~~CHINA CLASSIFICATION SOCIETY~~INTERNATIONAL SHIP CLASSIFICATION

GUIDELINES FOR STATUTORY SURVEYS OF INLAND WATERWAY SHIPS

2015

PART FOUR LOAD LINES

CONTENTS

CHAPTER 1 GENERAL PRINCIPLES

Section 1 GENERAL PROVISIONS

1.1.1 Application

1.1.1.1 This Part applies to the assigning and marking of the load lines of inland waterways ships. Except where otherwise stated, this Part is not applicable to floating docks.

1.1.2 General requirements

1.1.2.1 For ships assigned and marked with load lines in accordance with the requirements of this Part, the strength, intact stability and damage stability (when applicable) are to meet the relevant provisions of PART FIVE of the Guidelines.Where the minimum freeboard calculated in accordance with this Part is different from those determined by the strength, intact stability and damage stability (when applicable), the maximum value of them is to be adopted for assigning freeboard and marking the load lines.

1.1.2.2 For feeder container ship ships carrying containers and dry bulk cargos, where the load lines are different from those assigned for container ships and dry cargo ships according to 1.1.2.1, the load line mark and load line of dry cargo ships may be firstly marked according to 2.1.1.3~2.1.1.5, then the additional load line of container ships may be marked according to 2.1.1.6.

1.1.2.3 For working ships, where the load lines for ships under navigating (sheltering from wind) and operating marked according to 1.1.2.1 are different, the load line mark and load line for ships under navigating (sheltering from wind) may be firstly marked according to 2.1.1.3~2.1.1.5, then the additional load line for ships under operating may be marked according to 2.1.1.6.

1.1.2.4 A ship is to not be so loaded that the upper edge of the assigned load line mark appropriate to the service area or section is submerged.

1.1.2.5 A load line corresponding to the approved draught is to be assigned and marked permanently and clearly on the both sides respectively at the ship's middle, fore and after end.It is suggested to assign the load line in accordance with Appendix I.

1.1.2.6 When ship structural component is below the datum line corresponding to the approved draught, the dimensions of the ship structural component that is below the datum line are to be indicated in the notes of Load Line Certificate/Document of Appliance.

1.1.2.7 For ships of which the additional load lines are marked according to 1.1.2.2 and 1.1.2.3, the type and status of ships corresponding to the load line marks, load lines and additional load line are to be indicated in the notes of Load Line Certificate/Document of Appliance.

1.1.3 Definitions

1.1.3.1 *Depth for Freeboard* (D_1) refers the Molded Depth (D) plus the thickness of the freeboard deck stringer plate amidships.

1.1.3.2 *Perpendicular* refers the fore and aft, vertical lines perpendicular to waterline, taken at the forward and after ends of the length of ship (L).

1.1.3.3 *Amidships* refers point at the middle of the length of ship (L).

1.1.3.4 *Freeboard* refers the distance measured vertically downwards amidships from the upper edge of the deck line to the upper edge of related load line.

1.1.3.5 A *freeboard deck* refers normally the first continuous deck over waterline, from which the freeboard is measured and calculated. Where there is raised fore or quarter deck, the lowest line of the deck and its extension parallel to the raised part of the deck are to be taken as the freeboard deck.

1.1.3.6 A *superstructure* refers a decked structure on the freeboard deck, extending from side to side of the ship or with the side plating not being inboard of the shell plating more than 4% of the breadth (B).

1.1.3.7 A *deck house* refers a decked structure not complying with the definition of 1.1.3.6.

1.1.3.8 *Weathertight* refers that in any sea condition water will not penetrate into the ship.

1.1.3.9 *Watertight* refers that the dimension and arrangement of components may prevent water from penetrate into the ship from any directions under potential water head.

1.1.3.10 A *type A ship* refers a ship that has following features and carries bulk liquid cargos:

(1) the exposed cargo areas upon the freeboard deck (including raised fore deck and raised quarter deck) are highly watertight and the cargo holds are only fitted with small passageways and enclosed by steel or equivalent watertight materials;

(2) the cargo holds loading cargos have low permeability;

(3) other openings upon the exposed freeboard deck (including raised fore deck and raised quarter deck)

are fitted with weathertight covers.

1.1.3.11 A *type B ship* refers a ship that her cargo hatchways and other openings upon the exposed freeboard deck (including raised fore deck and raised quarter deck) are fitted with weathertight covers.

1.1.3.12 A *type C ship* refers a ship that her cargo hatchways upon the exposed freeboard deck (including raised fore deck and raised quarter deck) are not fitted with weathertight covers, whereas other hatchways are fitted with weathertight covers.

1.1.3.13 A *closed superstructure* refers the superstructure of which the bulkhead structures be of sufficient strength and all opening in the bulkheads are fitted with weathertight closing appliances.

1.1.3.14 A *closed deckhouse* refers the deck house of which the bulkhead structures be of sufficient strength and all opening in the bulkheads are fitted with weathertight closing appliances.

1.1.3.15 A *height of hatch coaming* refers the minimum vertical height measured from the deck to the top edge of the hatch coaming.The height of hatching coaming is to consider the influence of camber and sheer.

1.1.3.16 A *height of cabin and doghouse doorsill* refers the minimum vertical height measured from the deck to the top edge of the cabin and doghouse doorsill.

CHAPTER 2 DECK LINES AND LOAD LINE MARKS

Section 1 DECK LINES AND LOAD LINE MARKS

2.1.1 Marks

2.1.1.1 The specification and model of deck line and load line mark are illustrated in Figure 2.1.1.1.

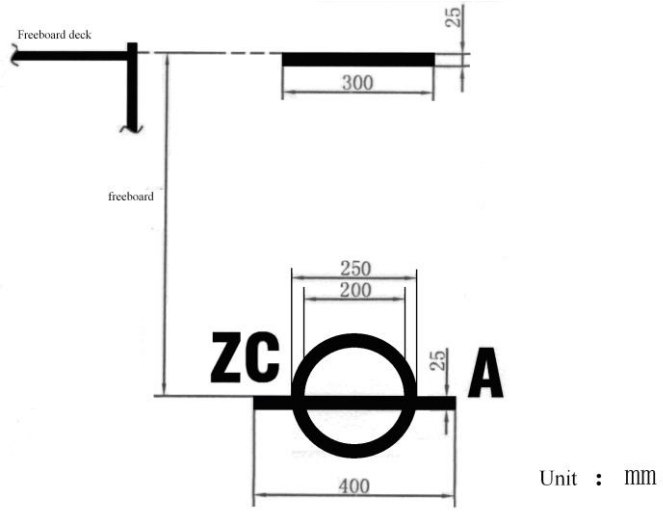

Figure 2.1.1.1

2.1.1.2 The deck line is a horizontal line 300mm in length and 25 mm in width. The middle of deck line is to be located amidships on each side of the ship, and its upper edge is normally to pass through the line where the outward extension of the upper surface of the freeboard deck intersects the outer surface of the shell.

