

PHILIPPINE SHIP SAFETY

REGULATION AND REGULATIONS

(PSSRR)

BOOK II

VOLUME VI

Non-Propelled Barges

Specific Provisions

2018

SUBJECT FOR FINAL REVIEW

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CHAPTER I

HULL CONSTRUCTION AND EQUIPMENT

Regulation 1

General

These Rules and Regulations are geared to ensure that all non-propelled barge of Philippine owner and/or registry, are so designed, constructed, maintained, operated and inspected in accordance with the standards on maritime security, safety of life and property at sea, and the protection of the marine environment.

Regulation 2

Application

1 Unless expressly provided otherwise, Volume VII, Book II shall apply to non-propelled barge the keels of which are laid or which are at a similar stage of construction on or after the effectivity of these Rules and Regulations.

2 For the purpose of these Regulations, the term a similar stage of construction means the stage at which:

- .1 construction identifiable with a specific barges begins; and
- .2 assembly of that barges has commenced comprising at least 50 tons or 1% of the estimated mass of all structural material, whichever is less.

3 For the purpose of these Regulations:

- .1 the expression non-propelled barges constructed means non-propelled barges the keels of which are laid or which are at a similar stage of construction;
- .2 the expression all non-propelled barges means non-propelled barges constructed before, on or after the effectivity of this Rules and Regulations;
- .3 any other barges which is converted to a non-propelled barge shall be treated as a non-propelled barge constructed on the date on which such a conversion commences.

4 Applicable requirements for existing barge

Unless expressly provided otherwise, for barges constructed before the effectivity of these Rules and Regulations, the Administration shall ensure that the requirements which are applicable under the Philippine Merchant Marine Rules & Regulations 1997 are complied with.

5 Repairs, alteration, modifications and outfitting.

- .1 All non-propelled barges which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these non-propelled barges. Such non-propelled barges if constructed before the effectivity of these Rules and Regulations shall, as a rule, comply with the requirements for non-propelled barges constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting.
- .2 Repairs, alterations and modifications which substantially alter the dimensions of barges or substantially increase a barges service life and outfitting related thereto shall meet the requirements for non-propelled barges constructed on or after the effectivity of these Rules and Regulations in so far as the Administration deems reasonable and practicable.

Regulation 3

Hull Construction

The construction of hull, deckhouses, bulkheads and any other structure and equipment shall be sufficient to withstand all foreseeable conditions of the intended service. A non-propelled barge built and maintained in conformity with the applicable regulation of a classification society or other body recognized by the Administration may be considered as adequate in this respect

Regulation 4

Loading Conditions

The responsibility for stability and trim, for handling and loading, as well as for avoidance of distributions of weight which are likely to set up abnormally severe stresses rest upon the Administration. Where it is desired to provide for exceptional conditions of loading, full particulars are to be given in connection with the submission of plans are to be submitted and approved by the Administration before proceeding with the work.

The sizes, materials, joint details and welding or other methods of construction are to be shown on the plans as clearly and fully as possible. Plans and data, as applicable, are to be submitted in triplicate.

Regulation 5

Conditions for Surveys after Construction Information Regarding Damage, Failure and Repair

1 Examination and Repair

Information regarding damage, failure, deterioration or repair to hull, or equipment, which affects or may affect the barge is to be submitted by the owners or their representatives for examination by the surveyor of the Administration. All repairs found necessary by the surveyor are to be carried out to his satisfaction.

2 Notification and Availability for Survey

The owners or their representatives are to notify the Administration on all occasions when a barge can be examined in dry dock, on a slipway or in afloat condition. Should the surveyor of the Administration find occasion during any survey to recommend repairs or further examination, notification is to be given immediately to the owners or their representatives in order that appropriate action will be taken.

3 Materials and Fabrication

These Regulation are intended for barges of welded construction using steels. Use of other materials other than steel will be specially considered.

4 Design Consideration

Where scantlings are reduced in connection with the use of higher-strength steel or where aluminum alloys are used, adequate buckling strength is to be provided. Where it is intended to use material of cold flanging quality for important longitudinal strength members, this steel is to be indicated on the plans.

5 Guidance for Repair

Where a special welding procedure is required for the special steels used in the construction including any low temperature steel and those materials, a set of plans showing the following information for each steel should be placed aboard the barge.

Regulation 6

Scantlings

1 General

The amidship scantlings are to apply throughout the midships $0.4L$. End scantlings are not to extend for more than $0.1L$ from each end of the barge. The reduction from the midships to the end scantlings is to be effected in as gradual a manner as practicable. Sections having appropriate section moduli or areas, in accordance with their functions in the structure as stiffeners, columns or combinations of both, are to be adopted, due regard being given to the thickness of all parts of the sections to provide a proper margin for corrosion. It may be required that calculations be submitted in support of resistance to buckling for any part of the barge's structure.

2 Reduced Scantlings With Protective Coatings

Where deemed necessary to suit the particular type and service of the barge or the space, a reduction in scantlings in association with protective coatings may be considered. In such instances, the justification for the reduction is to be submitted for review together with the particulars of the coating, including the program for maintenance. The plans are to show the required scantlings and the proposed scantlings, both suitably identified. Where any of the proposed reductions are approved, such reductions are to be taken.

3 Workmanship

All workmanship is to be of commercial marine quality and acceptable to the Surveyor. Welding is to be in accordance with the standard requirements acceptable to the Administration. The Surveyors are to satisfy themselves that all operators to be employed in the construction of barges to be classed are properly qualified in the type of work proposed and in the proper use of the welding processes and procedures to be followed.

4 Required Section Modulus

The scantling requirements of these Regulation are applicable to structural angles, channels, bars, and rolled or built-up sections. The required section modulus of members such as girders, webs, etc, supporting frames and stiffeners is to be obtained with an effective width of plating basis as described below, unless otherwise noted. The section modulus is to include the structural member in association with an effective width of plating equal to one-half the sum of the spacing on each side of the member or 33% of the unsupported span l , whichever is less. For girders and webs along hatch openings, an effective breadth of plating equal to one-half the spacing or 16.5% of the unsupported span l , whichever is less, is to be used. Where channel construction is adopted, the required section modulus is to be obtained solely by the channel. The required section modulus of frames and stiffeners is assumed to be provided by the stiffener and one frame space of the plating to which it is attached.

