

RULES
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CHINA CLASSIFICATION SOCIETY

RULES FOR CONSTRUCTION OF SEA-GOING SHIPS ENGAGED ON DOMESTIC VOYAGES

AMENDMENTS

2026

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CHINA CLASSIFICATION SOCIETY

**RULES FOR CONSTRUCTION OF
SEA-GOING SHIPS ENGAGED ON
DOMESTIC VOYAGES**

AMENDMENTS

2026

PART TWO HULL

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CHAPTER 1 GENERAL

Section 2 HULL STRUCTURAL MEMBERS

1.2.6 Secondary member end connections

1.2.6.1 Unless otherwise specified in this PART, the end connections of secondary members are to comply with the requirements of 1.2.6.

1.2.6.2 The ends of secondary members are generally to be bracketed, see Figure 1.2.6.2. Where secondary members pass through primary members, secondary members are to be connected to the webs of primary members by welding.

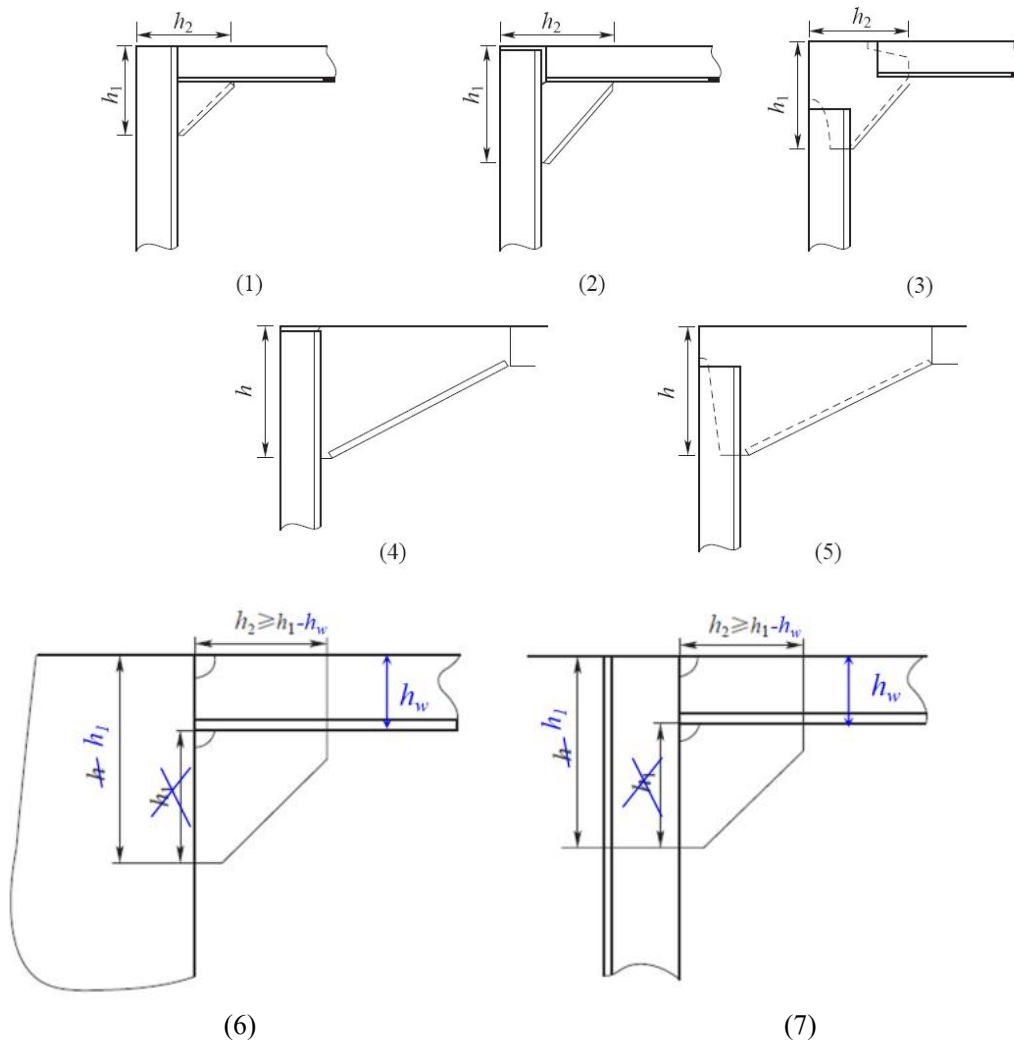


Figure 1.2.6.2

1.2.6.3 Where the secondary members contributing to longitudinal bending strength are cut in way of bulkheads or transverse primary members, connecting brackets are to be provided so as to ensure the longitudinal continuity. The brackets at both sides of the bulkheads or transverse primary members are to be in alignment.

1.2.6.4 The section modulus W of frames that is used for determining the scantlings of brackets is to be selected as follows:

- (1) For the brackets connecting the secondary to the primary members, W is the section modulus of the secondary members.
- (2) For the brackets at frame ends, W is the section modulus of the frames.
- (3) For other brackets, W is the lesser of section moduli of two connecting members.

1.2.6.5 The thickness t of brackets is to be not less than that obtained from the following

formulae:

$$t = (0.25\sqrt{W} + 2) \sqrt{\frac{R_{eH_s}}{R_{eH_b}}} + C \quad \text{mm, for brackets with face plate or flanged brackets}$$

$$t = (0.25\sqrt{W} + 3.5) \sqrt{\frac{R_{eH_s}}{R_{eH_b}}} + C \quad \text{mm, for brackets without face plate or unflanged brackets}$$

where: W — Rule section modulus of frames, in cm^3 ;
 R_{eH_s} — yield stress of material of frames, in N/mm^2 ;
 R_{eH_b} — yield stress of material of brackets, in N/mm^2 ;
 C — coefficient, taken as 2.5 for brackets in tanks or 1.5 for other brackets.

The minimum thickness of brackets is generally to be 6.5 mm and need not be greater than 15 mm.

1.2.6.6 Where the Rule section modulus W of frames is not less than 500 cm^3 or the free edge is more than 50 times the thickness of brackets in length, the brackets are to be flanged or fitted with face plates. The breadth b of the flanges or face plates is not to be less than that obtained from the following formula:

$$b = 0.04W + 40 \text{ mm, and not less than } 50 \text{ mm}$$

where: W — Rule section modulus of frames, in cm^3 .

1.2.6.7 The arm length h of brackets is not to be less than 2.2 times the **web** depth of frames l_w (where the ends of frames are welded, it may be reduced to not less than twice the **web** depth, see Figure 1.2.6.2 (1)), and is not to be less than that obtained from the following formula:

$$h = 75 \sqrt{\frac{W}{t - C}} \quad \text{mm}$$

where: W — Rule section modulus of frames, in cm^3 ;
 t — thickness of brackets, in mm;
 C — coefficient, see 1.2.6.5 of this Section.

1.2.6.8 The two arms of the brackets are to be as far as possible equal in length. Where the two arms are not the same in length, they are to comply with the following:

$$\begin{aligned} h_1 + h_2 &\geq 2h \\ h_1 &\geq 0.8h \\ h_2 &\geq 0.8h \end{aligned}$$

where: h_1, h_2 — actual length of bracket arms, in mm, as shown in Figure 1.2.6.2;
 h — arm length of brackets, in mm, see 1.2.6.7 of this Section.

1.2.6.9 Where the frame is lapped to the bracket, the length of overlap is not to be less than 1.25 times the **web** depth of the frame l_w .

1.2.6.10 Where the frames are bracketed to primary members, such brackets are in general to be extended to the face plates of primary members.