2.1.1.3 The load line marks are to consist of a ring which is intersected by a horizontal line, The center of the ring is to be placed amidships and at a distance equal to the freeboard assigned for the highest grade of service area, measured vertically to the upper edge of the deck line.

The ring is 250 mm in outside diameter and 25 mm in width; the horizontal line is 400 mm in length and 25mm in width, of which the upper edge passes through the center of the ring.

The letters CS are to be marked at the left side of the ring, which is 100mm in height, 60mm in width, 25 mm apart from each other, from the upper edge of the horizontal line and from the left side of the ring. The letter A (B or C) is to be marked at the right side of the ring indicating the service area, which is 100 mm in height, 60 mm in width, standing on the continuation of the upper edge of the horizontal line and 25 mm apart from the right end of that line, as illustrated in Figure 2.1.1.3.

Figure 2.1.1.3

2.1.1.4 Load line refers the load waterline determined according to the service area (section) where ships navigating in.For ships navigating in more than one grade of service area (or section), several horizontal lines are to be marked as illustrated in Figure 2.1.1.4. A vertical line 25mm in width is to be marked upwards (or downwards) from the right end of the horizontal line. Horizontal lines 150mm in length and 25mm in width are to be extended rightwards from the vertical line to indicating load line assigned for other grades of service area (or section).

Each load line means the upper edge of corresponding load line.The line marked with ‘A’ indicates load line for grade A of service area. The line marked with ‘B’ indicates load line for grade B of service area. The

line marked with 'C' indicates load line for grade C of service area. The line marked with 'J_1' indicates load line for grade J_1 of service section. The line marked with 'J_2' indicates load line for grade J_2 of service section.

If the characters can not be marked because the distance between load lines is short, they may be placed upwards or downwards properly. For J_1 and J_2, the foot notation of digit '1' or '2' is to be marked as 50mm in height and 30mm in width, and its upper edge is to be at the middle of the character 'J' and 25mm apart.

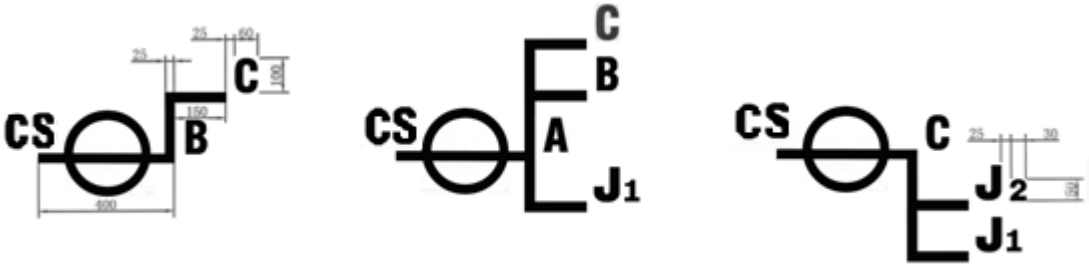

Figure 2.1.1.4

2.1.1.5 If actual load lines for more than one grade of service area (or section) are combined, the characters are to be placed side by side and 25 mm apart from each other. As illustrated in Figure 2.1.1.5.

If the distance between load lines for ships navigating in more than one grade of service area (section) is short, the load lines and characteris are to be subject to the high grade of service area (section) and the load lines of low grade of service area (section) are to be expressed by the lower edge of each character. The distance between adjacent characters is to be 25mm.

Figure 2.1.1.5

2.1.1.6 For ships of which the additional load lines are marked according to 1.1.2.2 and 1.1.2.3 of this Part, the additional load lines are as shown in Figure 2.1.1.6.A vertical line 25mm in width is to be marked downward (or upwards) from the right end of the horizontal line. Horizontal lines 150mm in length and 25mm in width are to be extended rightwards from the vertical line to indicating load line assigned for other grades of service area (or section).When the distance between the lowest load line and the highest additional load line marked according to 2.1.1.3 and 2.1.1.4 of this Part is greater than 150mm, the vertical line between them may be exempted.

Each additional load line means the upper edge of corresponding load line.The symbol of additional load line is consisted of character 'F' and service area (section). Chatacter 'F' is 100mm in height and 60mm in width, and adjacent characters are 25mm apart.The line marked with 'FA' indicates additional load line for grade A of service area. The line marked with 'FB' indicates additional load line for grade B of service area. The line marked with 'FC' indicates additional load line for grade C of service area. The line marked with 'FJ_1' indicates additional load line for grade J_1 of service section. The line marked with 'FJ_2' indicates load line for grade J_2 of service section.If actual load lines for more than one grade of service area (or section) are combined, the characters are to be placed side by side and 'F' between characters is to not be marked.

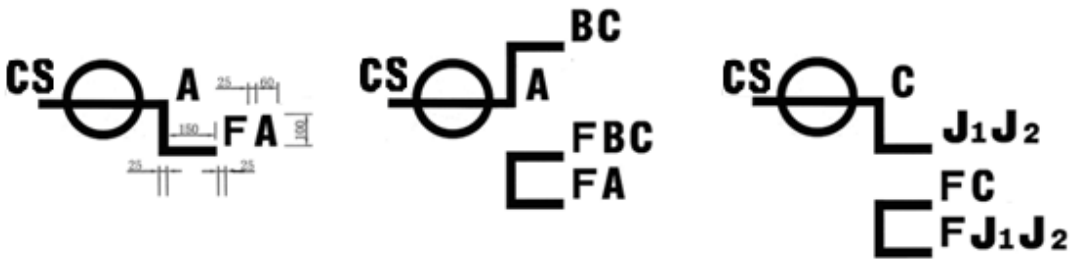

Figure 2.1.1.6

Section 2 POSITION OF MARKS AND EXEPTION OF MARKING

2.2.1 Position of marks

2.2.1.1 The right, line and character of deck line, load line marks and load lines are to be painted as white and yellow when the side of ship is with dark color background and painted black when the side of ship is with light color background.

