEANS OF REMOTE SURVEY", Part B of the Rules for the Survey and Construction of Steel Ships**. However, in the case of matters stipulated in international regulations or conventions from Administrations, this may only be done with Administration acceptance.

Chapter 3 GENERAL ARRANGEMENT

3.1 Safety Deck

A safety deck is to be fitted at such a height below the top deck that when all tanks below the safety deck are flooded but with no load on the keel blocks, there is a reasonable freeboard from the top deck to the waterline. Alternative arrangements to fitting a safety deck, such as the provision of an air cushion, will be given special consideration. Special consideration will also be given to the need for a safety deck in relation to the depth of water in which the deck operates.

3.2 Top Deck

The dock is to be provided with a weathertight top deck, weathertight in this case meaning the ability to exclude water other than that due to rainfall in way of necessary access openings.

3.3 Ventilation and Access

All tanks are to have vent or overflow pipes that terminate well above the water line at the maximum draught when the dock is submerged. All compartments are to be provided with manholes for access and openings are to be arranged to provided adequate ventilation and access to all parts of the structure.

3.4 Cofferdam

Compartments carrying oil are to be separated cofferdams from those carrying fresh or feed water.

Chapter 4 FREEBOARD AND STABILITY

4.1 Freeboard

4.1.1 Freeboard to Top Deck

When the dock is submerged to its maximum draught, the freeboard to the top deck is generally not to be less than 1.0 *m*.

4.1.2 Freeboard to Pontoon Deck

The freeboard to the pontoon deck with the dock in its final working condition with a ship corresponding to the lifting capacity of the dock on the blocks is not to be less than 300 *mm* at the centreline and not less than 75 *mm* at the inner wing walls. The dock cranes may be positioned so as to produce no trim.

4.1.3 Freeboard in Unsheltered Waters

If the dock's port of operation is not sheltered against waves, greater freeboards than given by **4.1.1** and **4.1.2** may be required.

4.2 Stability

4.2.1 General

The requirements for stability specified in **4.2.2**, **4.2.3** and **4.2.4** below apply to the docks operating in sheltered waters and special consideration will be given to the docks operating in areas other than sheltered waters.

4.2.2 Metacentric Height, GM

In general, the initial metacentric height GM is not to be less than 1.0 *m* in any condition of loading as referred to in **(1)**,**(2)** and **(3)** below. For transient conditions of short duration, however, a smaller metacentric height GM may be accepted upon special consideration.

(1) Dock fully submerged to the minimum freeboard to the top deck.

(2) Dock with pontoon immersed to just below top of keel blocks, with the most unfavourable typical ship supported by the blocks, and restoring water-plane for the combination dock/ship provided only by the wing walls of the dock.

(3) Dock in final working condition with typical ships on the blocks, including the most unfavourable ship.

4.2.3 Statical Stability Diagram

The statical stability diagram including wind heeling moment curve is to be submitted for the design condition of **4.2.2(3)**.

In general, the point of intersection between the statical stability curve and the wind heeling moment curve is under no circumstance to exceed the angle where any part of the pontoon deck submerges.

4.2.4 Wind Heeling Moment

The wind heeling moment may be calculated from the following formula.

$0.613\times10^{-3}\times V^2AH\ (kN\cdot m)$

where :

A : the longitudinal projected area of the exposed surface considered at every stage of inclining exposed areas of docked ship (m^2).

$H = \Delta H + \frac{1}{2}d\ \ (m)$

ΔH : Vertical distance from the center of A to the water line of the dock (m).

d : draught of the dock (m).

V : wind velocity (*m/sec.*), the wind velocity is not to be than 25*m/sec.* in general. However, the values of the wind velocity will depend on the service location and the mode of operation of the dock, and may be considered more precisely in each case.

Chapter 5 HULL STRUCTURE

5.1 General

5.1.1 Material

1 This chapter applies to the docks mainly constructed with the hull structural rolled steels specified in **Part K of the Rules for the Survey and Construction of Steel Ships** or equivalent.