Section 5 DIRECT STRENGTH CALCULATIONS

1.5.6 Direct strength calculation for cargo holds

1.5.6.4 The meshing of elements is to be in compliance with the following principles:

(1) Meshes are divided for each spacing of longitudinals or similar spacing in transverse and vertical direction of hull and for each spacing of frames or similar spacing in longitudinal direction of hull, and so are side meshes divided. Meshes are to be shaped square as far as practicable.

(2) Not less than three plate elements are to be arranged in vertical direction for bottom girders and floors. Not less than two plate elements are to be arranged in vertical direction for ring structures of hopper tanks and top wing tanks.

(3) In general, each flange plate or web plate of a corrugated bulkhead is to be taken at least as a plate element; for the plate elements at the lower end of the corrugated bulkhead in the vicinity of lower stool and for the elements adjacent to stool plate, the aspect ratio is to be close to 1.

(4) Normally, the aspect ratio of plate elements is not to exceed 3, and the aspect ratio of plate elements for corrugated bulkhead is not to exceed 2. Triangular plate elements are to be minimized in modeling as far as possible; the aspect ratio of plate elements is to be close to 1 as far as

possible within the high stress area or area of high stress gradient and triangular plate elements are to be avoided.

(5) When detailed stress analysis is used, mesh refinement modeling is to simulate the real geometry and structural details of the structure insofar as practicable, so as to accurately reflect the true structural response of the refined nodes.

Section 6 CORROSION CONTROL FOR HULL STRUCTURES

1.6.4 External hull protection

1.6.4.1 Shell plating, particularly the portion between light and loaded load lines, weather decks and hatch covers are to be provided with suitable corrosion protection.

1.6.4.2 Where an impressed current cathodic protection system is fitted, plans or information showing the proposed layout of anodes, reference electrodes, wiring and methods of attaching to the rudder and propeller, are to be submitted.

1.6.4.3 A small cofferdam is to be included in the arrangements for glands, where cables pass through the shell. Cables ~~to anodes~~ are not to be led through compartments with cargoes or fuels having a flashpoint not exceeding 60°C tanks intended for the carriage of low flash point oils. Where cables are led through cofferdams ~~or clean ballast tanks~~ of these compartments tankers, they are to be enclosed in a substantial steel tube of at least 10 mm thickness.

1.6.4.4 For ships subject to in-water survey instead of drydocking survey, the underwater portion of the hull is to be coated with a high resistant paint. Details of the high resistant paint are to be submitted to CCS for information.

CHAPTER 2 HULL STRUCTURES

Section 1 GENERAL PROVISIONS

2.1.2 Plans and documents

2.1.2.1 Plans and documents covering the following items are to be submitted to CCS for approval. In the case of special constructions and arrangements, additional plans and documents may be required if considered necessary by CCS:

- (1) Principal transverse sections;
- (2) Construction profile, including longitudinal sections, decks, inner bottom, superstructures and deckhouses;
- (3) Stem;
- (4) Stern frame;
- (5) Shell expansion;
- (6) Oiltight and watertight bulkheads;
- (7) Main engine seating and thrust bearing seating;
- (8) Propeller shaft bracket;
- (9) Hatch coamings;
- (10) Cargo hatch covers;
- (11) Arrangement of anchoring equipment including equipment number calculations;
- (12) Rudder, rudder stock and tiller;
- (13) Masts, derrick posts and crane pedestals, together with their support structures;
- (14) Ice strengthening with calculations;
- (15) Welding, including type and size of welds;
- (16) Preliminary and finished loading manuals;
- (17) [Typical nodes \(which may be included in the profile\).](#)

Section 8 DECK FRAMING

2.8.7 Longitudinal framing — deck transverses

2.8.7.8 Holes [may be](#) cut for the passage of pipes or cables in the web of deck transverses, [and the edges of holes are to be smooth and well-rounded, as shown in Figure 2.8.7.8.](#) Holes are to have a depth h not greater than 25% of that of the web H and a width l not exceeding 60% of the spacing of deck longitudinals s or the web depth H , whichever is the greater, [and the distance \$h_1\$ from the lower edge of hole to the face plate of deck transverses is not to be less than 40% of web depth \$H\$,](#) otherwise compensation is required.

Normally the compensation is achieved by fitting doublers, spigots or insert plates for strengthening, and the cross-sectional area of such strengthening pieces is to be not less than that lost from the web due to openings. The strength level of the material of strengthening pieces is not to be lower than that of the web material. [Holes after compensation are generally to comply with the following requirements: holes after compensation are to have a depth \$h\$ not greater than 35% of the web depth \$H\$; the distance \$h_2\$ from the upper edge of hole to the deck after compensation is not to be less than 10% of web depth \$H\$ and at least 50 mm; the distance \$h_1\$ from the lower edge to the face plate is not to be less than 20% of web depth \$H\$ and at least 60 mm. ~~The edges of holes are not to be less than 40% of the web depth from the face plate of deck transverses. The edges of the holes are to be smooth and well rounded.~~](#)

The holes are not to be concentrated in the spacings of adjacent longitudinals, [i.e. the spacing \$l_1\$ between the edges of two adjacent holes is to be not less than twice the hole width \$l\$ \(where the widths of two adjacent holes are different, \$l\$ is to be taken as the greater one\).](#) No holes are to be cut on the web of deck transverses within 200 mm from the bracket toe of deck transverses, [and holes are to be avoided in high stress areas.](#)

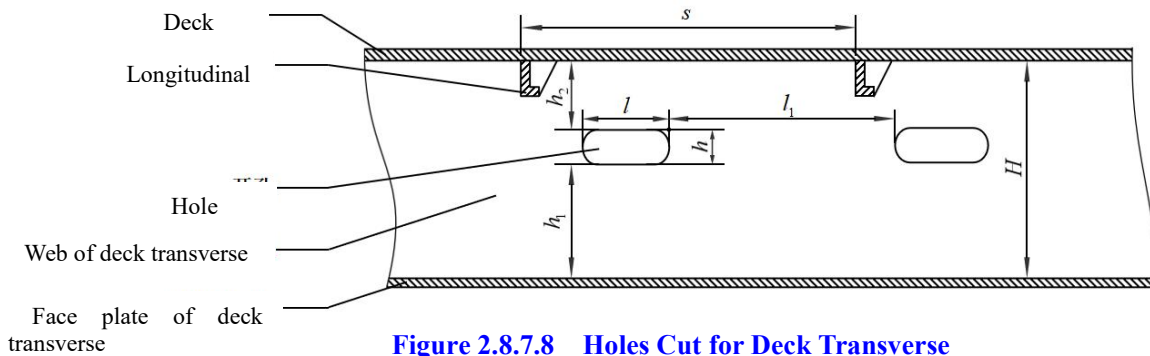


Figure 2.8.7.8 Holes Cut for Deck Transverse

Section 20 HATCHWAYS AND HATCH COVERS

2.20.2.3 The net structural scantling of weathertight steel hatch covers is to be in compliance with the following requirements:

(1) Local net plate thickness

The local net plate thickness of the hatch cover top plating is not to be less than that obtained from the following formulae, and not less than 6 mm:

$$t = 0.0158 F_p s \sqrt{\frac{p}{0.95 R_{eH}}} \quad \text{mm}$$

$$t = 0.01s \quad \text{mm}$$

where: F_p — factor for combined membrane and bending response, calculated as follows:

$$F_p = 1.5 \quad \text{in general;}$$

$$F_p = 1.9 \frac{\sigma}{\sigma_a} \quad \text{for } \frac{\sigma}{\sigma_a} \geq 0.8 \text{ for the attached plate flange of primary supporting}$$

members;

s — stiffener spacing, in mm;

p — pressure p_H and p_L , calculated according to 2.20.2.2 of this Section, in kN/m²;

σ — maximum normal stress of hatch cover top plating, in N/mm², determined according to Figure 2.20.2.3;

σ_a — permissible stress, see Table 2.20.2.5., in N/mm²;

R_{eH} — yield stress of materials, in N/mm².