2.2.2 Exemption of marking

2.2.2.1 Where the deck line or load lines can not be completely marked because of the fitting of the side fenders or other, the deck line or part of load lines may be exempted, but this exemption is to be indicated in the Load Line Certificate for Inland Waterway Ships.

CHAPTER 3 CONDITIONS OF ASSIGNING FREEBOARD

Section 1 DECK LINES AND LOAD LINE MARKS

3.1.1 General requirements

3.1.1.1 Openings (excluding the cargo hatches of C type ships) in the freeboard (including raised fore deck and raised quarter deck) are to be fitted with weathertight covers or be protected by the closed superstructures or closed deck houses or be protected by the superstructures or deck houses that meet the requirements of 3.1.1.2 of this Section.

3.1.1.2 When the open superstructures or deckhouses are used, their doors or bulkheads being 1m below the freeboard. are to comply with the requirements for weathertight.

3.1.1.3 Hatchways, ventilators, air pipes, discharges, freeing ports, side scuttles and ports are to comply with the requirements of CHAPTER 2, CHAPTER 3 and CHAPTER 8 of PART FOUR in addition to this CHAPTER.

3.1.1.4 The arrangements and constructions of above-mentioned items are to comply with rules of of ~~CCS~~ISC Rules for the Construction of Inland Waterway Steel Ships.

3.1.1.5 Where local sink or groove should be fitted above the exposed freeboard deck due to structural style and arrangement, the following provisions are to be met:

(1) The distance between the bottom plate of local sink or groove communicated to outside water and full load waterline (waterline corresponding to the relevant loadline) is to be not less than the basic freeboard F_0 in Table 4.2.2.1 of CHAPTER 4 of this Part;

(2) The circumference (bottom plate, sidewise plate and transverse plate) of the local sink or groove isto meet the watertight requirements;

(3) where the local sink or groove is located within 0.4*L* amidships and extendd to the sides of the ship, the length of the local sinke or the groove is to be less than or equal to 1 m;

(4) Freeboard correction for local sink or groove of freeboard deck according to 4.2.6 of CHAPTER 4 of this Part isto be taken into account.

Section 2 PROTECTION AND IMPERMEABILITY OF OPENINGS

3.2.1 Hatchway coamings and doorway sills of casing

3.2.1.1 The height of hatchway coamings and doorway sills of superstructure and casings on exposed freeboard deck (including raised fore deck and raised quarter deck) is to comply with the requirements of 4.2.5 of this Part.

3.2.1.2 For hatchways in superstructure or deckhouse located above the freeboard deck (including raised fore deck and raised quarter deck), where the hatchways are within 0.2B of midship vertical line or fitted with weathertight covers, the height of hatchway coamings is not required; the height of hatchway coamings of other hatchways is to be not less than 50mm.

3.2.1.3 Any opening access to lower spaces on the exposed deck of enclosed superstructure and the exposed top of enclosed deckhouse above the freeboard deck are to be fitted with weathertight covers; the height of hatchway coamings is to not be less than 50mm.

3.2.1.4 Any opening access to lower spaces above other exposed decks is to be fitted with awnings or corresponding protectors; the height of hatchway coamings is to not be less than 50mm.

3.2.2 Hatchs of passenger cabins/cargo holds

3.2.2.1 For B type ships, the weathertight covers and weathertight protective measures of exposed passenger cabins/cargo holds above the freeboard deck include the following two types:

(1) movable covers (portable hatch beams) and tarpaulin and hatch battens may be used to guarantee the weathertight covers;

(2) steel (or other equivalent materials) covers fitted with lining and clamping device may be used to guarantee the weathertight covers.

3.2.2.2 For the the weathertight covers and weathertight protective measures mentioned in 3.2.2.1, the structures of portable hatch beams and covers are to meet the provisions of ~~CCS~~ISC Rules for the Construction of Inland Waterway Steel Ships. The materials, methods and devices for guanranteeing and maintaining weathertight passenger cabins/cargo holds are to be approved by ~~CCS~~ISC.

3.2.2.3 For C type ships, the exposed passenger cabins/cargo holds above the freeboard deck without weathertight covers are to be fitted with effective protective measures to prevent water logging caused by green water and rain.

3.2.3 Ventilators

3.2.3.1 The ventilators located on exposed freeboard deck (including raised fore deck and raised quarter deck) are to be fitted with (or other equivalent materials) coamings constructed substantially and efficiently closing arrangements.

3.2.3.2 The height of ventilator coaming above the deck is to not be less than the specified value in Table 3.2.3.2.

Coaming Height (mm) Table 3.2.3.2

Length of coaming (m) / Service area (section)	＜40	≥40
Grade A, J_1	400	500
Grade B, J_2	300	400
Grade C	200	300

3.2.3.3 Ventilators on other decks are to be provided with rainproof canvas cover.

3.2.4 Air pipes

3.2.4.1 Where air pipes extend through the freeboard deck (including raised fore deck and raised quarter deck) upwards, the height from the lowest point where water may get access to the deck is to be not less than the specified value in Table 3.2.4.1.

Height of Air Pipes（mm） Table 3.2.4.1

Length of air pipe (m) / Service area (section)	＜40	≥40
Grade A, J_1	250	350
Grade B, J_2	200	300
Grade C	150	250

3.2.4.2 Air pipes are to be provided with proper closing device for ship navigating in service area A, B, and torrent section.