5 Serrated Sections

Serrated sections may be used for girders, webs, frames and stiffeners, but the depth of the member is not to be less than 2.5 times the depth of any cutout. The cutouts are to be arranged to provide regularly spaced points of contact with the plating sufficient to obtain the welding required.

Regulation 7

Structural Design Details

1 General

The designer shall give consideration to the following:

- .1 The thickness of internals in locations susceptible to rapid corrosion.
- .2 The proportions of built-up members to comply with established standards for buckling strength.
- .3 The design of structural details, such as noted below, against the harmful effects of stress concentrations and notches:

- .1 Details of the ends, the intersections of members and associated brackets.
 - .2 Shape and location of air, drainage, or lightening holes.
 - .3 Shape and reinforcement of slots or cut-outs for internals.
 - .4 Elimination or closing of weld scallops in way of butts, “softening” of bracket toes, reducing abrupt changes of section or structural discontinuities.
- .4 Proportions and thickness of structural members to reduce fatigue response due to cyclic stresses, particularly for higher-strength steels.

Regulation 8

Hull Construction and Equipment

1 Deck Fittings

All barges are to have a sufficient number of cleats and chocks of substantial design. The structure in way of these fittings is to be suitably reinforced by installation of headers, additional beams, brackets or doubling plates.

2 Hull Structures and Arrangements

Longitudinal Strength

Barges intended for coastwise service are to have longitudinal strength in accordance with the requirements of this Section. A breadth to depth ratio up to approximately 4 is acceptable in association with longitudinal bulkheads and trusses arranged at suitable intervals.

3 Hull Girder Longitudinal Strength

Strength Standard

The required hull girder section modulus SMR amidship, to the deck and bottom is to be obtained from the following equation:

$$SMR = K SMb \text{ cm}^2\text{-m (in}^2\text{-ft)}$$

Where

$$K = 0.629 + Ms/(fp SMb) \text{ but is not to be taken less than 1.0}$$

Ms = maximum still-water bending moment in the governing loaded or ballasted condition in kN-m (tf-m, Ltf-ft).

When still-water bending moment calculations are not submitted, K will be taken as 1.0.

$$fp = 17.5 \text{ kN/cm}^2 (1.784 \text{ tf/cm}^2, 11.33 \text{ Ltf/in}^2)$$

$$SMb = C1 C2 L^2 B (Cb + 0.7) \text{ cm}^2\text{-m (in}^2\text{-ft)}$$

$$C1 = 4.11 \quad 30 \leq L < 45 \text{ m}$$

$$= 16.33(L/100)^2 - 15.47(L/100) + 7.77 \quad 45 \leq L < 95 \text{ m}$$

$$= 10.75$$

4 Longitudinal Strength

Section Modulus Calculation

In general, the following items may be included in the calculation of the section modulus, provided they are continuous or effectively developed throughout the midships $0.4L$ and gradually tapered beyond. The sectional areas of the decks may be gradually reduced to one half of the amidship deck area at $0.15L$ from the ends.

5 Deck plating

Plating and longitudinal stiffeners of longitudinal bulkheads, longitudinals of deck, sides, bottom and inner bottom.

$$t = y(0.9 + 0.2 x/B) \text{ m (ft)}$$

where

y = distance, in m (ft), from the neutral axis to the top of the continuous coaming

x = distance, in m (ft), from the top of the continuous coaming to the centerline of the barge

B = breadth of the barge, in m (ft)

x and y are to be measured to the point giving the largest value of yt . In way of continuous hatch coamings, the section modulus to the deck at side, excluding the coamings, need not be determined.

6 Hull Girder Moment of Inertia

The hull girder moment of inertia I amidships is to be not less than obtained from the following equation:

$$I = 0.03SMRL \text{ cm}^2\text{-m}^2 \text{ (in}^2\text{-ft}^2)$$

where

L = length of barge

SMR = hull girder section modulus required for the barge, in $\text{cm}^2\text{-m}$ ($\text{in}^2\text{-ft}$)

7 Still-water Bending Moment and Shear Force Calculations

Still-water bending moment and shear force calculations are to be submitted for barges of 76 meters (250 feet) in length and above. They are to include at least the full load and ballast conditions and any contemplated loading conditions that might be expected to have an unfavorable influence on the hull girder strength. Where bending moment calculations indicate maximum values outside the midships $0.4L$, the midships scantlings may be required to be extended.

Still-water bending moment and shear force calculations are also to be submitted for chemical tank barges with independent tanks, irrespective of their length.

These calculations are to show bending moment and shear force values along the length of the barge.

8 Buckling Calculations

Where buckling calculations are required to be submitted to verify the acceptability of the thickness of decks, shell, longitudinal bulkheads, hatch side coamings etc., the total hull girder bending moment to be used in the calculations is to consist of the maximum still water bending moment in kN-m , (tf-m , Ltf-ft) plus a wave induced bending moment of

$$S_w \text{ SM}_b, \text{ kN-m (tf-m, Ltf-ft)}$$

where

$$S_w = 11.0 \text{ kN/cm}^2 \text{ (1.122 tf/cm}^2, 7.123 \text{ Ltf/in}^2).$$

Consideration will be given to the wave-induced bending moment calculated by means of a statistical analysis based on the barges motion calculation in realistic sea states. In such cases, the calculations, computer programs used, and the computed results are to be submitted for review.

9 Shell Plating

Shell Plating Thickness

Shell plating thickness is not to be less than what is required for purposes of longitudinal hull girder strength in accordance with the applicable Rule of the class society recognized by the Administration or in accordance with the Regulation set by Administration nor is it to be less than what is required by the respective equations for minimum thickness of side and bottom plating. Where hull girder shear values are abnormal, the thickness of the side shell plating may be required to be increased.

10 Shell Plating Amidships

Side Shell Plating Amidships

The thickness of the side shell plating within $0.4L$ amidships, is not to be less than obtained from the following equations nor less than required

$$t = 0.07L + 0.007s \text{ mm for } L \leq 150 \text{ meters}$$

where

t = required thickness of plating, in mm (in.)

L = length of the barge

s = frame spacing, in mm (in.)