For flange plates under compression, the buckling strength requirements of 2.20.2.6 of this Section are to be complied with.

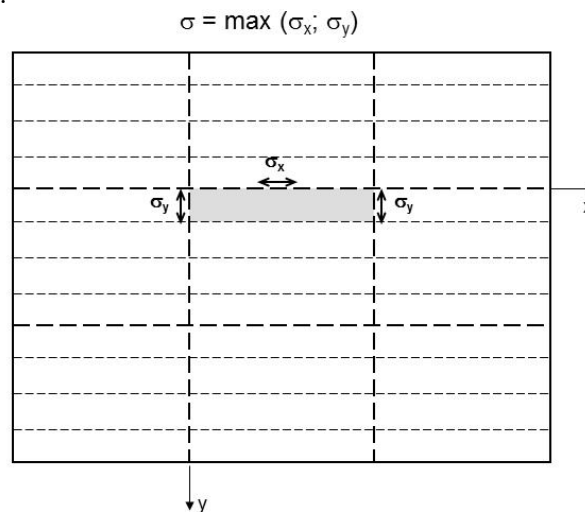


Figure 2.20.2.3

① The local net plate thickness of hatch covers for wheel loading is also to meet the relevant requirements of Section 21 of this Chapter.

② The local net plate thickness of lower plating of double skin hatch covers and box girders are to comply with the following requirements:

The thickness to fulfill the strength requirements is to be obtained from the calculation according to 2.20.2.4 under consideration of allowable stresses according to 2.20.2.5 of this Section. When the lower plating is taken into account as a strength member of the hatch cover, the net thickness, in mm, of lower plating is to be taken not less than 5 mm. When project cargo is intended to be carried on a hatch cover, the net thickness is not to be less than:

$$t = 6.5s \times 10^{-3} \quad \text{mm}$$

where: s — stiffener spacing, in mm.

When the lower plating is not considered as a strength member of the hatch cover, the thickness of the lower plating is not to be less than 5 mm.

Note:

Project cargo means especially large or bulky cargo lashed to the hatch cover. Examples are parts of cranes or wind power stations, turbines, etc. Cargoes that may be considered as uniformly distributed over the hatch cover, e.g. timber, pipes or steel coils need not to be considered as project cargo.

(2) The stiffeners of hatch covers are to comply with the following requirements:

The net section modulus Z and net shear area A_{shr} of uniformly loaded hatch cover stiffeners constrained at both ends are not to be less than:

$$Z = \frac{psl^2}{f_{bc}\sigma_a} \quad \text{cm}^3$$

$$A_{shr} = \frac{8.7psl}{\sigma_a} 10^{-3} \quad \text{cm}^2$$

where: l — secondary stiffener span, in m, to be taken as the spacing of primary supporting members or the distance between a primary supporting member and the edge support, as applicable. When brackets are fitted at both ends of all stiffener spans, the secondary stiffener span may be reduced by an amount equal to 2/3 of the minimum brackets arm length, but not greater than 10% of the unsupported span, for each bracket;

s — spacing of stiffeners, in mm;

p — p_H and p_L , to be calculated according to 2.20.2.2 of this Section, in kN/m²;

f_{bc} — boundary coefficient of stiffener, taken equal to:

$f_{bc} = 8$, in the case of stiffener simply supported at both ends or simply supported at one end and clamped at the other end;

$f_{bc} = 12$, in the case of stiffener clamped at both ends.

σ_a — allowable stress as defined in Tab.2.20.2.5, in N/mm².

For secondary stiffeners of lower plating of double skin hatch covers, requirements mentioned above are not applied due to the absence of lateral loads. For double skin hatch covers of holds designed for ballast or liquid cargo, the stiffeners on lower plating are to be strengthened according to CCS requirements.

The net thickness, in mm, of the stiffener (except U-beams/trapeze stiffeners) web is not to be less than 4 mm.

The net section modulus of secondary stiffeners is to be determined based on an attached plate width assumed equal to the stiffener spacing.

Stiffeners parallel to primary supporting members are to be continuous at crossing primary supporting members, and may be considered for calculations regarding cross-sectional properties of primary members. It is to be verified that the combined stress of those stiffeners induced by the bending of primary supporting members and lateral pressures does not exceed the allowable stresses according to 2.20.2.5 of this Section. When the lower plating is not taken into account as a strength member of the hatch cover, the requirements of this paragraph are not necessary for the

stiffeners of lower plating.

For hatch cover stiffeners under compression, sufficient safety against lateral and torsional buckling according to 2.20.2.6 of this Section is to be verified.

For hatch covers subject to wheel loading, the relevant requirements of Section 21 of this Chapter are to be complied with. For hatch covers subject to point loads, stiffener scantlings are to be determined by direct calculations under consideration of the allowable stresses as required in 2.20.2.5 of this Section.

(3) The net scantlings of primary supporting members are to comply with the following requirements:

- ① Scantlings of primary supporting members are to be obtained from direct calculations according to 2.20.2.4 under consideration of allowable stresses according to 2.20.2.5 of this Section.

For all components of primary supporting members sufficient safety against buckling is to be verified according to 2.20.2.6 of this Section. ~~For biaxially compressed flange plates, the buckling strength is to be verified within the effective width according to 2.20.2.6(3)② of this Section.~~

The net thickness, in mm, of webs of primary supporting members is not to be less than:

$$t = 6.5s \times 10^{-3} \quad \text{mm}$$

$$t = 5 \quad \text{mm}$$

where: s — spacing of stiffeners, in mm.

- ② The net scantlings of edge girders are to comply with the following requirements:

Scantlings of edge girders are to be verified according to 2.20.2.4 under consideration of allowable stresses according to 2.20.2.5 of this Section.

The net thickness of the outer edge girders exposed to wash of seawater is not to be less than the largest of the following values:

$$t = 0.0158s \sqrt{\frac{P_A}{0.95R_{eH}}} \quad \text{mm}$$

$$t = 8.5s \times 10^{-3} \quad \text{mm}$$
~~$$t_{min} = 6 \quad \text{mm}$$~~
~~$$t_{min} = 5 \quad \text{mm}$$~~

where: s — spacing of stiffeners, in mm;

P_A — horizontal weather design pressure, calculated according to 2.20.2.2 of this Section, in kN/m²;

For the required moment of inertia of edge girders, refer to 2.20.2.9(1)④.

2.20.2.6 Buckling strength of hatch cover structures

(3) Buckling requirements

③ Applied lateral pressure and stresses

The buckling assessment of hatch covers is based on the lateral pressure as defined in ~~2.12.20.2.2(1)~~ and ~~2.22.20.2.2(2)~~, and stresses obtained from FE analysis, refer to 2.20.2.4.

④ Safety factors

For all hatch cover structural members, safety factor $S=1.0$ is to be applied to both of the plating and stiffener buckling capacity formulas as defined in 5.2.2, Section 5 of Appendix 5 and 5.2.3, Section 5 of Appendix 5, respectively.