3.2.4.3 The height of air pipe may be calculated according to the following formula if any effective means is adopted to prevent water from penetrating into the ship in any service condition, and the reduced height of air pipes is to at least be 150mm.

$$\delta H = 1000(D_1 - d) - F - 200 \quad \text{mm}$$

If $\delta H \leq 0$, then $\delta H = 0$.

where, δH —— reduced height of air pipes, in mm;

D_1 ——moulded depth, in m;

d ——full load draught corresponding the approved highest grade of service area, in m;

F ——the minimum freeboard corresponding the approved highest grade of service area, in mm, see 4.2.1.1 or 4.3.2.2 of this Part.

3.2.5 Side scuttles and ports

3.2.5.1 The frame and deadlight of side scuttles are to be of steel or other suitable material. The thickness of toughened glass is to not be less than 9mm.

3.2.5.2 The side scuttles below the freeboard deck (including raised fore deck and raised quarter deck) are to be of fixed watertight type for ships navigating in Area A or Section J, be of removable watertight type for ships navigating in Area B or Area C.The side scuttles are to be provided with fenders and deadlights.

3.2.5.3 The scuttles above the freeboard deck (including raised fore deck and raised quarter deck) may be removable.

3.2.5.4 The distance from the lowest point in circumference of the scuttles below the freeboard deck (including raised fore deck and raised quarter deck) to the full load waterline is to not be less than the specified value in Table 3.2.5.4.

Table 3.2.5.4

Service area (section)	Distance from the lowest point in circumference to the full load waterline (mm)
Grade A, J_1	300
Grade B, J_2	200
Grade C	150

3.2.5.5 The side ports and doors of other similar openings under the freeboard deck (including raised fore deck and raised quarter deck) are to be watertight doors and the design is to ensure the consistent structural integrity of such watertight doors and surrounding outside plates. The number of the aforementioned openings is to be the minimum number that meets the design intent and actual working needs of ships. The low edge of the opening is to not be lower than the full load waterline.

Section 3 DRAINAGE AND CREW PROTRECTION

3.3.1 Discharges and freeing ports

3.3.1.1 Sufficient discharges or freeing ports on each deck are to be provided so as to drain off water effectively.

3.3.1.2 Deck scuppers or freeing ports are to be so positioned that water on the deck may be drained rapidly, no matter the ship is in upright or with trim in normal service conditions.

3.3.1.3 For discharge pipes used for the drainage of water from the superstructure or deckhouse (including the superstructure and deckhouse mentioned in 3.1.1.2 of this CHAPTER) on the freeboard deck, the distance from the lowest edge of a discharge to the full load waterline is to not be less than 100mm if the discharge is located below the freeboard deck at side. In general, one automatic non-return valve is to be fitted on each separate discharge.

For discharge pipes used for the drainage of water from cargo hold of below the freeboard deck or well-deck ship, the distance from the lowest edge of a discharge to the full load waterline are to not be less than 100mm if the discharge is located below the freeboard deck at side. In general, one automatic non-return valve is to be fitted on each separate discharge.

3.3.1.4 The freeing ports are to be fitted on each continuous bulwark. The total area of freeing ports is to be 5% ～ 10% of the area of each continuous bulwark.

3.3.1.5 The drainage outlets of cargo holds of self-unloading sand ships are to be above the freeboard deck and the lowest point from which water may penetrate is below the freeboard deck or the lowest point is above the freeboard but the height from it to the freeboard deck is less thn 300mm, the automatic non-return valve is to be fitted.

3.3.2 Crew protection

3.3.2.1 For all exposed parts on each deck of ships, fixed bulwarks or guardrails or the combination of bulwarks or guardrails are to be fitted on self-propelled ships; movable guardrails or skid-proof plates are to be fitted on non-self-propelled ships.

3.3.2.2 In the spaces on topside decks where crew do not often move and work, short guardrails or skid-proof plates may be fitted.

3.3.2.3 Where fixed bulwarks or guardrails or the combination of bulwarks or guardrails are fitted at the freeboard deck (including raised fore deck and raised quarter deck), movable doors or movable guardrails or stopper chains with appropriate width may be fitted to facilitate embarking and working of crew.

3.3.2.4 The height of bulwarks is to not be less than 0.55m. For ships with length not greater than 30m, the height of bulwarks may be reduced but is to not be less than 0.35m.

3.3.2.5 The height of guardrails or the combination of bulkwards and guardrails is to not be less than 0.80m. For ships with length not greater than 30m, the height of bulwarks may be reduced but is to not be less than 0.60m.

3.3.2.6 The height of skid-proof plates is to not be less than 0.05m.

3.3.2.7 Where the side passages are too narrow and it is difficult to fit bulwarks or fixed guardrails, movable guardrails may be fitted or skid-proof guardrails may be fitted at outer wall of deckhouse/hatch coaming.

3.3.2.8 Side passageways above the freeboard deck (including raised fore deck and raised quarter deck) are to be skid-proof.

3.3.2.9 Passageways for safe passing of crew are to be fitted between pushers and the pushed ships.

3.3.2.10 The height of bulwarks or guardrails or the combination of bulwarks or guardrails isto meet the provisions of PART SEVEN of the Guidelines.

3.3.2.11 For cargo ships with the length not greater than 40m navigating in C Grade service area, if it is difficult to fit bulwarks or guardrails above the freeboard decks according to 3.3.2.4 and 3.3.2.5, short guardrails may be fitted and skid-proof strips may be fitted on the decks.

3.3.2.12 The structures of bulwarks and guardrails are to meet the provisions of ~~CCS~~ISC Rules for the Construction of Inland Waterway Steel Ships.

CHAPTER 4 CALCULATION OF FREEBOARD

Section 1 GENERAL PROVISIONS

4.1.1 Freeboard determination

4.1.1.1 The freeboard is to comply the following formula:

$$\overline{F} \geq F$$

where: F ---minimum freeboard, in mm, as shown in 4.2.1.1 or 4.3.2.2 of this CHAPTER;

$\overline{F}$ ---actual freeboard, in mm, as shown in 4.1.1.2.

4.1.1.2 The actual freeboard $\overline{F}$ is calculated according to the following formula:

$$\overline{F} = 1000\left(D_1 - d\right) \quad \text{mm}$$

where: D_1 ---moulded depth, in m;

d ---moulded draught corresponding to relevant load lines, in m.