Reinforcement at Superstructure or Deckhouse Ends

The deck plating at the outboard corners of superstructures or deckhouses having lengths greater than $0.14L$ are to have insert plates of a thickness 25% greater than the adjacent required deck plating thickness.

11 Plating In Way of Deck Non-propelled

Where non-propelled is to be carried on deck, the thickness of the deck plating is not to be less than obtained from the appropriate equations, nor is the thickness to be less than the required for platform decks in enclosed non-propelled spaces.

12 Trunks

A trunk will be considered an effective part of the hull girder if it extends for not less than the midships $0.6L$ and has a width of not less than $0.6B$. The thickness of the trunk side is not to be less than 8.5 mm (0.34 inches) thick in barges not exceeding 30 meters (100 feet) in length. The thickness at intermediate lengths is obtained by interpolation. The thickness of the plating of the top of the trunk within the $0.4L$ is not to be less than required for purposes of longitudinal hull girder strength. Plating of trunk top and side is to have adequate strength to resist buckling.

13 Mechanical Unloading

In barges regularly engaged in trades where non-propelled is handled by grabs or similar mechanical appliances, it is recommended that flush plating be used in way of the non-propelled spaces and that increased framing and thickness of plating be provided.

14 Reinforcement at Openings

At corners of hatchways or other openings in decks, numerous radii are to be provided. In general, the radii are not to be less than one eighth of the breadth of the hatchway or other deck opening but the radii need not exceed 760 mm (30 in.).

15 Main Framing

.1 Application

This Section applies to the framing of deck non-propelled barges, and barges intended for carriage of dry non-propelled below decks.

.2 General

.1 Channel Construction

Channel construction may be used for barges up to 76 meters (250 feet) in length. Where bottom longitudinals are supported by members extending across the inner faces of the longitudinals, the attachment of the channels to the shell is to be augmented by fitting filler plates in alternate longitudinal frame spaces connected to the channel and the bottom shell plating. The minimum required weld area of the end connection of these channels is not to be less than 75% of the sectional area of the channel. In determining the weld area provided, the throat dimension of the fillet is to be used.

.2 Longitudinals

Bottom, inner bottom, side, deck and bulkhead longitudinals are to be continuous or attached at their ends in such a manner as to effectively develop the sectional area and the resistance to bending. Where the barge length, L , is less than 76 meters (250 feet), the end attachment may be with non through brackets.

.3 Flanged Plate Members

Flanged plate main supporting members are to be fitted with brackets arranged so as to support the flange at intervals of about 3 meters (10 feet) and in close proximity to changes of sections. The width of the flange is not to exceed 14 times the thickness of the member. Unusually deep members may require additional stiffeners on the webs.

.4 Drydocking Supporting Structures

Girders or other structures are to be provided to support the barge on dry-dock.

.5 Tripping Brackets

Tripping brackets, arranged to support the flanges or face bars of girders, chords and transverses, are to be fitted at intervals of about 3 meters (10 feet), close to change of section and in line with, or as near as practicable, to the stanchions of transverse or longitudinal trusses.

.6 Stiffeners

Where the depth/thickness ratio of the web portion of girders, chords and transverses exceeds 80, stiffeners are to be provided aligning with each longitudinal or transverse frame or horizontal or vertical bulkhead stiffener, as appropriate. In addition, where the depth/thickness ratio exceeds 200, a stiffener is to be fitted parallel to the flange at about 25% of the depth of the web from the flange.

16 Fore End Construction

.1 Arrangement of Fore End Framing

Arrangement of framing members for a typical rake-ended barge. Deck and bottom longitudinal framing members are to be attached to the collision bulkhead by effective brackets and to the head log by deep diaphragm

plates or a system of vertical channels which in turn support horizontal stiffening on the head log. The longitudinals in the rake are not to have spans greater than 2.44 meters (8 feet). The longitudinals may be supported by transverse trusses or by transverses which are supported by fore and aft trusses. The transverses, in general, are to be flanged plates or equivalent, notched over the longitudinals. Bottom transverses are to have flat bar stiffeners at each bottom longitudinal. Channels extending across the face of the longitudinals will be accepted in barges where the length L does not exceed 76 meters (250 feet). Where channels are used as bottom transverses, filler plates are to be fitted in each longitudinal frame bay connecting the channel to the bottom shell plating.

.2 Extent of Fore End Framing

Fore end framing requirements are to extend from the head log to a vertical plane in line with the lower turn of the rake or to the collision bulkhead if located aft of the lower turn of the rake.

.3 Barges-Shaped Bows

Barges with barges-shaped bow forms are to have scantlings in accordance with the requirements of the Administration.

.4 Trusses

.1 Trusses Arrangement

Trusses are to be arranged as necessary for the support of frames and may extend either fore and aft or athwartship.

.2 Stanchions

The permissible load W_a of a stanchion, pillar or strut is to be obtained from the following equation which will, in all cases, be equal to or greater than the calculated load W

$$W_a = [1.232 - 0.00452l/r]A \text{ tonnes} \quad W_a = [7.83 - 0.345l/r]A \text{ tons}$$

Where

l = unsupported span of the strut, stanchion or pillar, in cm (ft)

r = least radius of gyration, in cm (in.)

A = area of the strut, stanchion or pillar, in cm² (in²)

.5 Calculated Load

The calculated load W for a specific stanchion, pillar or strut is to be obtained from the following equation:

$$W = 1.025bhs \text{ tonnes} \quad W = 0.0286bhs \text{ tons}$$

where

b = mean breadth of the area supported, in m (ft)

h = vertical distance, in m (ft), from the bottom shell in way of the stanchion to a point located above the deck,

s = length of the area supported, in m (ft).

.6 Diagonals

Diagonals in trusses are to be arranged to have angles of inclination of about 45°, and a sectional area of approximately 75% of that of the adjacent stanchion.

.7 End Connections

The required welding area of end connections of stanchions and diagonals is not to be less than the following:

Stanchions: 75% of the area of the stanchions

Diagonals: 50% of the area of the diagonal

In determining the weld area provided, the throat dimension of the fillet is to be used.

17 Watertight Bulkheads

All barges without propulsion system are to be provided with watertight bulkheads in accordance with this Section. In all cases, it shows clearly the location and extent of the bulkheads in the plans submitted.