⑤ Buckling acceptance criteria

A structural member is considered to have an acceptable buckling strength if it satisfies the following criterion:

$$\eta_{act} \leq \eta_{all}$$

where: η_{act} — Buckling utilisation factor based on the applied stress, as defined in 1.3.2.2, Section 1 of Appendix 5 and Section 4 of Appendix 5, and calculated per Section 5 of Appendix 5.

η_{all} — Allowable buckling utilisation factor, taken as given in Tab.2.20.2.6(3)⑤.

Allowable buckling utilisation factors

Table 2.20.2.6(3)⑤

Structural component	Subject to	η_{all} , allowable buckling utilisation factor
Plates and stiffeners Web of PSM	External pressure, as defined in 2.20.2.2(1)	0.80
	Other loads, as defined in 2.20.2.2(2)~(5)	0.90 for static+dynamic load case 0.72 for static load case

2.20.2.9 Closing arrangements of weathertight steel hatch covers

(1) Securing arrangements

① General requirements

Securing devices between cover and coaming and at cross-joints are to be installed to provide weathertightness. Sufficient packing line pressure is to be maintained. Securing devices are to be appropriate to bridge displacements between cover and coaming due to hull deformations.

Securing devices are to be of reliable construction and effectively attached to the hatchway coamings, decks or covers. Individual securing devices on each cover are to have approximately the same stiffness characteristics. According to the requirements of 2.20.2.3(3)② of this Section, a sufficient number of securing devices is to be provided at each side of the hatch cover, including that consisting of several parts.

The materials of stoppers, securing devices and their welding are to comply with the relevant requirements of CCS Rules for Materials and Welding. Specifications of the materials are to be shown in the drawings of the hatch covers.

② Rod cleats

Where rod cleats are fitted, resilient washers or cushions are to be incorporated.

③ Hydraulic cleats

Where hydraulic cleating is adopted, a positive means is to be provided so that it remains mechanically locked in the closed position in the event of failure of the hydraulic system.

④ Cross-sectional area of the securing devices

The gross cross-sectional area of the securing devices is not to be less than:

$$A = 0.28qS_{SD}k_l \quad \text{cm}^2$$

Correspondingly, the stiffness of edge girders is to be sufficient to maintain adequate sealing pressure between securing devices. The moment of inertia, in cm⁴, of edge girders is not to be less than:

$$I = 6qs_{SD}^4 \quad \text{cm}^4$$

where: q — packing line pressure, in N/mm, minimum 5 N/mm;

S_{SD} — spacing between securing devices, in m, not to be taken less than 2 m;

$$k_l = \left(\frac{235}{R_{eH}}\right)^e;$$

R_{eH} — the minimum yield stress of material, in N/mm², but not to be taken greater than $0.7R_m$;

R_m — tensile strength of material, in N/mm²;

$e = 0.75$ for $R_{eH} > 235$ N/mm²;

$e = 1.00$ for $R_{eH} \leq 235$ N/mm².

Rods or bolts are to have a gross diameter not less than 19 mm for hatchways exceeding 5m² in area.

Securing devices of special design in which significant bending or shear stresses occur may be designed as anti-lifting devices according to 2.20.2.9(1)⑤. The design load is taken as the packing line pressure q multiplied by the spacing S_{SD} between securing devices.

CHAPTER 3 EQUIPMENT AND OUTFITS

Section 1 RUDDERS

3.1.1 General requirements

3.1.1.2 Design considerations

(3) In rudder trunks which are open to the sea, a seal or stuffing box is to be fitted above the ~~deepest load~~ waterline at scantling draught (without trim), to prevent water from entering the steering gear compartment and the lubricant from being washed away from the rudder carrier. If the top of the rudder trunk is below the waterline at scantling draught (without trim), two separate watertight seals/stuffing boxes are to be provided.

3.1.9 Strength of rudder horns and rudder trunk

3.1.9.1 Rudder horns

(1) Equivalent stress

$$\tau_T = M_T 10^3 / 2A_T t_h, \text{ N/mm}^2;$$

M_T — torsional moment, in N·m;

A_T — ~~area in the horizontal section enclosed by the rudder horn (including the area of inner hollow area)~~ mean of areas enclosed by outer and inner boundaries of the thin walled section of rudder horn (i.e. the areas enclosed by centre line of the thin walled section), in mm²;

Appendix 1 GUIDELINES FOR CALCULATION OF BENDING MOMENT AND SHEAR FORCE DISTRIBUTION

2 The Forces on Rudder–Rudder Stock

2.4 Semi spade rudder with one elastic support

$$f_i = \frac{he^2 \sum u_i / t_i}{3.14 \times 10^8 F_T^2} \quad \text{m/kN}$$

F_T — mean of areas enclosed by outer and inner boundaries of the thin walled section of rudder horn (~~excluding the area of the inner hollow area~~i.e. the areas enclosed by centre line of the thin walled section), in m²;

2.5 Semi spade rudder with 2-conjugate elastic support

J_{th} — torsional stiffness factor of the rudder horn, in m⁴. For any thin wall closed section:

$$J_{th} = \frac{4F_T^2}{\sum_i \frac{u_i}{t_i}} \quad \text{m}^4$$

F_T — mean of areas enclosed by outer and inner boundaries of the thin walled section of rudder horn (~~excluding the area of the inner hollow area~~i.e. the areas enclosed by centre line of the thin walled section), in m²;

μ_i — length, in mm, of the individual plates forming the F_T area;

t_i — thickness, in mm, of the individual plates mentioned above.

For solid rudder horn, τ_T is to be calculated based on the specific geometrical shape.

where:

F_{A1}, F_{A2} — support forces, in N;

A_H — effective shear sectional area of the rudder horn, in mm², in y -direction;

M_T — torque, in N·m;

F_T — mean of areas enclosed by outer and inner boundaries of the thin walled section of rudder horn (~~excluding the area of the inner hollow area~~i.e. the areas enclosed by centre line of the thin walled section), in m²;

CHAPTER 10 TUGS

Section 5 TOWING ARRANGEMENTS AND SUPPORTING STRUCTURE

10.5.1 Towing hooks and towing winches

10.5.1.1 Towing hooks or the position of fixed towing guide point are normally to be situated at 5% to 10% of the ship's length abaft amidships, but in no case are they to be sited forward of the longitudinal centre of gravity of the tug in any anticipated condition of loading, [except for tugs engaged in backward towing operation](#). In addition, they are to be located as low as practicable in order to minimize heeling moments arising in normal working conditions.

CHAPTER 12 BARGES

Section 1 GENERAL PROVISIONS

12.1.1 Application

~~12.1.1.3 For pontoons regarded as one of offshore floating facilities, the structure may be in accordance with the requirements of this Chapter for pontoon barges.~~

12.1.1.3 For pontoon barges, the rule length L is 97% of the extreme length on the waterline at the scantling draught.

Section 2 LONGITUDINAL STRENGTH

12.2.1 General requirements

12.2.1.1 The longitudinal strength of barges is to comply with the relevant requirements of Section 2, Chapter 2 of this PART, with the exception of the requirements for loading instruments. For pontoon barges of less than 100 m in length, the coefficient C in 2.2.3.1, Section 2, Chapter 2 of this PART is calculated in accordance with the following formulae:

$$\begin{aligned} C &= \frac{0.0016L^2 - 0.1539L + 7.9653}{} && \text{for } L < 90 \text{ m;} \\ C &= \frac{-0.0108L^2 + 2.1363L - 97.714}{} && \text{for } 90 \leq L < 100 \text{ m.} \end{aligned}$$

Section 4 HULL ENVELOPE FRAMING

12.4.5 Truss structure of pontoon barges

12.4.5.6 Diagonals are generally to have an angle of inclination with the horizontal of 45°, and a cross-sectional area of generally not less than 50% of that required for ~~of~~ the adjacent pillar.