4.1.2 Correction of freeboard marking

4.1.2.1 Where the lowest point of freeboard deck is not located amidships due to sheer, the freeboard marked at the both sides amidships is to be the minimum freeboard calculated in accordance with this CHAPTER plus the sheer of midship.

4.1.2.2 Where a ship has large trim, the freeboard marked at both sides amidships is to be the minimum freeboard calculated in accordance with this CHAPTER plus the draught difference caused by trim.

Section 1 MINIMUM FREEBOARD OF GENERAL SHIPS

4.2.1 Minimum freeboard

4.2.1.1 The minimum freeboard *F* is to be calculated according to the following formula:

$$F = F_0 + f_1 + f_2 + f_3 + f_4 \quad \text{mm}$$

where: F_0 ---the basic freeboard, in mm, as shown in 4.2.2;

f_1 ---freeboard correction for depth, in mm, as shown in 4.2.3;

f_2 ---freeboard correction for sheer, in mm, as shown in 4.2.4;

f_3 ---freeboard correction for the hatchway coamings or the height of or door sills of superstructure, in mm, as shown in 4.2.5.

f_4 ---freeboard correction for local sink or groove of freeboard deck, in mm, see 4.2.6 of this Section.

4.2.2 Basic freeboard

4.2.2.1 The basic freeboard F_0 is to be choose from Table 4.2.2.1, depending on type of ship, grade of service area and length of ship.

Basic freeboard（mm） Table 4.2.2.1

Types of ships and service areas (sections) / Basic freeboard (mm) / Length of ship（m）	Type A					Type B					Type C				
	Grade A	Grade B	Grade C	J_1	J_2	Grade A	Grade B	Grade C	J_1	J_2	Grade A	Grade B	Grade C	J_1	J_2
20	200 (160)	180 (140)	105 （85）	230 (180)	200 (160)	270	260	125	350	300	400	300	215	400	350
30	260 (210)	210 (160)	110 （90）	300 (250)	250 (200)	330	300	150	400	350	450	350	250	450	400
40	320 (270)	250 (190)	110 （90）	375 (325)	300 (250)	390	340	175	470	400	500	400	250	520	450
50	380 (330)	280 (220)	110 （90）	450 (400)	350 (300)	450	380	200	550	450	550	450	250	600	500

Types of ships and service areas (sections) / Basic freeboard (mm) / Length of ship（m）	Type A					Type B					Type C				
	Grade A	Grade B	Grade C	J_1	J_2	Grade A	Grade B	Grade C	J_1	J_2	Grade A	Grade B	Grade C	J_1	J_2
60	440 (380)	310 (250)	110 （90）	450 (400)	400 (350)	500	410	200	550	500	600	490	250	600	550
70	490 (430)	340 (280)	110 （90）	450 (400)	400 (350)	550	440	200	550	500	640	520	250	600	550
80	530 (460)	360 (300)	110 （90）	450 (400)	400 (350)	600	460	200	550	500	670	545	250	600	550
90	560 (500)	380 (320)	110 （90）	450 (400)	400 (350)	640	475	200	550	500	700	565	250	600	550
100	590 (530)	395 (335)	110 （90）	450 (400)	400 (350)	670	485	200	550	500	720	580	250	600	550
110	610 (550)	410 (350)	110 （90）	450 (400)	400 (350)	690	493	200	550	500	740	592	250	600	550
≥120	620 (560)	420 (360)	110 （90）	450 (400)	400 (350)	700	500	200	550	500	750	600	250	600	550

Notes: (1) The value in brackets are to be taken for A type ship fitted with gangway.

(2) For deck cargo ship, the value is selected according to B type ship. For well-deck ship, the value is selected according to B type or C type ship depending on its enclosed condition.

(3) Where the length of ship fall between any two lengths given in Table, the basic freeboard F_0 is to be obtained by linear interpolation.

4.2.3 Freeboard correction for depth

4.2.3.1 Where the ratio of the length of ship to the depth for freeboard L/D_1 is 15 or more, the freeboard need not be corrected. L/D_1 is less than 15, the freeboard is to be increased by the correction obtained from the following formula:

$$f_1 = 60\left(D_1 - \frac{L}{15}\right) \quad \text{mm}$$

where: f_1 ---freeboard correction for depth, in mm;

D_1 ---moulded depth, in m;

L ---length of ship, in m.

4.2.4 Freeboard correction for sheer

4.2.4.1 The standard height of sheer at the perpendiculars is to be selected form Table 4.2.4.1.

Table 4.2.4.1

Length of ship (m)		20	30	40	50	60	70	80	90	100	110	120 or above
Grade A, J_1	Fore sheer Y_{sb} (mm)	450	560	640	700	754	800	840	870	890	900	900
	Aft sheer Y_{wb} (mm)	225	280	320	350	377	400	420	435	445	450	450
Grade B, J_2	Fore sheer Y_{sb} (mm)	310	374	440	500	554	600	640	670	690	700	700
	Aft sheer Y_{wb} (mm)	155	187	220	250	277	300	320	335	345	350	350
Grade C	Fore sheer Y_{sb} (mm)	150	200	240	270	290	300	300	300	300	300	300
	Aft sheer Y_{wb} (mm)	75	100	120	135	145	150	150	150	150	150	150

Note: Where the length of ship fall between two lengths given in Table, the standard sheer height are to be obtained by linear interpolation.