2 The grades of steels used for the main structures of hulls are to be either of the following **(1)** or **(2)**:

(1) Where mild steel is used, the grade *KA* steels specified in **Part K of the Rules for the Survey and Construction of Steel Ships** may be used for main structures of hulls. Grade *KD* steels, however, is required for primary structural members such as deck plates, shell plates and their associated girders in cases where their respective thickness exceeds 30 *mm* and they are located within 0.4 L of amidships.

(2) Grades of high tensile steels used for the main structures of hulls are to be in accordance with **3.2.2, Part 1, Part C of the Rules for the Survey and Construction of Steel Ships**.

3 If the dock is to be operated in a site with air temperatures regularly below 0℃ in the winter season, the notch toughness of the steels will be given special consideration.

5.1.2 Welding

Welding and weld connections are to comply with the requirements in **Part M of the Rules for the Survey and Construction of Steel Ships**, as far as applicable to the docks. Alternatively, welding may be in accordance with another recognized standard provided all related requirements of the standard are also complied with.

5.1.3 Corrosion Protection

All external and internal surfaces of the hull structures except in oil tanks are to be protected against corrosion by paint of suitable composition or other effective means. Where special protective coatings are applied to the external and internal surfaces, or other specially, effective methods of corrosion control are adopted, reductions in scantlings will be specially considered.

5.1.4 General Construction

1 The requirements in this chapter apply to the steel docks of the following types :

(1) Caisson type; dock in which the bottom pontoon and both dock wings are continuous and inseparable.

(2) Sectional pontoon type; dock in which the dock wings are continuous and the bottom consists of individual discontinuous pontoons. The pontoons are permanently or detachably connected to the dock wings.

2 To avoid the excessive stress concentration, the structural members of the dock are to be continuous as far as possible.

5.2 Longitudinal Strength

5.2.1 Longitudinal Strength

The longitudinal strength of the dock is to be calculated for the most severe expected docking and transient conditions during normal operations. Such condition may be generally assumed that a ship having a weight equal to the maximum lifting capacity of the dock and the shortest ship's length (L_S) expected is supported on the keel blocks, the centre of the ship's length being positioned at the mid-length of the dock, and the freeboard at the pontoon deck is as described in **4.1.2**. The level of water ballast is to be constant over the length (L). The level of compensating ballast water may, however, be determined with the normal operation manual where it is intended that normal operation of the dock is to be by differential ballast conditions by special agreement with the Society.

5.2.2 Towing Condition

Special consideration will be given to the longitudinal strength where it is intended to tow the dock in unprotected waters, including particulars of the season and the duration and area of the towing operation.

5.2.3 Ship Weight Curve

The weight curve of the ship is to be taken as a rectangle with a superimposed parabola of half the area of the rectangle, the length of each area being L_S.

5.2.4 Permissible Stresses

For the loading conditions defined in 5.2.1 the longitudinal bending stresses are not to exceed $\frac{142}{K}$ *N/mm*^{2} and the shear stresses are not to exceed $\frac{98}{K}$ *N/mm*^{2}, where *K* is coefficient for the kind of steel and is defined as follows:

Mild steels *KA*, *KB*, *KD* or *KE*:	1.00
High tensile steels *KA*32, *KD*32, *KE*32 or *KF*32:	0.78
High tensile steels *KA*36, *KD*36, *KE*36 or *KF*36:	0.72
High tensile steels *KA*40, *KD*40, *KE*40 or *KF*40:	0.68

5.2.5 Section Modulus

When calculating the section modulus of the hull structure, the sectional area of all effective continuous longitudinal strength members are to be included. The section modulus of the hull structure at its mid-length is to be maintained within 0.4*L* a mid-length of the dock, unless a larger extension or special strengthening is necessitated by the bending moment curve.

5.2.6 Approximate Formula of Required Section Modulus

Notwithstanding the requirements of 5.2.1, 5.2.3 and 5.2.4, the section modulus required for the hull structure may be generally determined from the formula where the lifting capacity of the dock is not exceeds 40,000 *tons*. Where high tensile steels are used, the extent of use is to be as deemed appropriate by the Society.

$Z = 2.35KQL$ (cm^3)

K: As specified in 5.2.4.

Q: the maximum lifting capacity in *tons*.