Section 5 STRENGTHENING AT ENDS OF SHIP

12.5.3 Strengthening of structures of bottom forward against slamming

12.5.3.2 Where pontoon barges are towed or pushed at a speed of less than 10 kn and minimum fore draught equal to or greater than $0.01L$ (L being length of ship, in m), with trim being kept at zero, the requirements for strengthening of bottom forward in Section 15, Chapter 2 of this PART may be dispensed with.

CHAPTER 13 FLOATING CRANES

Section 1 GENERAL PROVISIONS

13.1.1 Application

13.1.1.1 This Chapter applies to single-deck crane barges with both deck and bottom being framed longitudinally.

[13.1.1.2 This Chapter also applies to salvage ships and pile driving barges.](#)

13.1.1.23 Those not covered in this Chapter are to comply with the relevant requirements of Chapter 2 of this PART.

CHAPTER 14 DREDGERS

Section 3 SHELL ENVELOPE PLATING

14.3.3 Openings in shell plating

14.3.3.1 The corners of hopper door openings or wells in the bottom are to be [elliptical or rounded](#), and the ratio of the radius of corners to the width of openings is not to be less than 1/10.

Section 4 DECKS AND DECK FRAMING

[14.4.5 Deck openings](#)

[14.4.5.1 For hatches in the strength deck, the corner is to be elliptical or rounded. For the corners at the foremost and aftmost ends of the hopper, the ratio of the corner radius to the opening width is not to be less than 1/10. For rounded corner with negative radius, verification is to be carried out by direct calculation.](#)



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2026

**PART THREE MACHINERY
INSTALLATIONS**

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CHAPTER 1 GENERAL

Section 2 GENERAL PROVISIONS

1.2.3 Astern power

1.2.3.1 ~~In order to maintain sufficient manoeuvrability and secure control of the ship in all normal circumstances, the main propulsion machinery is to be capable of reversing the direction of thrust so as to bring the ship to rest from the maximum service speed. The main propulsion machinery is to be capable of maintaining in free route astern at least 70% of the ahead revolution. The minimum astern power required by SOLAS II-1/28.1 to secure proper control of the ship in all normal circumstances is to be determined by the ship designer and is not to exceed the maximum permissible astern power (MPAP) for which the propulsion plant is designed. Astern trials are to be conducted in accordance with the provisions of ISO 19019:2005, section 5.4: Astern trials.~~

1.2.3.2 Where steam turbines are used for main propulsion, ~~the astern trial is to demonstrate that~~ they are to be capable of ~~maintaining operating at their maximum permissible astern power (MPAP) in free route astern at least 70% of the ahead revolution~~ for a period of at least 15 min. The astern trial is to be limited to 30 min or in accordance with manufacturer's recommendation to avoid overheating of the turbine due to the effects of "windage" and friction.

1.2.3.3 ~~For the main~~ Main propulsion systems with reversing gears, controllable pitch propellers or electric propeller drive ~~are to be designed for the maximum permissible astern power, running astern which~~ is not to lead to the overload of propulsion machinery.

1.2.3.4 ~~Main propulsion systems are to undergo tests to demonstrate the astern response characteristics.~~ The ~~astern~~ tests are to be carried out ~~at least over the manoeuvring range of the propulsion system and~~ from all control positions. A test plan is to be provided by the yard and accepted by the surveyor. If specific operational characteristics have been defined by the manufacturer these are to be included in the test plan^①.

~~1.2.3.5 The reversing characteristics of the propulsion plant, including the blade pitch control system of controllable pitch propellers, are to be demonstrated and recorded during trials^②.~~

① ~~This regulation~~ This revision applies to:

(1) Ships the contract for construction was signed on or after ~~1 July 2018~~ January 2026.

(2) On or after ~~1 July 2018~~ January 2026, the astern test for the ships other than those in (1) above is to comply with the relevant requirements of 5.5.4.4 of Section 5, Chapter 5 of Rules for Classification of Sea-Going Ships engaged on Domestic Voyages.

② ~~Same as~~ ①.

CHAPTER 2 PUMPING AND PIPING SYSTEMS

Section 1 GENERAL PROVISIONS

2.1.1 General requirements

2.1.1.1 Unless otherwise stated, this Chapter applies to piping systems of all ships. Chemical cargo piping, chemical process piping, liquefied gases cargo piping and liquefied gases process piping and fuel piping such as liquefied natural gas, liquefied petroleum gas, ammonia, methanol/ethanol, etc. are to respectively ~~comply with~~ satisfy relevant requirements of applicable CCS rules and guidelines such as in CCS-Rules for Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, and CCS-Rules for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, Rules for Ships Using Natural Gas Fuel, Guidelines for Ships Using Liquefied Petroleum Gas Fuel, Guidelines for Ships Using Ammonia Fuel, and Guidelines for Ships Using Methanol/Ethanol Fuel.

2.1.5 Classes of pipes

2.1.5.1 For the purpose of assigning appropriate testing requirements, types of joints to be adopted, heat treatment and weld procedure, pressure piping systems are divided into three classes in accordance with their design pressure and design temperature, as indicated in Table 2.1.5.1.

Piping system class

Table 2.1.5.1

Piping system	Class I		Class II		Class III	
	Design pressure > P ₂ (MPa)	Design temperature > T ₂ (°C)	Design pressure ≤ P ₂ (MPa)	Design temperature ≤ T ₂ (°C)	Design pressure ≤ P ₁ (MPa)	Design temperature ≤ T ₁ (°C)
Steam	> 1.6	or > 300	≤ 1.6	and ≤ 300	≤ 0.7	and ≤ 170
Thermal oil	> 1.6	or > 300	≤ 1.6	and ≤ 300	≤ 0.7	and ≤ 150
Fuel oil, lub-oil, flammable hydraulic oil	> 1.6	or > 150	≤ 1.6	and ≤ 150	≤ 0.7	and ≤ 60
Other media	> 4.0	or > 300	≤ 4.0	and ≤ 300	≤ 1.6	and ≤ 200

Notes:

① For Class I piping, one parameter for design pressure and design temperature of Class I specified in the Table is to be met; ~~For Class II piping, one parameter for design pressure and design temperature of Class II specified in the Table is to be met; For Class II or Class III piping, both two parameters are not to exceed meet the provisions of Class III the Table. For Class II or Class III piping, both the parameters for design pressure and design temperature specified in the Table are to be met.~~

② Toxic or corrosive media, flammable media heated above flash point or with flash point below 60°C media and liquefied gas belong to class I. If means of special safeguards for preventing

leakage and its consequences are provided (e.g. pipes led in positions where leakage of internal fluids will not cause a potential hazard or damage to surrounding areas which may include the use of pipe ducts, shielding, screening etc.), they may also belong to class II, but except toxic media.

- ③ Cargo pipes belong to class III.
- ④ Class III pipes may be used for open ended piping, e.g. drains, overflows, vents boiler waste steam pipes, etc.
- ⑤ Other media mean air, gases, water, ~~and~~ non-flammable hydraulic oil and urea for Selective Catalytic Reduction (SCR) system (when the piping material is selected in accordance with ISO 18611-3:2014) etc. In addition, the oxygen and acetylene piping is to be Class I piping (except for discharge pipes with openings).
- ⑥ Thermal oil means the circulating oil used in the thermal oil system as specified in Section 8, Chapter 4 of this PART.