.1 Arrangement of Watertight Bulkheads

.1 Collision Bulkhead

All barges without propulsion system are to be fitted with a collision bulkhead extending intact to the freeboard deck in one plane.

The collision bulkhead is to be located at a distance aft of the forward perpendicular not less than given by the following:

$0.05L$ meters where $L < 200$ meters

The collision bulkhead is to be located at a distance aft of the forward perpendicular, except as specially permitted, not more than given by the following:

$0.05L + 3.66$ meters where $L < 122$ meters

.2 Other Watertight Bulkheads

Watertight bulkheads are to be arranged to provide a reasonable standard of subdivision.

The following is recommended as a guide to determine the maximum spacing between transverse watertight bulkheads in single bottom deck non-propelled barges, but is not required as a condition of classification:

$S = 0.153L + 3.81$ m for $L < 122$ m

where

S = distance between transverse bulkheads, in meters (feet)

L = length of the barge,

18 Protection of Deck Openings

All openings in decks are to be so framed as to provide efficient support with beams reinforced as necessary. Beams which are cut for hatchways are to be properly supported. Openings in the deck are to be located as far as practicable from the gunwale, but in no case are they to be less than 150 mm (6 in.) from the side shell.

.1 Position of Deck Openings

For the purpose of these Regulation, two positions of deck openings are defined as follows:

Position 1 Upon exposed freeboard deck; and upon superstructure decks situated forward of a point located a quarter of the barge's length from the forward perpendicular.

Position 2 Upon exposed superstructure decks situated abaft 0.25L from the forward perpendicular.

.2 Hatchway Coamings

.1 Height of Coamings

The height of coamings of hatchways secured weathertight by tarpaulins and battening devices is to be at least as follows:

600 mm (23.5 in.) if in Position 1

450 mm (17.5 in.) if in Position 2

Where hatch covers are made of steel or other equivalent material and made tight by means of gaskets and clamping devices, these heights may be reduced, or the coamings omitted entirely, provided that the safety of the barge is not thereby impaired in any sea condition.

.2 Coaming Plates

Coaming plates are not to be less than 8 mm (0.32 in.) thick in barges not exceeding 30.5 meters (100 feet) length.

.3 Protection of Coamings

Heavy convex moldings are to be fitted at the upper edges of all exposed coamings, and the lower edges are to be flanged or provided with other suitable protection against damage.

.4 Continuous Longitudinal Hatch Coamings

Strength deck longitudinal hatch coamings of length greater than 0.14L are to be effectively supported by underdeck longitudinal bulkheads or deep girders and they are, in general, to be longitudinally stiffened. The coaming thickness is not to be less than the required and the longitudinal stiffeners are not to be less than the required. For strength deck longitudinal beams; where s is the spacing of the stiffeners in m (ft), l is the distance between coaming brackets in m (ft) and h is as follows:

$$h = 0.02L + 0.46 \text{ meters for } L < 91.5 \text{ m}$$

Special consideration will be given to the coaming scantlings where adequate buckling strength is shown to be otherwise provided.

.3 Steel Hatch Covers

.1 Strength of Covers

.1 Plating

The thickness of the plating of steel hatch covers is not to be less than $0.01s$ or 6 mm (0.24 in.), if that is greater.

.2 Webs and Stiffeners

The scantlings of steel cover primary and secondary webs or stiffeners are to have a section modulus SM and a moment of inertia (I), in association with the plating to which they are attached.

.4 Flush Hatch Covers

Where flush hatch covers are fitted on the freeboard deck within the forward one-fourth length, and the barge is assigned a freeboard less than Type-B under the International Convention of Load Lines 1966, the assumed loads are to be increased by 15%.

.5 Other Materials

The strength and stiffness of covers made of materials other than steel is to be equivalent to those of steel and is to be subject to special consideration and needs approval by the Administration.

.6 Hatch Beams and Wood or Pontoon Covers

Wood Hatch Covers

Wood hatch covers are to have a finished thickness of not less than 60 mm (2.375 in.) in association with an unsupported span of 1.5 meters (5 feet) and not less than 82 mm (3.25 in.) with an unsupported span of 2 meters (6.5 feet).

.7 Hatch Cover Securing Arrangements

Steel Covers – Clamped and Gasketed

The means for securing and maintaining weather tightness are to be such that the tightness can be maintained in any sea conditions. The covers are to be hose-tested in position under a water pressure of at least 2 bar (2.1 kgf/cm², 30 lbf/in²) at the time of construction and, if considered necessary, at subsequent surveys. Special consideration will be given to the omission of gaskets on covers on hatchways in decks located above Position 2 where it can be shown that the closing arrangements are weathertight.

.8 Portable Covers – Tarpaulins and Battening Devices

.1 Tarpaulins

At least two tarpaulins, thoroughly waterproofed and of ample strength, are to be provided for each exposed hatchway in Positions 1 and 2. The material is to be guaranteed free from jute and is to be of an approved type. Synthetic fabrics which have been demonstrated to be equivalent will be specially approved.

.2 Cleats

Cleats are to be set to fit the taper of the wedges. They are to be at least 65 mm (2.5 in.) wide and spaced not more than 600 mm (23.5 in.) center to center. The cleats along each side or end are to be not more than 150 mm (6 in.) from the hatch corners.

.3 Wedges

Wedges are to be of tough wood. They are to have a taper of not more than 1 in 6 and not less than 13 mm (0.50 in.) thick at the toes.

.4 Battening Bars

Battening bars are to be provided for properly securing the tarpaulins. They are to have a width of 64 mm (2.5 in.) and a thickness of not less than 9.5 mm (0.375 in.).

19 Bulwarks, Rails and Ventilators

.1 Bulwarks and Guard Rails

.1 Unmanned Barges

Bulwarks or guard rails are not required on barges intended to be unmanned while at sea.

.2 Spacing of Guard Rails

The opening below the lowest course of the guard rails is not to exceed 230 mm (9 in.). The other courses are to be not more than 380 mm (15 in.) apart.

.3 Guard Rail Construction

For guard rails to be considered efficient, and to provide for a maximum spacing between courses, they must be rigid. This rigidity should normally be achieved by solid or tubular sections.