5.2.7 Buckling

The buckling strength for the longitudinal strength members of docks is to be in accordance with the requirements in **5.3, Part 1, Part C of the Rules for the Survey and Construction of Steel Ships**.

5.2.8 Operation Manual

Information on the loading conditions for the longitudinal strength is to be contained in the operation manual. Where governing bending moments and/or shear forces may occur at less than the maximum lifting capacity, such conditions are to be investigated, and contained in the operation manual.

5.2.9 Deflection Control

The maximum allowable deflection of the dock is to be submitted for approval. This deflection is not to exceed that under the loading conditions defined in 5.2.1. As for deflection monitoring measures, *see* 6.2.

5.3 Transverse Strength

5.3.1 Loading Condition

The transverse strength of the dock is to be calculated for the most severe expected docking and transient conditions during normal operations, and is to be examined at least for the conditions as follows;

(1) The docked ship conditions: as described in 5.2.1. It is assumed that the docked ship normally is supported by the keel blocks only.

(2) The transient condition: the dock emerging out of water with a typical ship fully supported on the blocks and the pontoon deck subjected to a water head just below top of docking blocks, with corresponding ballast water in the tanks.

5.3.2 Permissible Stress

Under the loading conditions in 5.3.1 the compressive or tensile stresses in transverse members are not to exceed 170 *N/mm*^{2}. The shear stresses in the transverse members are not to exceed 98 *N/mm*^{2}.

5.3.3 Approximate Formula

Where the maximum lifting capacity of the dock does not exceed 40,000 *tons*, calculations of the transverse strength may be omitted if the thickness of the top and bottom plates of the pontoon is not less than that given below:

(1) Caisson type; obtained from the following formula.

$0.0047B^2$ (*mm*)

(2) Sectional pontoon type; given by the above or obtained from the following formula, whichever is greater;

$$0.033\frac{Ql_P}{Ld_P}\ (mm)$$

where :

Q : the maximum lifting capacity in *tons*

l_P : length of the sectional pontoon measured alongside the centre line of the dock in *metres*

d_P : depth of the pontoon at the centre in *metres*

5.3.4 Buckling

1 The structural panels and members of the hull structures are to be adequately stiffened to prevent buckling.

2 Where the maximum lifting capacity of a dock exceeds 40,000 *tons*, buckling strength is to be assessed using the stresses obtained from direct strength calculations.

5.4 Structural Detail and Local Strength

5.4.1 Structural Arrangement

A centerline girder or longitudinal member is to provide adequate support for the keel blocks. Side girders or transverse members are to be arranged to support the side blocks.

5.4.2 Tank and Shell Plates

The thickness of the tank and shell plates is not to be less than obtained from the following formula. The minimum thickness is, however, to be 6.5 *mm* for the tank plates and 7 *mm* for the shell plates.

$$CS\sqrt{h} + 2.5(mm)$$

where :

C: To be obtained from the following formulae according to bulkhead type and stiffener system:

For longitudinal tank plates and side shells of longitudinal systems

$$C = 13.4\sqrt{\frac{K}{27.7 - \alpha K}}$$

However, C is not to be less than $3.6\sqrt{K}$.

For longitudinal tank plates and side shells of transverse systems

$$C = 100\sqrt{\frac{K}{767 - \alpha^2 K^2}}$$

For transverse tank plates

$$C = 3.6\sqrt{K}$$

where :

K: As specified in 5.2.4.

α: Either α_1 or α_2 according to values of z

$$\alpha_1 = 14.5 f_D \frac{z - z_B}{z_0} \qquad \text{when } z_B < z$$

$$\alpha_2 = 14.5 f_B \left(1 - \frac{z}{z_B}\right) \qquad \text{when } z \le z_B$$

where :

f_D and f_B: Ratios of section moduli of athwartship section on the basis of mild steel in accordance with the requirements of 5.2 to actual section moduli of athwartship section concerning the top deck plating and the bottom plating

z: Vertical distance (m) from the top of the bottom plating to the lower edge of the tank plating under consideration

z_B: Vertical distance (m) from top of the bottom plating amidship to the horizontal neutral axis of the athwartship section of the dock

z_0: Vertical distance (m) from the neutral axis to the top of the top deck beam

S : spacing of stiffeners, frames etc., in *metres*

h : $2.5m$ or the followings, whichever is greater;

for tanks;

vertical distance measured from the lower edge of plate to the mid-point of the distance between the top of tanks and the top of overflow pipes in *metres*. As an alternative the maximum differential head defined in **5.4.6** may be used for the ballast tanks.

for cofferdams and void spaces;

vertical distance measured from lower edge of plate to the maximum immersion water line in *metres*.