Section 2 CARBON, LOW ALLOY STEELS AND STAINLESS STEELS

2.2.2 Calculation of wall thickness

2.2.2.5 The minimum wall thickness δ mentioned in 2.2.2.1 above has not taken into account the negative manufacturing tolerance, where there is any negative tolerance allowable in manufacture, the nominal thickness δ_m of pipes is not to be less than that determined by the following formula:

$$\delta_m = \frac{\delta}{1 - \frac{|a|}{100}} \quad \text{mm}$$

where: a — percentage of negative manufacturing tolerance on thickness; in the case of a positive tolerance, a is to be zero (0).

2.2.2.6 Where the minimum thickness calculated by the formula specified in 2.2.2.5 is less than that shown in Table 2.2.2.6(1), Table 2.2.2.6(2) or Table 2.2.2.6(3), the minimum nominal thickness for the appropriate standard pipe size shown in the Tables is to be used.

For threaded pipes, the thickness is to be measured at the bottom of the thread.

External diameter and minimum nominal thickness for steel pipes, in mm Table 2.2.2.6(1)

External diameter, D	Minimum nominal thickness (δ)			
	General pipe ^{③④⑥⑦⑧}	Air pipe, overflow pipe and sounding pipe of tank related to hull structure ^{①②③④⑥⑦⑧}	Bilge and ballast pipe, general sea water pipe and steam heating coil in liquid tank ^{①③④⑥⑦⑧}	Bilge pipe, air pipe, overflow pipe and sounding pipe through ballast tank and fuel oil tank. Ballast pipe through fuel oil tank and fuel oil pipe through ballast tank ^{①②③④⑥⑦⑧}
10.2~12	1.6			
13.5~19.3	1.8			
20	2.0			
21.3~25	2.0		3.2	
26.9~33.7	2.0		3.2	
38~44.5	2.0	4.5	3.6	6.3
48.3	2.3	4.5	3.6	6.3
51~63.5	2.3	4.5	4.0	6.3
70	2.6	4.5	4.0	6.3
76.1~82.5	2.6	4.5	4.5	6.3
88.9~108	2.9	4.5	4.5	7.1
114.3~127	3.2	4.5	4.5	8.0
133~139.7	3.6	4.5	4.5	8.0
152.4~168.3	4.0	4.5	4.5	8.8
	4.5	5.0	5.0	8.8

177.8				
193.7	4.5	5.4	5.4	8.8
219.1	4.5	5.9	5.9	8.8
244.5~273	5.0	6.3	6.3	8.8
298.5~368	5.6	6.3	6.3	8.8
406.4~457.2	6.3	6.3	6.3	8.8

Section 3 COPPER AND COPPER ALLOYS

2.3.2 Calculation of wall thickness

2.3.2.4 The minimum wall thickness δ mentioned in 2.3.2.1 above has not taken into account the negative manufacturing tolerance, where there is any negative tolerance allowable in manufacture, the nominal thickness of pipes is not to be less than that determined by the following formula:

$$\delta_m = \frac{\delta}{1 - \frac{|a|}{100}} \quad \text{mm}$$

where: a — percentage of negative manufacturing tolerance on thickness; [in the case of a positive tolerance, \$a\$ is to be zero \(0\)](#).

Section 5 CONNECTION OF PIPE LENGTHS, HEAT TREATMENT AND NON-DESTRUCTIVE TESTING

2.5.1 Connection of pipe lengths

2.5.1.2 The application of the aforesaid types of connection is as follows:

(1) Welded butt-joints and slip-on sleeve welded joints are to comply with the requirements specified in Table 2.5.1.2(1).

Connection of pipe length		Table 2.5.1.2(1)
Type of connection	Allowed for classes	Allowed for outside diameter
Butt welded joints with special provision for a high quality of root side	I, II, III	No restriction
Butt welded joints without special provision for a high quality of root side	II, III	
Slip-on sleeve welded joints	III	
	I, II, except for piping systems conveying toxic media where fatigue, severe erosion or crevice corrosion is expected to occur	$D \leq 88.9$ mm

(2) Slip-on threaded joints are to comply with requirements of a recognized standard. Slip-on threaded joints may be used for outside diameters as stated below except for piping systems conveying toxic or flammable media or services where fatigue, severe erosion [or crevice corrosion is expected to occur](#). [Slip-on threaded joints with outside diameters of maximum 25mm may be used for connecting small bore instrumentation equipment \(e.g., pressure/temperature sensors\) to piping systems conveying flammable media](#). Threaded joints in CO₂ systems are to be allowed only inside protected spaces and in CO₂ cylinder rooms.

① Threaded joints for direct connectors of pipe lengths with tapered thread may be allowed for Class I, outside diameter not more than 33.7 mm as well as Class II and Class III, outside diameter not more than 60.3 mm.

② Threaded joints for parallel thread may be allowed for Class III, outside diameter not more than 60.3 mm.

③ In particular cases, sizes in excess of those mentioned above may be accepted if they satisfy the requirements of recognized international or national standards.

2.5.3 Mechanical joints

2.5.3.1 The different mechanical joints applicable to this paragraph are indicated in Table 2.5.3.1(1).

The mechanical joints are to be subject to type approval based on different usage and location in accordance with the requirements of Appendix 3, Chapter 2, PART THREE of CCS Rules for Classification of Sea-Going Steel Ships.

Application of mechanical joints depending upon the class of piping **Table 2.5.3.1(3)**

Types of joints	Classes of piping system		
	Class I	Class II	Class III
Pipe unions			
Welded and brazed type	× ($D_0 \leq 60.3\text{mm}$)	× ($D_0 \leq 60.3\text{mm}$)	×
Compression couplings			
Swage type	×	×	×
Bite type	× ($D_0 \leq 60.3\text{mm}$)	× ($D_0 \leq 60.3\text{mm}$)	×
Typical Compression Type ^①	× ($D_0 \leq 60.3\text{mm}$)	× ($D_0 \leq 60.3\text{mm}$)	×
Flared type	× ($D_0 \leq 60.3\text{mm}$)	× ($D_0 \leq 60.3\text{mm}$)	×
Press type	-	-	×
Slip-on joints			
Machine grooved type	×	×	×
Grip type	-	×	×
Slip type	-	×	×

Notes:

× Application is allowed.

- Application is not allowed.

D_0 Outside diameter of the pipe.

① This regulation applies to any mechanical joints submitted for approval from 1 January 2020 or any renewal of existing design type approval of mechanical joints after 1 January 2020.

Section 7 TESTS

2.7.3 Testing after assembly on board

2.7.3.1 All piping systems are to be checked for leakage under working conditions.

2.7.3.2 Liquid fuel (~~oil or gas~~) piping, heating coils in tanks, bilge pipes in way of double bottom tanks or deep tanks and hydraulic piping are to be tested by hydraulic pressure in accordance with Table 2.7.3.2.

Hydraulic tests after assembly on board

Table 2.7.3.2

Piping system	Test pressure
<u>Liquid</u> fuel (oil or gas) piping	1.5 times design pressure, but not less than 0.4 MPa
Heating coils in tanks	
Bilge pipes in way of double bottom tanks or deep tanks	Not less than test pressure of the tank
Hydraulic piping	1.25 times design pressure, but no need to exceed design pressure plus 7 MPa

2.7.3.5 Pneumatic leak testing may be carried out on water sensitive systems, in lieu of hydrostatic testing. In certain circumstances, a combined hydrostatic - pneumatic strength test may also be applied, where the system is partially filled with water and the free space above is pressurized with a test gas (typically air or nitrogen). When pneumatic tests cannot be avoided, the sufficient safety precautions are to be taken.