.2 Guard Rail Stanchions

Support stanchions are to be fitted not more than 1.5 m (5 ft) apart, and at least every third stanchion is to be supported by a bracket or stay. In the case of barges with rounded gunwales, the guard rail stanchions are to be placed on the flat of the deck.

.1 Portable Rails and Stanchions

Wire ropes or chains may only be accepted in lieu of rigid guard rails in special circumstances and then only in limited lengths. There must be a specific operational reason to warrant their use. The wires and chains are to be made taut by means of turnbuckles. The requirement for openings between courses is the same as for rigid rails. Removable or hinged stanchions are to be capable of being locked in the upright position. Other requirements associated with portable stanchions, such as support and spacing, are the same as for fixed or permanent stanchions.

.3 Barges with Less than Standard Sheer

In barges with no sheer, the calculated area is to be increased by 50%. Where the sheer is less than the standard, the percentage is to be obtained by interpolation.

.4 Trunks

Where a barge is fitted with a trunk, and open rails are not fitted on weather parts of the freeboard deck in way of the trunk for at least half their length, or where continuous or substantially continuous hatchway side coamings are fitted between detached superstructures, the minimum area of the freeing port openings is to be calculated based on the Regulation of Administration.

20 Equipment

.1 Anchoring and Towing Equipment

Barges are to have equipment of anchors and cables in accordance with the requirements of the Administration. The weight per anchor of bower anchors, is for anchors of equal weight. The weight of individual anchors may vary 7% plus or minus from the tabular weight provided that the combined weight of anchors is not less than that required for anchors of equal weight. The total length of chain required to be carried on board shall be in accordance with the Regulation set by the Administration and is to be reasonably divided between the two bower anchors. Cables which are intended to form part of the equipment are not to be used as check chains when the barge is

launched. The inboard ends of the cables of the bower anchors are to be secured by efficient means. Anchors and their cables are to be connected and positioned, ready for use. Means are to be provided for stopping each cable as it is paid out, and the windlass should be capable of heaving in either cable. Suitable arrangements are to be provided for securing the anchors and stowing the cables.

The number of weight and sizes of anchors and cables for non-propelled barges are to the satisfaction of the Administration.

The designer or builder is to submit evidence that the Administration has reviewed the arrangements and that the details are acceptable to the Administration.

Accommodation spaces are not to be located forward of the collision bulkhead.

.2 Equipment for Unmanned Barges

Equipment will not be required on unmanned barges unless specified by the Administration.

.3 Equipment Weight and Size

Anchors and chains are to be in accordance with the applicable Regulation of the classification society recognized by the Administration or in accordance with Regulation of the Administration including the numbers, weights and sizes.

.4 Anchor Types

Anchors may be either of the ordinary or stockless type. The weight of the head of a stockless anchor, including pins and fittings, is not to be less than three-fifths of the total weight of the anchor. Where specifically requested by the Owners, the Administration is prepared to give consideration to the use of special types of anchors and where these are of proven superior holding ability, consideration may also be given to some reduction in the weight, up to a maximum of 25% from the weight.

.5 Anchor Chain

Where the equipment number EN is less than 110, unstudded short-link chain may be employed in lieu of stud-link chain. The unstudded short-link chain is to have a breaking strength not less than the required tabular normal strength steel (Grade 1) stud-link bower chain. The unstudded short-link chain is to comply with the requirements of the Administration.

.6 Hawsers and Towlines

Hawser and towline sizes are to be in accordance with the applicable Regulation of a classification society recognized by the Administration or in accordance with Regulation of the Administration.

Where the tabular breaking strength exceeds 490 kN (50,000 kgf, 110,200 lbf), the breaking strength and the number of individual hawsers, may be modified, provided that their product is not less than that of the breaking strength and the number of hawsers. For barges having an A/EN ratio greater than 0.9 for SI/MKS units (9.7 for US units), the number of hawsers is to be increased by the number required by Administration.

.7 Hawse Pipes

Hawse pipes are to be of ample size and strength. They are to have full rounded flanges and the least possible lead in order to minimize the nip on the cables. They are to be securely attached to thick doubling or insert plates by continuous welds the size of which are to be in accordance with plating thickness and type of joint selected. When in position, they are to be thoroughly tested for water tightness by means of a hose in which the water pressure is not to be less than 2 bar (2.1 kgf/cm², 30 lbf/in²). Hawse pipes for stockless anchors are to provide ample clearances. The anchors are to be shipped and unshipped so that the Surveyor may be satisfied that there is no risk of the anchor jamming in the hawse pipe. Care is to be taken to ensure a fair lead for the chain from the windlass to the hawse pipes and to the chain pipes.

21 Dry Non-propelled Barges

Dry Non-propelled Barges

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Deck

l = distance, in m (ft), between the floors. Where the barge length L is ≥ 61 meters (200 feet), the value of l is not to be taken as less than 1.83 m (6.0 ft) without struts nor less than 2.44 m (8.0 ft) where effective struts are fitted. Where effective struts are fitted and the tank top is intended to be uniformly loaded with non-propelled, l may be taken as 81% of the distance between the floors, subject to the preceding minimum.

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Deck

Where bulk or ore cargoes are to be carried, each inner-bottom longitudinal, in association with the plating to which is attached, is to have a section modulus SM not less than required by the above nor less than that obtained from the following equation:

$$SM = 7.8chs^2 \text{ cm}^3 \quad SM = 0.0041chs^2 \text{ in}^3$$

where

$$c = 1.12 \text{ for barges intended for bulk non-propelled}$$

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Deck

For barges regularly engaged in trades where the non-propelled is handled by grabs or similar mechanical appliances, or where heavy bulk cargoes are carried, it is recommended that flush inner-bottom plating be adopted throughout the non-propelled space and that the plating requirements be suitably increased, but the increase need not exceed 5 mm (0.20 in.). It is also recommended that the minimum thickness be not less than 12.5 mm with 610 mm (0.50 in. with 24 in.) frame spacing and 19 mm with 915 mm (0.75 in. with 36 in.) frame spacing with intermediate thicknesses obtained by interpolation. It is recommended that for barges specially designed to carry ore, the minimum thickness of the inner bottom be 19 mm (0.75 in.) at 510 mm (20 in.) spacing of longitudinal. Where provision is to be made for the operation or stowage of vehicles having rubber tires, and after all other requirements are met, the thickness of the inner bottom plating is to be not less than obtained value.