5.4.3 Tank Stiffener and Frame

The section modulus of tank stiffeners and frames is not to be less than obtained from the following formula;

$125C_1C_2Shl^2$ (cm^3)

where :

S : spacing of stiffeners, frames etc. in *metres*

l : span of stiffeners, frames etc. in *metres*

h : $2.5m$ or the followings, which ever is greater;

for tanks;

vertical distance measured from the mid-point of l for vertical stiffeners of S for horizontal stiffeners to the midpoint of the distance between the top of tanks and the top of overflow pipes in *metres*. As an alternative, the maximum differential head defined in **5.4.6** may be used for the ballast tanks.

for cofferdams and void spaces;

vertical distance measured from the midpoint of l for vertical frames etc. or S for longitudinal frames etc. to the maximum immersion water line in *metres*.

C_1: To be obtained from the following formulae according to the stiffener system:

$C_1 = \dfrac{K}{24-\alpha K}$ for longitudinal systems

However, the value of C_1 is not to be less than $\dfrac{K}{18.8}$

$C_1 = \dfrac{K}{18.8}$ for transverse systems or transverse tank plates

K: As specified in **5.2.4.**

α : As specified in **5.4.2.** However, "the lower edge of the tank plating under consideration" is to be construed as "the stiffener or frame under consideration" in applying the requirements for z.

C_2: Coefficient given in **Table 5.1**, according to the type of end connections

Table 5.1 Values of C_2

The other end of stiffeners	One end of stiffeners		
	Connection by brackets	Lug-connection or supported by girders	End of stiffener unattached
Connection by brackets	0.70	0.85	1.30
Lug-connection or supported by girders	0.85	1.00	1.50
End of stiffener unattached	1.30	1.50	1.50

5.4.4 Girder, Web Frame etc.

1 The section modulus of the girders, web frames etc. supporting the tank stiffeners or frames is not to be less than obtained from the following formula;

$7.13Shl^2$ (cm^3)

where :

S : breadth of the area supported by the girders, web frames etc. in *metres*

h : $2.5m$ or the followings, which ever is greater.

for tanks;

vertical distance measured from the mid-point of l for vertical girders etc. or S for horizontal girders etc. to the mid-point of the distance between the top of tanks and the top of overflow pipes in *metres*. As an alternative, the maximum differential head defined, in 5.4.6 may be used for ballast tanks.

for cofferdams and void spaces;

vertical distance measured from the mid-point of l for vertical girders etc. or S for horizontal girders etc. to the maximum immersion water line in *metres*.

2 Thickness of web plates is not to be less than obtained from the following formula.

$10S_1$ (mm)

where :

S_1 : stiffener space or depth of web plates, whichever is less in *metres*.

5.4.5 Cross Tie

The sectional area of cross ties, where fitted between the stiffeners, frames, girders, web frames etc. is not to be less than obtained from the following formula

$2.2Sbh$ (cm^2)

where :

S : space of the stiffeners etc. supported by the cross tie in *metres*.

b : distance between the mid-point of two adjacent spans of stiffeners etc. supported by the cross tie in *metres*.

h : the maximum head in *metres* to be determined in accordance with the requirements of 5.4.3 or 5.4.4 as applicable.

5.4.6 Maximum Differential Head

Where the maximum differential head is used for the design basis of the ballast tanks, hydrostatic data is to be submitted for approval to show the differential head based on the highest levels to which water will rise on each side of the structure in service. The differential head on the design is to be determined with a suitable margin to an actual differential head in service. Necessary data on operating the dock within such design limits are to be included in the operating manual.

5.4.7 Top Deck

1 Thickness of the top deck plates is not to be less than obtained from the following formula or 7 *mm*; whichever is greater.