CHAPTER 11 SHAFTING AND PROPELLERS

Section 2 SHAFTING

11.2.5 Stern tubes or strut and bearings

11.2.5.1 The length of the bearing in the stern bush next to and supporting the propellers aftmost propeller shaft bearing, next to and carrying the propeller, whether the bearing is in a stern tube or in a strut is to be as follows:

(1) For water lubricated bearings, the length of the bearing is not to be less than 4 times the rule calculated diameter for the screwshaft in way of the bearing. For water lubricated synthetic materials, if the design and materials of bearings comply with CCS provisions as demonstrated by tests, the length of the bearings may be appropriately reduced, but not less than 2 times the rule diameter of the shaft in way of the bearing. Synthetic materials of water lubricated stern tube bearings are to be type approved. The type approval requirements in this clause apply to all aftmost propeller shaft bearings made of synthetic materials. For type approval testing requirements of synthetic material for the aftmost propeller shaft bearing, refer to CCS Guidelines for polymer bearing material.

(2) For bearings which are white-metal lined and oil lubricated, the length of the bearing is not to be less than twice the rule calculated diameter for the screwshaft in way of the bearing. If the normal bearing pressure is less than 0.8 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight, the length of the bearings may be appropriately reduced. However, the minimum length is to be not less than 1.5 times the actual diameter.

(3) For bearings of synthetic rubber, reinforced resin or plastics materials which are approved for use as oil lubricated stern bush bearings, the length of the bearing is to be not less than twice the rule diameter of the shaft in way of the bearing. If the normal bearing pressure is less than 0.6 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight, the length of the bearings may be appropriately reduced. However, the minimum length is to be not less than 1.5 times the actual diameter. Synthetic materials for application as oil lubricated stern tube bearings are to be Type Approved. The type approval requirements in this clause apply to all aftmost propeller shaft bearings made of synthetic materials. For type approval testing requirements of synthetic material for the aftmost propeller shaft bearing, refer to CCS Guidelines for polymer bearing material.

Where the material has proven satisfactory testing and operating experience, consideration may be given to an increased bearing pressure.

(4) The length of a grease lubricated bearing is to be not less than 4.0 times the rule diameter of the shaft in way of the bearing.

(5) For bearings which are lined with other materials or lubricated by other methods, background for adopting its bearing length is to be provided, e.g. test results such as expansion characteristics and bearing capability of bearing material or service experience.

Section 3 SHAFT TRANSMISSION UNITS

11.3.6 Transmission devices for controllable pitch propeller

11.3.6.17 The pitch control system of CP propellers for main propulsion is to be tested and recorded in accordance with the following requirements, in order to demonstrate that the propelling thrust is not significantly altered when transferring control from one location to another and in case of failures in the control system, and that the pitch response times measured during the test do not exceed the maximum value.

(1) A full range of pitch response tests is to be carried out to get the pitch response and verify that it coincides with the combinator curve of the propeller. The tests are to be carried out for at least three positions of the control lever in ahead and astern directions (e.g., dead slow ahead / astern, half ahead / astern, full ahead / astern). The tests are to be carried out in normal and emergency operating conditions. Tests that are not affected by the control position may be carried out from one control position only.

(2) A test of the fail-to-safe characteristics of the propeller pitch control system is to be carried out to

demonstrate that failures in the pitch command and control or feedback signals are alarmed and do not cause any change of thrust. Such failures are to be clearly identified and included in the test procedure.

(3) The test is to record: Position of the control handle; Actual pitch indication (local indication, remote indications); Rotational speed of the propeller; Response time between the pitch change order (modification of the lever position) and the instant when the pitch and propeller speed have reached their final position; Propelling thrust variation during the transfer of the control from one location to another one.

(4) The test procedure, including the list of the parameters to be recorded and the maximum pitch response time, is to be prepared and submitted by the pitch control system manufacturer or integrator, subject to the agreement of the flag State Administration.

CHAPTER 12 SHAFT VIBRATION AND ALIGNMENT

Section 3 AXIAL VIBRATION

12.3.1 General requirements

12.3.1.2 Documents of axial vibration characteristics of the slow-speed two-stroke diesel engine direct propulsion shafting systems ~~and of the turbine propulsion shafting systems~~ are to be submitted for approval.



CHINA CLASSIFICATION SOCIETY

**RULES FOR CONSTRUCTION OF
SEA-GOING SHIPS ENGAGED ON
DOMESTIC VOYAGES**

AMENDMENTS

2026

**PART FOUR ELECTRICAL
INSTALLATIONS**

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CHAPTER 2 ELECTRICAL INSTALLATIONS IN SHIPS

Section 5 PROTECTION

2.5.6.1 Unless otherwise provided in 2.5.6.8 of this section, generators are to be protected against short-circuit and overloads by circuit breakers arranged to interrupt simultaneously all insulated poles, and the overload protection is to be adequate for the thermal capacity of the generator. In addition, the following requirements are to be complied with:

(1) for overloads between 10% and 50%, the circuit breaker is to be tripped with a time delay of less than ~~2 min.30s. It is recommended that the circuit breaker be set within the limits of 125 to 135% of the rated current of the generator and with a time delay of 15 to 30 s. The aforementioned limits may be exceeded if this is permitted by the overcurrent capacity of the generator;~~

Section 6 AUXILIARY MACHINERIES

2.6.6.1 Power ventilation of accommodation spaces, service spaces, cargo spaces and control stations is to be capable of being stopped from an easily accessible position outside the space being served. This position is not to be readily cut off in the event of a fire in the space served.

For cargo ships and passenger ships carrying not more than 36 passengers, the exhaust fans in the exhaust ducts from galley ranges are to be capable of being shut off within the galley; for passenger ships carrying more than 36 passengers, the shutting-off device is to be placed in a position outside the galley close to the entrance to the galley.

Section 8 INTERNAL COMMUNICATION SYSTEMS

2.8.1.2 The main engine telegraph system is to be in compliance with the following requirements:

- (1) The controls of the transmitters and receivers are to be safeguarded by suitable means against being inadvertently moved.
- (2) The engine telegraph is to be a two-way system in which the signal given by the receiver is also immediately discernible at the transmitter.
- (3) In the case of installations with several control positions the acknowledged command must be indicated at all control positions. Where a control position is selected by switching, an additional indication is to be provided to show which one is in use.

Section 11 STORAGE BATTERIES

2.11.1.1 Storage batteries^① are not to be installed in spaces where they are exposed to excessively high or low temperatures, water splattering, steam or other factors which will impair their serviceability or shorten their service life. They are to be installed in such a way that persons will not be endangered and equipment will not be damaged by escaping gases or electrolytic leakage.

2.11.2.3 For natural ventilation of the battery room, the cross-sectional area A of the inlet is to be equal to that of the outlet, not less than:

(1) for vented type batteries

2.11.2.4 Mechanical ventilation is to be provided for the battery room, box or locker containing ~~vented type~~ batteries with a total charging power higher than 2 kW. The quantity Q of air expelled is at least equal to:

① The storage batteries in this section are of the acid lead plate type and the alkaline nickel plate type. Lithium-ion storage batteries are to comply with the requirements of the CCS Rules for Ships Applying Battery as a Power.

(1) Vented type batteries

$$Q = 0.11 In \text{ m}^3/\text{h}$$

where: I — maximum current delivered by the charging equipment during gas formation, but not less than 25 per cent of the maximum obtainable charging current in amperes;

n — number of cells in series.

(2) Valve-regulated sealed type batteries

The ventilation rate for compartments containing valve-regulated sealed type batteries may be reduced to 25% of that required in 2.11.2.4(1).