.1 Deck Non-propelled Barges

General

The requirements of this Regulation are generally intended to apply to single deck non-propelled barges.

.2 Deck Beams

Each deck beam in association with the plating to which it is attached, is to have a section modulus SM approved by the Administration.

Where non-propelled is to be carried on deck, the uniformly distributed deck loading is to be indicated on the drawings and the transverse or longitudinal deck beams, are also to comply with the requirements of the Administration.

.3 Side and Bottom Frames

Each side and bottom frame in association with the plating to which it is attached is to have a section modulus SM not less than that obtained from the following equation:

$$SM = 7.8chs^2 \text{ cm}^3 \quad SM = 0.0041chs^2 \text{ in}^3$$

where

$c = 1.25$ for transverse and longitudinal side frames

$= 1.34$ for bottom longitudinal frames

$= 1.25$ for bottom transverse frames

h = is the vertical distance, in meters (feet), from the mid point of length l to the deck at side,

.4 Truss Arrangement

Trusses are to be arranged as necessary for the support of frames and may extend either fore and aft or athwartship.

.5 Stanchions

The permissible load W_a of a stanchion, pillar or strut is to be obtained from the following equation which will, in all cases, be equal to or greater than the calculated load W defined in 5-1-1/15.5:

$$W_a = [1.232 - 0.00452 (l/r)]A \text{ tf} \quad W_a = [7.83 - 0.345 (l/r)]A \text{ Ltf}$$

where

l = unsupported span of the strut, stanchion, or pillar, in centimeters (feet)

r = least radius of gyration, in centimeters (inches)

A = area of the strut, stanchion or pillar, in cm^2 (in^2)

.6 Calculated Load

The calculated load W for a specific stanchion, pillar or strut is to be obtained from the following equation:

$$W = 1.025bDs \text{ tf} \quad W = 0.0286bDs \text{ Ltf}$$

where

b = mean breadth of the area supported, in meters (feet)

D = depth of the barge, in meters (feet)

s = length of the area supported, in meters (feet)

.7 Diagonals

Diagonals in trusses are to be arranged to have angles of inclination of about 45° , and a sectional area of approximately 50% of that of the adjacent stanchion.

.8 End Connections

The required welding area of end connections of stanchions and diagonals is not to be less than the following:

Stanchions: 75% of the area of the stanchions

Diagonals: 50% of the area of the diagonal

In determining the weld area provided, the throat dimension of the fillet is to be used.

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Deck

The requirements of this Section are generally intended to apply to double bottom dry non-propelled barges

.9 Framing Arrangements in Holds

The structural requirements for frames, side shell stringers, etc., are to be in accordance with the requirements of the Administration.

.10 Double Bottom

.1 Center Girder

A center girder is to extend as far forward and aft as practicable. The plates are to be continuous within the midships three-quarters length. Elsewhere, they may be intercostal between the floors. Where double bottoms are to be used for ballast, the center girder is to be intact, but need not be tested under pressure. This requirement may be modified in narrow tanks at the ends of the barge or where other intact longitudinal divisions are provided at about $0.25B$ from the centerline. Where the girder is not required to be intact, manholes may be cut in every frame space outside the midships three-quarters length. They may be cut in alternate frame spaces within the midships three-quarters length in barges under 90 m (295 ft) in length, provided the depth of the hole does not exceed one third the depth of the center girder.

.2 Side Girders

Side girders are to be extended as far forward and aft as practicable. They are to be so arranged that the distance from the center girder to the first side girder, between the girders or from the outboard girder to the outboard abutment does not exceed 4.6 meters (15.0 feet).

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Deck

.11 Solid Floors

.1 Longitudinally Framed Double Bottoms

Longitudinally framed double bottoms are to have solid floors of the type required by the Administration and spaced not more than 3.66 meters (12.0 feet) apart, and are to have a thickness not less than given by the following equation:

$$t = 0.036L + 6.0 \text{ mm} \quad t = 0.000432L + 0.236 \text{ in.}$$

The floors are to have stiffeners fitted at every longitudinal.

.2 Transverse Framed Double Bottoms.

Solid floors are to be fitted on every frame forward on $0.3L$ from amidships and are to have a thickness not less than given by the following equation:

$$t = 0.036L + 4.5 \text{ mm} \quad t = 0.000432L + 0.177 \text{ in.}$$

Barges Intended for the Carriage of Dry Non-propelled in Holds Below Decks

.3 Open Floors

Open floors are to be fitted at each frame between the solid floors and are to satisfy the following requirements.

.4 Frames and Reverse Frames

Each frame and reverse frame in association with the plating to which they are attached, is to have a section modulus SM as obtained from the following equation:

$$SM = 7.8chs^2 \text{ cm}^3 \quad SM = 0.0041chs^2 \text{ in}^3$$

where

s = spacing of frames, in m (ft)

c = 1.0 without struts

= 0.5 with struts

h = distance, in m (ft), from the keel to the load line or two-thirds of the distance to the bulkhead or freeboard deck, whichever is greater. In the case of reverse frames without struts, the distance may be measured from the top of the double bottom.

l = distance, in m (ft), between the connecting brackets on the centerline girder and the margin plate. Where side girders are fitted, they shall be in accordance with the applicable Regulation of an IACS Member Society or, refer to the Administration (SRO, MARINA).

.5 Bottom Longitudinal Frames

Each bottom longitudinal frame in association with the plating to which it is attached is to have a section modulus SM not less than obtained from the following equation:

$$SM = 7.8chs^2 \text{ cm}^3 \quad SM = 0.0041chs^2 \text{ in}^3$$

where

c = 1.30 without struts

= 0.715 with effective struts

h = distance, in m (ft), from the keel to the load line, or two-thirds of the distance to the bulkhead or freeboard deck, whichever is greater

s = spacing of longitudinals, in m (ft)

.6 Structural Sea Chests

Where the inner bottom or the double bottom structure form part of a sea chest, the thickness of the plating is to be not less than that of the shell plating in the same location, but need not exceed 25 mm (1.0 in.).