$10S$ (mm)

where :

S : beam space (m)

2 Section modulus of the top deck beam is not to be less than obtained from the following formula.

CSl^2 (cm^3)

where :

C : 14.5 for longitudinal beam within $0.4l$ amid-length, 5.4 for transverse beam and longitudinal beam at the fore and aft end. For longitudinal beam other than the aforesaid, C may be gradually from 14.5 to 5.4.

S : space of beam in *metres*

l : span of beam in *metres*

3 Section modulus of the transverse girder of the top deck is not to be less than obtained from the following formula.

$6.1bl^2$ (cm^3)

where :

b : distance between the mid-points of two adjacent spans of the beams supported by the girder in *metres*

l : span of girder in *metres*

5.4.8 Safety Deck

1 Scantlings of the safety deck as constructed as the tanks are to be in accordance with the requirements defined in 5.4.2, 5.4.3 and 5.4.4.

2 Scantling of the safety deck as constructed as other than the tanks are to be as follows;

(1) Thickness of the deck plates is not to be less than 6.5 *mm* or obtained from the following formula.

$1.25S\sqrt{h} + 2.5$ (mm)

where :

S : beam space in *metres*

h : deck loads in kN/m^2

(2) Section modulus of the deck beam is not to be less than obtained from the following formula.

$0.43Shl^2$ (cm^3)

where :

S : beam space in *metres*

h : deck loads in kN/m^2

l : span of beam in *metres*

(3) Section modulus of the deck girders is not to be less than obtained from the following formula.

$0.484bhl^2$ (cm^3)

where :

b : distance between the mid-points of two adjacent spans of the beams supported by the girders in *metres*

l : span of the girder in *metres*

h : deck load in kN/m^2

5.4.9 Non-water Tight Structures

The thickness of the web plates of the non-water tight structures such as the centre girder, side girders and solid floors of the pontoon, and the non-water tight bulkheads, is not to be less than obtained from the following formula in general.

$10S_1$ (mm)

where :

S : space of stiffeners in *metres*

5.4.10 Keel Block and Supporting Structure

The keel blocks and their supporting structures are to be generally designed to the following loads;

$P = 14.7Q/L$ (kN/m)

where :

P : loads to the keel blocks and supporting structures over the whole length of the dock.

Q : the maximum lifting capacity of the dock in *tons*.

5.4.11 Platforms

The minimum load on the platforms of dock ends is to be 5.88 kN/m^2, the factor of safety being not less than 4.

5.4.12 Swing Bridge

The minimum load on the swing bridge at dock ends is to be 3.92 kN/m^2, the factor of safety being not less than 4.

Chapter 6 MACHINERY AND INSTRUMENTATION

6.1 Machinery

6.1.1 Machinery

The pressure vessels other than those belonging to Group 3 and essential machinery such as generator driving and auxiliary machinery which are necessary for operations of the docks, are generally to be in accordance with the relevant provisions of the Ship Rulers.

6.1.2 Piping System

1 The piping systems are generally to be in accordance with the relevant provisions of the Rules for the Survey and Construction of Steel Ships as far as applicable.

2 The dock is to have at least two water ballast pumps. The arrangements for de-ballasting are to be such that in case of failure to the one pump an alternative pumping is available for each ballast tank.

6.1.3 Electrical Equipment

1 Electrical equipment to be installed in the manner of minimizing the risks due to electrical cause such as electric shocks, fires etc. on reference to the requirements of **Part H of the Rules for the Survey and Construction of Steel Ships**.

2 Electrical machinery and cables are to be those conformed to an applicable standard accepted by the Society, and suitable to be used safely and effectively under the conditions of the environment where they are installed.

3 Electric circuits are to be protected against accidental overcurrents including short circuit, These protecting devices are to be capable of breaking a fault circuit, eliminating the expansion of the faults and the hazards of fire and securing to serve electric power to essential driving sources, lights, internal communications and alarm devices.

6.2 Indicator System

Deflection metres or acceptable alternatives, tank level, draught, and trim indicators are to be provided to enable the operation of the dock to be properly controlled.