2.11.2.5 In addition to the calculation methods of ventilation specified in sections 2.11.2.3 and 2.11.2.4, other industrial standards may be utilized to calculate ventilation rate, for example, section 7.2 and 7.3 of IEC 62485-2:2010, or section CC.2 of Annex CC to IEC 62040-1:2017, as appropriate.

2.11.2.65 Except those boxes and lockers on open deck or within the spaces required in 2.11.1.6 and 2.11.1.7 of this Section, the ventilation system for battery rooms, boxes or lockers is to be separate from other ventilating systems. The exhaust ducting is to be led to a location where any flammable gas can be safely diluted, away from any source of ignition, and the inlet ducting is to be led into spaces where flammable gases may accumulate. The outlet is to be situated at the top and the inlet at the bottom with the means to prevent the ingress of water and flame.

2.11.2.67 Mechanical ventilators for battery rooms, boxes or lockers are to be provided with means to prevent sparking in case of the impeller touching the casing. Non-metal impellers are to be of an antistatic material.

2.11.2.78 All openings of battery rooms, other than ventilation openings, are to be effectively sealed to prevent the explosive gas from entering adjacent compartments.

~~2.11.2.8 The quantity Q of air expelled from the rooms, boxes or lockers containing vented type batteries is not to be less than:~~

$$Q = 0.11 In \text{ m}^3/\text{h}$$

where: I — ~~the maximum charging current during the development of gas, but not less than 25% of the maximum charging current output by the charging device, in A;~~

~~— n — number of battery cells.~~

~~2.11.2.9 The quantity of air expelled from the rooms, boxes or lockers containing valve-regulated sealed batteries may be reduced to 25% of that required in 2.11.2.8.~~

2.11.5.3 Where vented type batteries and/or valve-regulated sealed type batteries ~~are replaced by vented type batteries are installed,~~ it is to be ensured that there is adequate ventilation as so required in 2.11.2.4 or 2.11.2.5 and 2.11.2.8 of this Section, ~~and that~~ The requirements in 2.11.1 of this Section relevant to the location and installation ~~of vented type batteries~~ are complied with.

Section 12 CABLES

2.12.3.3 All cables and wiring external to electrical equipment are to be at least of a flame-retardant type. In general, cables which have passed the test of bunched flame-retardant cables in accordance with acceptable standards^① are to be used. Where cables which have individually passed the test of a single flame-retardant cable in accordance with acceptable standards^② are to be bunched, means are to be provided to limit the propagation of fire along the bunched cables (see 2.12.10).

① Refer to IEC Publication 60332-3-22: Tests on electric and optical fibre cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A, or the equivalent standards.

② Refer to IEC Publication 60332-1-2: Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame ~~and IEC Publication 60332-2-2: Tests on electric and optical fibre cables under fire conditions – Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame,~~ or the equivalent standards.

2.12.3.4 Where cables for services, required to be operable under fire conditions, including their supply cables, pass through high fire risk areas^①, and in addition for passenger ships, main vertical fire zones, other than those which they serve, they are to be so arranged that a fire in any of these areas or zones does not affect the operation of the service in any other area or zone. This may be achieved by either of the following:

(1) Cables being of a fire resistant type^② complying with the requirements of 3.5.1.1 of PART Four in CCS Rules for Classification of Sea-going Steel Ships are installed and run continuously to keep the fire integrity within the high fire risk area, as shown in Figure 2.12.3.4.

(2) At least two-loops/radial distributions run as widely apart as is practicable and so arranged that in the event of damage by fire at least one of the loops/radial distributions remains operational.

However, no requirements are provided for fail-safe system, system with self-test function or duplexed system with cable distributions running widely apart.

However, fail-safe systems, systems with self-diagnostic functions, or duplicated systems with cables routed widely apart may be exempted from this requirement.

Section 14 SPECIAL REQUIREMENTS FOR HIGH VOLTAGE ELECTRICAL INSTALLATIONS

Minimum Air Clearances

Table 2.14.2.3

Nominal voltage (kV)	Minimum air clearance (mm)
3 (3.3)	55 60
6 (6.6)	90
10 (11)	120
15	160

2.14.6.2 Switchgear and control gear assemblies are to be constructed in accordance with the following requirements:

(1) Switchgear is to be of metal-enclosed type or of the insulation-enclosed type in accordance with acceptable standard(s)^③.

(2) Withdrawable circuit breakers and switches are to be provided with mechanical locking facilities in both service and disconnected positions. For maintenance purposes, key locking of withdrawable circuit breakers and switches and fixed disconnectors is to be possible.

Withdrawable circuit breakers are to be located in the service position so that there is no relative motion between fixed and moving portions.

(3) The fixed contacts of withdrawable circuit breakers and switches are to be so arranged that in the withdrawable position the live contacts are automatically covered. Shutters are to be clearly marked for incoming and outgoing circuits. This may be achieved with the use of labels or colours.

(4) For maintenance purposes an adequate number of earthing and short-circuiting devices is to be provided to enable circuits to be worked upon with safety.

① The “high fire risk areas” are defined as follows:

(1) machinery spaces as defined in SOLAS Reg. II-2/3.30, excluding spaces having little or no fire risk as defined in SOLAS Reg. II-2/9.2.2.3.2.2 (10) (including the interpretations for tables 9.3, 9.4, 9.5, 9.6, 9.7 and 9.8 given in MSC/Circ.1120 as amended by MSC.1/Circ.1436 and MSC.1/Circ.1510);

(2) spaces containing fuel treatment equipment or other highly flammable substances;

(3) galley and pantries containing cooking appliances;

(4) laundry containing drying equipment;

(5) [cargo spaces except cargo tanks for liquids with flashpoint above 60 °C and except cargo spaces exempted in accordance with SOLAS Reg. II-2/10.7.1.2 or 10.7.1.4; spaces as defined in SOLAS Reg. II-2/9.2.2.3.2.2\(8\), \(12\), and \(14\) for ships carrying more than 36 passengers.](#)

(6) [vehicle, ro-ro and special category spaces.](#)

② Fire resistant type cables are to be easily distinguishable.

③ Refer to IEC Publication 62271-200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV, and compliance with IEC Publication 62271-201: AC insulation-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV.

(5) Switchgear and controlgear assemblies are to be internal arc classified (IAC). Where switchgear and controlgear assemblies are accessible by authorized personnel only, Accessibility Type A is sufficient (refer to IEC Publication 62271-200; Annex AA; AA 2.2). Accessibility Type B is required if accessible by non-authorized personnel. Installation and location of the switchgear and controlgear assemblies are to correspond with their internal arc classification and classified sides (F, L and R).

2.14.6.4 A power-frequency voltage test is to be carried out on any switchgear and control gear assemblies. The test procedure and voltages are to be according to acceptable standard(s)^①.

2.14.7.1 Where equipment is not contained in an enclosure but a room forms the enclosure of the equipment, the access doors are to be so interlocked that they cannot be opened until the supply is isolated and the equipment earthed down.

At the entrance of the spaces where high-voltage electrical equipment is installed, a suitable marking is to be placed which indicates danger of high-voltage. As regards the high-voltage electrical equipment installed outside a.m. spaces, the similar marking is to be provided.

An adequate, unobstructed working space is to be left in the vicinity of high voltage equipment for preventing potential severe injuries to personnel performing maintenance activities. In addition, the clearance between the switchboard and the ceiling/deckhead above is to meet the requirements of the internal arc classification^②.

① Refer to IEC Publication 62271-200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV – Part 78: Routine test, or other equivalent standards.

② Refer to ~~6.2.5 of~~ IEC Publication 62271-200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV ([Refer to 2.14.6.2\(5\) of this Section](#)).