.7 Manholes and Lightening Holes

Manholes and lightening holes are to be cut in all non-tight members, except in way of widely spaced pillars, to ensure accessibility and ventilation. The proposed locations and sizes of holes are to be indicated on the plans submitted for approval. Manholes in tank tops

are to be sufficient in number to ensure free ventilation and ready access to all parts of the double bottom. Care is to be taken in locating the manholes to avoid the possibility of interconnection of the main subdivision compartments through the double bottom insofar as practicable. Covers are to be of steel or other approved material and where no ceiling is fitted in the non-propelled holds, they are to be effectively protected against damage by the non-propelled.

Regulation 9

Mooring and Towing Arrangements for Barges

- 1 The towing and mooring arrangements shall be such as to reduce to a minimum any danger to personnel during towing or mooring operation. Such arrangements shall be suitable for the particular type of barge and of adequate strength.
- 2 The design and arrangements of fittings or equipment for towing and mooring of barges shall be to the satisfaction of the Administration and shall take into account both normal and emergency conditions.
- 3 Secondary or emergency towing arrangements shall be fitted on board the barge so as to be easily recoverable by the towing tug in the event of failure of the main towing wire or failure of ancillary equipment.

Regulation 10

General Protection Measures against Accidents

- 1 The dimensions of access hatches shall be such that it will allow a person to have a quick and easy escape to a safe place in the event of an emergency. Where practicable, the dimensions of access hatches of non-propelled, and accommodations spaces shall be such that they will facilitate expeditious rescue operation
- 2 Handrails, grabrails and handholds of sufficient size and strength shall be provided to the satisfaction of the Administration as support for persons when the barges is severely rolling or pitching.

CHAPTER II

ELECTRICAL INSTALLATION

Regulation 1

Source of Electrical Power

A source of electrical power of sufficient capacity to supply those services needed by this type of barge shall be provided accordingly.

A self-contained emergency source of electrical power shall be provided or as per recommendation by the manufacturer as such practice a one (1) unit 24- volt battery for marine use to maintain services of the vessel's navigational lights as required by COLREG.

Regulation 2

Electrical Systems

1 General – Electrical

Electrical installations are to be in accordance with the applicable requirements of the Administration except as modified herein. These requirements may also be modified for barges for limited service and for barges having an aggregate generator capacity not exceeding 75 kW.

2 Plans and Data to be submitted

The following plans and data are to be submitted in triplicate to the Administration.

Batteries giving the details of the arrangement, cable overload and reverse power protection, and corrosion protection.

3 Accessibility

The design and arrangement of electrical apparatus is to provide accessibility to parts requiring inspection or adjustment.

4 Watertight Equipment

All electrical equipment exposed to the weather or located in spaces where it would be exposed to the sea, splashing or other severe moisture condition is to be of a watertight type or be protected by means of watertight enclosures.

In general, all electrical equipment is to be constructed of durable, flame-retardant, moisture-resistant materials which are resistant to deterioration in the atmospheres and at the temperatures to which they are likely to be exposed.

Regulation 3

Special Considerations

The Administration may waive any of the requirements specified in this Regulation taking into account the requirements of electrical power and the size of the barges.

CHAPTER III

FIRE PROTECTION AND FIRE EXTINCTION

Regulation 1

Application to Existing Non-propelled Barges

The provisions of the present Regulation shall apply to existing non-propelled barges, within a period not exceeding three years from the date of entry into force of the present Regulations, where they are regarded by the Administration as necessary and reasonable.

Regulation 2

General

1 Unless provided otherwise under the present Regulation, the provisions on fire protection shall comply with the Fire Safety System Code, as amended, adopted by the IMO Maritime Safety Committee in Resolution MSC.98 (73).

2 When the nature and conditions of the voyage are such that the application of the present Regulations is neither necessary nor reasonable, the Administration may adopt alternative arrangements if it is satisfied that they are as effective as the measures set out in the present Regulation.

Regulation 3

Fire Prevention

1 Paints, varnishes or other substances with a nitro-cellulose or toxic base, or highly flammable products shall not be used.

2 Precautions shall be taken to avoid combustible substances or vapors coming into contact with parts reaching elevated temperatures. In particular:

- .1 arrangements shall be made to ensure that sparks or flames from smoke ducts such as those of cooking or heating appliances cannot penetrate ventilation ducts;
- .2 appliances with naked flames or unprotected resistors for lighting and heating of accommodation shall be prohibited;

3 Insulation materials shall be approved by the appropriate authority.

4 The fixing of combustible parts less than 60 cm from appliances such as ovens and furnaces shall be prohibited unless special precautions are taken to insulate them.

5 Materials readily rendered ineffective by heat shall not be used for overboard scuppers, discharges which are close to the water line or for accessories whose destruction in the event of fire would give rise to a risk of flooding.

6 Oil or oil fuel pipes shall be of steel or other authorized materials taking into account the risk of fire.

7 Air extraction ducts from bunkers and tanks containing combustible liquids shall be fitted with an effective fire-screen capable of being easily cleaned and which shall not significantly reduce the effective diameter of the air duct and shall comply with the provisions of paragraph 6.

8 Mechanical ventilation of closed ro-ro non-propelled spaces carrying motor vehicles with fuel in their tanks for their own propulsion and machinery spaces, if any, shall be capable of being stopped from a point easily accessible and identifiable located outside such spaces.

9 Ventilation ducts serving non-propelled spaces, closed ro-ro non-propelled spaces and machinery spaces shall be provided on their upper parts with non-combustible means of closing.

10 Other openings in machinery spaces shall be capable of being closed from outside those spaces.

Regulation 4

Ready Availability of Fire-Extinguishing Appliances

1 Fire-extinguishing appliances shall be kept in good order and be available for immediate use at all times.

2 Equipment and systems shall be subject to periodic tests to ensure that they are in good working order or special checks depending on their nature, at least once a year. The date and purpose of such inspections shall be recorded in a maintenance and test log, and noted in the ship's log.

Regulation 5

Carriage of Dangerous Goods

The provisions of Regulation VII of the SOLAS Convention shall apply to the carriage of dangerous goods in containers.

Unless expressly provided otherwise, these Regulations shall apply to non-propelled barges regardless of size and tonnages.

Regulation 6

Portable Fire Extinguishers

1 Every non-propelled barge shall be provided with a sufficient number of approved portable fire extinguishers to ensure that at least two (2) extinguisher will be readily available for use in any part of accommodation spaces and service spaces.