4.2.4.2 The sheer starts amidships, and smoothly rises towards the fore and aft ends of the ship within 1/4 before and ¼ after.Where the actual sheer height is less than the standard sheer height, the freeboard is to be increased (or decreased) by the freeboard correction f_2 obtained from the following formula.

$$f_{2.1} = \frac{1}{6}Y_{sb} - \frac{Y_s L_s + H_s L_{hs}}{3L} \quad \text{mm}$$

$$f_{2.2} = \frac{1}{6}Y_{wb} - \frac{Y_w L_w + H_w L_{hw}}{3L} \quad \text{mm}$$

$$f_2 = f_{2.1} + f_{2.2} + C(f_{2.1} - f_{2.2}) \quad \text{mm}$$

If $f_2 < -1.5L$ mm, then $f_2 = -1.5L$ mm.

where: $f_{2.1}$ ---freeboard correction for non-standard fore sheer, in mm;

$f_{2.2}$ ---freeboard correction for non-standard after sheer, in mm;

C ---coefficient, if $f_{2.2} < f_{2.1}$, then $C = 0.3$; if $f_{2.2} \geq f_{2.1}$, then $C = 0$;

Y_{sb} ---standard height of fore sheer given in Table 4.2.4.1, in mm;

Y_{wb} ---standard height of aft sheer given in Table 4.2.4.1, in mm;

Y_s ---actual height of forward sheer, in mm;

Y_w ---actual height of after sheer, in mm;

H_s ---actual height of raised fore deck, in mm;

H_w ---actual height of raised quarter deck, in mm;

L_s ---the distance from the beginning point of fore sheer to fore perpendicular, in m; if $L_s < 0.25L$, then $L_s = 0$;

L_w ---the distance from the beginning point of aft sheer to aft perpendicular, in m; if $L_w < 0.25L$, then $L_w = 0$;

L_{hs} ---actual length of raised fore deck, in m; if $L_{hs} < 0.05L$, then $L_{hs} = 0$;

L_{hw} ---actual length of raised fore deck, in m; if $L_{hw} < 0.05L$, then $L_{hw} = 0$;

L ---length of ship, in m.

4.2.5 Freeboard correction for height of hatchway coamings and doorway sills

4.2.5.1 The standard height of hatchway coamings and doorway sills of superstructure and casings on freeboard deck, measured from freeboard deck, is to be selected from Table 4.2.5.1.

Standard Height（mm） Table 4.2.5.1

Length of ship and service areas (sections) / Standard height (mm) / Type of hatway		L<40m			L≥40m			Remarks
		A, J_1	B, J_2	C	A, J_1	B, J_2	C	
Height of exposed cargo hatchway coamings, in mm	Type C ships	450	350	230	650	550	400	
	Type A and B ships	250	190	130	350	300	200	
Height of non-exposed cargo hatchway coamings, in mm		190	150	80	250	200	125	May not be required if fitted with substantial weathertight closing arrangement which is permanently closed during the voyage
Height of other exposed hatchway coamings, doorway sills of superstructure and casing, in mm								

4.2.5.2 Where the actual height of hatchway coamings and doorway sills is not less than that required in Table 4.2.5.1, the freeboard is to not be corrected. Otherwise the freeboard is to be increased by the freeboard correction obtained according to 4.2.5.3, but the actual height of hatchway coamings and doorway sills is to be not less than 50mm.

4.2.5.3 Freeboard correction for height of hatchway coamings and doorway sills is to be calculated according to the following formula:

$$f_3 = 0.5\sum \frac{L_{ci} b_{ci}}{LB}(h_{bi} - h_{ci}) \quad \text{mm}$$

where: i ---order of hatchs and cabins and doghouses;

L ---length of ship, in m;

B ---moulded breadth; in m;

L_{ci} ---length of hatchway, in m. For the calculation of correction for height of doorway sills of superstructure and casing, L_{ci} is the length of the casing or the superstructure, or the length of the superstructure which may be arrived at from such doorway sills;

b_{ci} ---width of hatchway, in m. For the calculation of correction for height of doorway sills of superstructure and casing, b_{ci} is the width of the casing or the superstructure, or the width of the superstructure which may be arrived at from such doorway sills;

h_{bi} ---standard height of hatchway coamings and doorway sills of superstructure or casings, given in Table 4.2.5.1, in mm,

h_{ci} ---actual height of hatchway coamings or doorway sills of superstructure and casings, in mm.

4.2.6 Freeboard correction for local sink or groove of freeboard deck

4.2.6.1 Where local sinks or grooves are fitted on the freeboard decks, the freeboard is to be increased according to the correction f_4 obtained from the following provisions:

(1) When the grooves do not communicate with outside water (do not extend to hull bottom, side, stern and bow), as shown in Figure 4.2.6.1 (1), the freeboard f_4 correction for grooves is to be calculated according to 4.2.5.3 of this Section. The standard height of hatch coamings is to take the value passenger/cargo holds and the actual height of hatch coamings is to be 0;

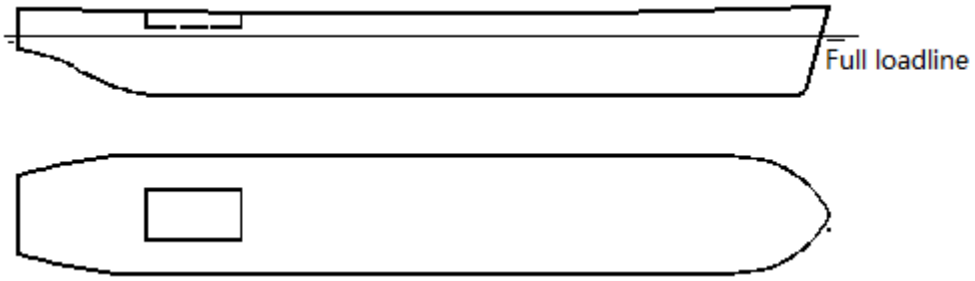

Figure 4.2.6.1（1）

（2）When the local sinks or grooves extend to the sides of the ship or to the stern or bow, as shown in Figure 4.2.6.1 (2), the the freeboard f_4 correction for local sinks or grooves is to be calculated according to the following formulae. Under this conditions, the influences of sheer in the groove area and raised deck and hatch coaming on the freeboard are to be taken into consideration;

$$f_4 = 1000\frac{V_d}{LB} \qquad \text{mm}$$

where: V_d ---volume of local sinks or grooves under the freeboard deck, in m^3;

L ---length of ship, in m;

B ---moulded width, in m.