Chapter 7 FIRE PROTECTION AND EXTINGUISHING

7.1 General

The requirements of this Chapter apply to the minimum fire protection and extinction for the docks and do not cover equipment fitted for fighting fires that may occur on ships in the dock. Attention should also be given to any relevant statutory requirements of the National Authority of the country in which the dock is to operate. Compliance with such statutory requirements may, at the discretion of the Society, be accepted as meeting the requirements of this Chapter.

7.2 Fire Protection

7.2.1 Accommodation

Accommodation, control station and service spaces are to be arranged so that the risk of fire will be reduced to a minimum. Deck houses are to be of steel or equivalent materials. Deck coverings on the decks forming the crown of machinery spaces are to be of a type which will not readily ignite.

7.2.2 Machinery Space

Boundary walls of the machinery spaces and interior stairways below the top deck to be of steel or equivalent materials.

7.2.3 Paints

In accommodation, control station, service and machinery spaces, paints, varnished and similar preparations having a nitrocellulose or other highly inflammable bases are not to be used.

7.3 Fire-extinguishing

7.3.1 Fire System

The fire pumps, associated piping and fire main are to be so designed that a minimum pressure can be maintained sufficient to produce at least 12 *m* jet throw through adjacent nozzles of sizes required by 7.3.2. A fire main is to be provided on each dock wing. Two separate means of water supply are to be provided for the fire main. At least, one mean of water supply is to be of an adequate shoreside supply or an independent driven emergency pump is to be provided with the dock.

7.3.2 Hydrant, Hose and Nozzle

1 The number and position of the hydrants are to be such that at least two jets of water not emanating from the same hydrant, one of which is to be from a single length of hose, may reach any part of the dock except the water ballast tanks under any operating conditions.

2 In spaces containing machinery with a total power of 735.5 *kW* and over, two hydrants are to be provided, and in spaces where the total power of the machinery is less, one hydrant will be accepted. Where, in either of the above cases, fire fighting from within a small compartment is impracticable due to limitations in space, the hydrants required may be situated outside and adjacent to the compartment entrance.

3 The fire hoses are to be sufficient in length to protect a jet of water to any of the spaces in which they may be required to be used. The hoses are not to exceed 18 *metres* in length with a nozzle in size of 12 *mm* or over.

7.3.3 International Shore Connection

It is recommended that the top deck of the dock is provided with the international shore connection specified in **Chapter 22, Part R of the Rules for the Survey and Construction of Steel Ships** to supply water to the docking ship's extinguisher from the dock's pump.

7.3.4 Portable Extinguisher

1 Portable extinguishers are to be placed onboard in places with risk of fire. Within the accommodation portable extinguishers are to be so placed that at least one extinguisher will be accessible from any part of the accommodation. The total number of extinguishers required within the accommodation area will depend on its size and arrangement.

2 Portable extinguishers are to be provided in machinery spaces as well as spaces with electric motors and switchboards etc. for pumps, warping capstans etc. Number and location will depend on the size and arrangement of the spaces.

7.3.5 Fire Smothering Gas System

Where provision is made for the injection of gas into machinery spaces for fire-extinguishing purposes, the necessary pipes for conveying the gas are to be provided with control valves or cocks which are to be so placed that they will be easily accessible and not readily cut off from use by an outbreak of fire. Suitable provision is to be made to prevent inadvertent admission of the gas to any compartment.

Contents

GUIDANCE FOR FLOATING DOCKS

Chapter 2 CLASSIFICATION SURVEYS

2.1 Classification Surveys during Construction

2.1.1 General

With respect to **2.1.1-2 of the Rules**, surveyors are to confirm the asbestos-free declarations and supporting documents specified in **2.1.2(2)(h) of the Rules**. The wording “materials containing asbestos” means that asbestos is present in the product/material above the threshold value stipulated in Appendix 1 of *IMO* resolution *MEPC*.379(80).

2.4 Preparation for Surveys and Others

2.4.1 Preparation for Surveys and Others

With respect to **2.4.1-6 of the Rules**, surveyors are to confirm at periodical surveys that asbestos-free declarations and supporting documents are provided for any replaced or newly installed fittings, equipment, parts, etc. The wording “materials containing asbestos” means that asbestos is present in the product/material above the threshold value stipulated in Appendix 1 of *IMO* resolution *MEPC*.379(80).