The approved fire control plan shall be the basis in determining the required minimum number of portable fire extinguishers.

2 Every non-propelled barge where, in the opinion of the Administration, electrical installations fitted in accommodation, service and control stations constitute hazard of fire or explosion, additional fire extinguishers suitable for extinguishing electrical fires shall be provided.

Portable and semi-portable extinguishers are to be provided in the quantities, minimum weight/capacity and locations approved by the Administration. The fire extinguishers are to be visible and readily accessible.

Regulation 7

Fireman's Axe

Every non-propelled barge shall be provided with at one (1) fireman's axe in an easily accessible location outside the accommodation and service spaces.

In addition, instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire shall be kept under one cover, readily available in an accessible position.

Regulation 8

Fire Protection Requirements for Non-propelled Barges Less Than 24 Meters

1 Non-propelled Barges less than 24 m in length, the provisions specified in this Regulation may be relaxed to the extent except that no relaxation shall be granted to this type of vessel in the carriage of dangerous, hazardous and harmful cargoes shall not be permitted unless approved by the Administration.

2 Non-propelled barges shall be provided with fire buckets as follows:

- .1 Fire buckets shall be provided which shall be of a material which is not readily flammable. They shall be painted red, clearly marked with the word

- "FIRE" and provided with lanyards of sufficient length, having regard to the size of the barges;
- .2 the capacity of each of the fire buckets referred to in this part shall be at least ten liters
 - .3 fire buckets provided in compliance with this Regulation shall not be used for any other purpose than extinguishing fire;
 - .4 Where the provision of fire extinguishing system is considered to be impracticable, the Administration may accept alternative arrangements.

Regulation 9

Acceptance of Substitutes

Where in this Regulation, a type of appliance, apparatus, fire-extinguishing medium or arrangement is specified, any other type of appliance may be allowed provided the Administration is satisfied that it is not less efficient.

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CHAPTER IV

LIFE-SAVING APPLIANCES and EQUIPMENT

Regulation 1

Application

Life-saving appliances and equipment fitted on-board non-propelled barges plying the domestic trade shall in accordance to these Regulation and Regulations conform to its type of operation.

Regulation 2

Alternative Specifications

The Administration may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this Regulation unreasonable or unnecessary, an approved alternative specifications that are equally effective under the circumstances shall be recommended.

Regulation 3

Approval of Life-Saving Appliances and Arrangements

1 Life-saving appliances and arrangements required by this Regulation shall be approved by the Administration. Before giving approval to life-saving appliances and arrangements, the Administration shall ensure that such life-saving appliances and arrangements shall comply with the regulation and regulations.

2 Where novel life-saving appliances or arrangements are to be approved, the Administration shall ensure that they provide the same safety standards as specified herein and that such appliance and arrangements are evaluated and tested in accordance with the recommendation of the IMO.

Regulation 4

Distress Signal System

Every non-propelled barges shall carry at least two-(2) rocket parachute flares and two-(2) smoke signal trading in Coastwise and two (1) rocket parachute flares and two (1) smoke signal trading in Bay and River respectively.

Regulation 5

Personal Life-Saving Appliances

- 1 Every non-propelled barges shall carry at least two (2) lifebuoys of which at least:
 - .1 For non-propelled barges permitted to engage in Coastwise trading, 50% of the required lifebuoys and, in no case not less than one (1), shall be fitted with a manually activated smoke signal and as well as a buoyant line of at least 25 meters in length.
 - .2 For non-propelled barges permitted to engage in Bay and River trading, 50% of the required shall only be fitted with a buoyant line of at least 25 meters in length.
- 2 Every non-propelled barges shall carry one (1) approved-type life jacket for every person authorized on-board. Lifejackets shall be fitted with retro-reflected material, whistle and light.

Regulation 6

Survival Craft

Every non-propelled barges shall carry at least (1) rigid liferaft capable to accommodate the total number of persons authorized onboard.

CHAPTER V

SAFETY OF NAVIGATION

Regulation 1

General

Domestic tugboats towing or pushing non-propelled barges as far as practicable should comply with the regulations relating to the routing measures adopted by the Administration (Safety of Navigation) of SOLAS 1974 as amended and the International Convention on Regulations for Preventing Collisions at Sea, (COLREG) 1972 including its annexes I, III and IV.

Regulation 2

Positioning and Technical Details of Lights and Shapes (For Tugboats and Its Towing Barges)

- 1 Regulation in this Part shall be complied within all weathers.
- 2 The Regulation concerning lights shall be complied with from sunset to sunrise and during such times no other lights shall be exhibited, except such lights as cannot be mistaken for the lights specified in these Regulation or do not impair their visibility or distinctive character, or interfere with the keeping of a proper look-out.
- 3 The lights prescribed by these Regulation shall, if carried, also be exhibited from sunrise to sunset in restricted visibility and may be exhibited in all other circumstances when it is deemed necessary.
- 4 The Regulation concerning shapes shall be complied with by day.
- 5 The lights and shapes specified in these Regulation shall comply with the provisions of Annex I of COLREG 1972

Regulation 3

Visibility of Lights

The lights prescribed in these Regulation shall have intensity as specified so as to be visible at the following minimum ranges:

- 1 In vessels of 50 metres or more in length:
 - .1 a masthead light, 6 miles;
 - .2 a sidelight, 3 miles;
 - .3 a stern light, 3 miles;
 - .4 a towing light, 3 miles;
 - .5 a white, red, green or yellow all-round light, 3 miles.
- 2 In vessels of 12 metres or more in length but less than 50 metres in length:
 - .1 a masthead light, 5 miles; except that where the length of the vessel is less than 20 metres, 3 miles;
 - .2 a sidelight, 2 miles;
 - .3 a stern light, 2 miles;
 - .4 a towing light, 2 miles;
 - .5 a white, red, green or yellow all-round light, 2 miles.
- 3 In vessels of less than 12 metres in length:
 - .1 a masthead light, 2 miles;
 - .2 a sidelight, 1 mile;

- .3 a stern light, 2 miles;
 - .4 a towing light, 2 miles
 - .5 a white, red, green or yellow all-round light, 2 miles.
- 4 In inconspicuous, partly submerged vessels or objects being towed:
a white all-round light, 3 miles.

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