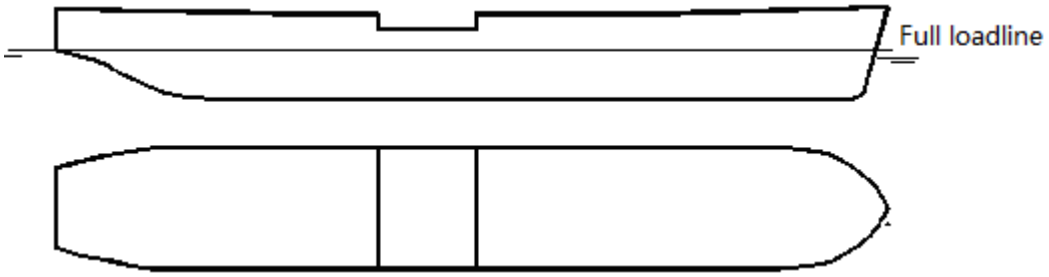

Figure 4.2.6.1 (2)

Section 3 MINIMUM FREEBOARD OF WORKING SHIPS

4.3.1 Working ships

4.3.1.1 The working ships mentioned in this Section include dredges, hopper barges, floating cranes, floating pile drivers, etc.

4.3.2 Minimum freeboards

4.3.2.1 The minimum freeboard of dredgers, hopper barges (ships), split hopper barges (ships) and self-propelled working ships is to be calculated according to the relevant provisions of Section 2 of this CHAPTER. The types of ships (A type ships or B type ships or C type ships) are to be determined according to the hull structures and the protection conditions of openings above the freeboard decks (including raised fore deck and raised quarter deck). When the ships are determined to be A type ships, the basic freeboard is to be selected from the values outside the brackets of A type ships column according to Table 4.2.2.1.

4.3.2.2 Except the working ships mentioned in 4.3.2.1, the minimum freeboard *F* of other working ships isto be calculated according to the following method:

(1) The minimum freeboard *F* under navigating (dispatching) or sheltering from wind is to be calculated according to the following formula:

$$F = 55(L \times D_1)^{0.6} \quad \text{mm}$$

If $F \leq 200$mm, then F =200mm.

where: L ---length of ship, in m;

D_1 ---moulded depth for calculation, in m.

(2) the minimum freeboard *F* under working is to be 1/3 of the value obtained according to article (1), but not be less than 200mm.

Section 4 MINIMUM FREEBOARD OF SELF-UNLOADING SAND SHIPS

4.4.1 Minimum freeboard

4.4.1.1. The minimum freeboard of self-unloading sand ships is to be calculated according to the provisions in 4.2.1.1 of this CHAPTER. The freeboard correction for the height of hatchway coamings or the height of door sills is to be calculated according to the provisions in 4.4.1.2~4.4.1.4 of this Section.

4.4.1.2 The height of hatch coaming of cargo conveyors at the exit of the freeboard deck (or rised deck) is to meet the provisions for the height of hatch coaming of exposed cargo hatches in 4.2.5.1 of this Part.

4.4.1.3 The actual height of hatch coaming of cargo conveyor at the exit of the freeboard deck (or rised deck) is to be measured from of the freeboard deck (or rised deck).When the actual height of hatch coaming is not less than the standard height mentioned in 4.4.1.2 of this Section, the actual height is not corrected; when the actual height of hatch coaming is less than the standard height mentioned in 4.4.1.2, the freeboard is to be increased according to the value obtained according to 4.2.5.3 of this CHAPTER.

4.4.1.4 When calculating the correction of height of hatch coaming of cargo conveyor at the exit of the freeboard deck (or rised deck) according to 4.2.5.3 of this CHAPTER, the hatch width is to be the transverse distance between cargo hatch coaming at two sides or the width between the watertight bulwarks (longitudinal bulkheads) fitted between front wall and collision bulkhead, whichever the lesser; the hatch length is to be the horizontal distance between back coaming of cargo holds and collision bulkhead.

4.4.1.5 For the ships fitted with a raised quarter deck, the actual height of the hatchcoaing in way of the exit for the cargo converyor may be measued from the freeboard deck, provided that the exit is located on the raise quarter deck. If so, the freeboard correction for sheer (see 4.2.4 of this Part) is to not be considered for the raised quarter deck.

AppendixI DRAUGHT MARKS

The draught marks consist of graduation lines and numbers, of which the style is as illustrated in Figure I (1) and Figure I (2).

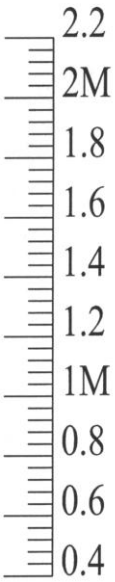

Figure I (1)

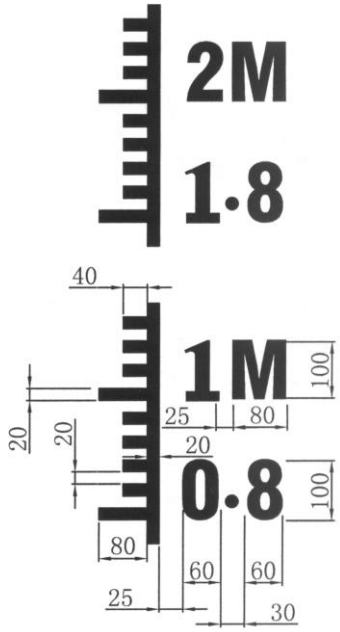

Figure I (2)

Description of draught marks for ships:

I.1 Graduation lines consist of vertical lines (inclined lines may be used at the fore and aft) and horizontal lines.The width of the vertical lines (including inclined lines) is 20mm. One horizontal line with a width of 20mm is drew from the vertical line every 20 mm (the adjacent two horizontal lines are 20mm apart), and of which the length is 80mm (hereinafter referred to as the long horizontal line) or 40mm (hereinafter referred to as the short horizontal line). The space of the long horizontal lines is 200mm (the low-edges of the adjacent two horizontal lines is 200mm apart), and the others are short horizontal lines. The height of the low-edge of the long horizontal line is the draught which is a multiple of 0.2m. The direction from which the horizontal line is drew from the vertical line is the notch direction of draught scales. The notch direction of draught scales is to be determined by the position where the draught marks are assigned.

I.2 The numbers consist of figures, decimal points and units.The graduation lines of the draught marks are a multiple of 0.2m, and the unit m is added behind the figure where it is a whole number, on the contrary the unit m is not added.The lines are 20mm in breadth, and the figures are 100mm in height and 60mm in width. The place held by the decimal points is 50mm in height and 30mm in width (the circle's centre of the decimal point is at the centre of 50mm×30mm, and the diameter is 20mm). The unit is the capital letter 'M', which is 100mm in height and 80mm in width.The space between the vertical line and the figure, the figures and the figure and the unit is 25mm, and no space is between the figure and the place held by the decimal point.

I.3 The reading is marked at the low-edge of the long horizontal line, the low-edge of which is at the same level as that of the horizontal line. Where the water is up to the low-edge of the figure of the reading, the reading is the draught. The distance between the draught scales and figures is to be 25mm. When the draught scales are consisted of vertical lines and horizontal lines, the figures are usually at the opposite side of the notch direction of draught scales; When the draught scales are consisted of oblique lines and horizontal lines, the figures are usually at the same side of the notch direction of draught scales.

I.4 The outer surface of the midship keel plate (or bottom edge of keel) and the extension line is to be taken as the measurement datum line of draught. For the ships with original trim (ships of rake keel), the outer surface of midship rake keel and the extension line is to be taken as the measurement datum line of draught.For bow, midship and stern draughts, the crossing point of datum line and the bow, midship and stern perpendiculars is taken as the measurement datum point.

I.5 Draught marks are to be marked at least 0.2m below the actual light draught and are to be a multiple of 0.2m. The actual draught of the ship (including trim condition) is to be indicated correctly through the marks.Where the light draught is 0.6m, they are to be marked from at least 0.4m as illustrated in

Figure I (1).

I.6 The right hand side of the draught marks is to be located at a distance of 600mm leftwards to the center of the ring, where they are marked amidships at both sides.

I.7 The fore or aft draught marks are to be marked on or as near as possible to the stem or stern perpendicular. The draught marks may be stepped depending on the practical condition. Where it is difficult to marks, the aft draught marks maybe marked at a steel bar fitted on rudder or at proper position on the after edge of rudder. The notch direction of bow and stern draught scales usually face midship.

I.8 In the load line marks and draught figures, the position of draught datum line (whether the outer surface of the midship keel plate or the low-edge of keel is taken as the measurement datum line) mentioned in I.4 is to be indicated and the position of bow and stern draught marks mentioned in I.7 is to be indicated.

I.9 The assignment position and style of draught marks at left and right sides are shown in Figure I.9 (1) and I.9 (2).

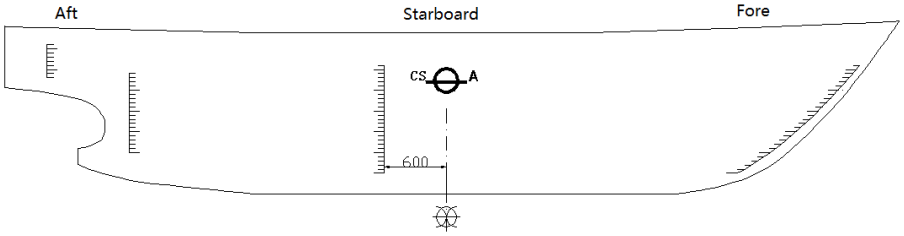

Figure I. 9 (1) Starboard

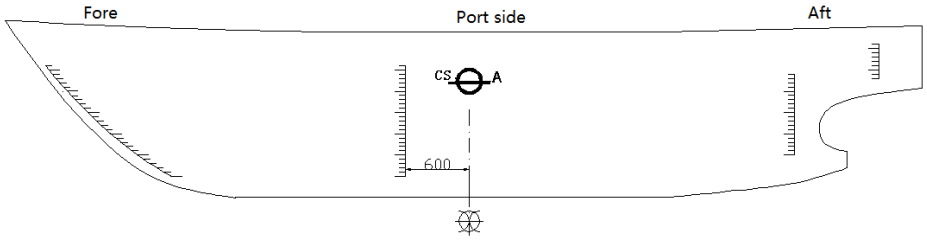

Figure I. 9 (1) Port side

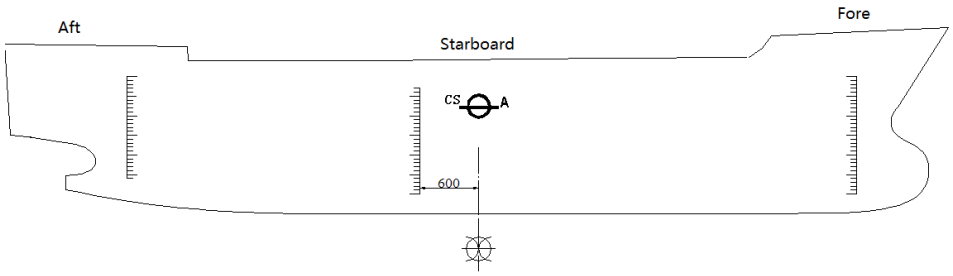

Figure I. 9 (2) Starboard

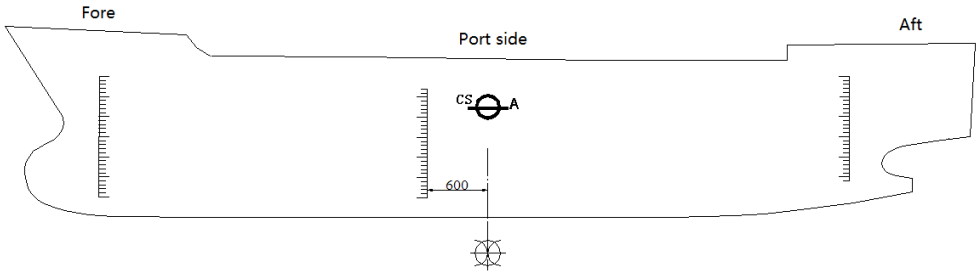

Figure I. 9 (2) Port side

I.10 The lines, figures, decimal points and letters of draught marks are to be painted white and yellow when the side board is with dark color background; and are to be painted black when the side board is with light color background.

I.11 When ship draught is read through draught marks, the readings at the stem, midship and stern draught marks are to be converted to the data at the stem, midship and stern perpendiculars. The difference between the draught datum line mentioned in I.4 and the datum line in sheer plan are to be noted.