Common Structural Rules for Bulk Carriers and Oil Tankers, 1 January 2024, Corrigenda 1

Amended Rules

Rules for the Survey and Construction of Steel Ships Part CSR-B&T

Reason for Amendment

IACS periodically makes Rule Changes or Corrigenda as a part of the maintenance of its Common Structural Rules for Bulk Carriers and Oil Tankers (CSR-BC&OT).

Since Corrigenda are primarily intended to correct editorial errors, they are to be applied retroactively to the date of entry into force of the rules in the relevant year edition. However, since it takes time to go through the entire rule change process for incorporation into the NK Rules, the Rules already specify through an amendment dated 30 June 2016, Corrigenda adopted by IACS are, in principle, applicable from their effective dates.

Corrigenda 1 related to the 1 January 2024 edition of the CSR-BC&OT was published by IACS in May 2025. Relevant requirements are, therefore, amended in accordance with Corrigenda 1.

Outline of Amendment

Amends relevant requirements in accordance with Corrigenda 1.

Effective Date and Application

Effective date of this amendment is 1 January 2026.

ID:DH25-08

Amended	Original	Remarks
Part CSR-B&T COMMON STRUCTURAL RULES FOR BULK CARRIERS AND OIL TANKERS **Part 1 GENERAL HULL REQUIREMENTS** **Chapter 9 FATIGUE** **Section 2 STRUCTURAL DETAILS TO BE ASSESSED** **2. Finite Element Analysis** **2.1 Structural Details to be Assessed** 2.1.3 Details to be checked by screening fatigue assessment The structural details listed in **Table 2** for which FE fine mesh models have been analysed according to yielding requirements given in **Ch 7, Sec 3** are to be assessed using the screening fatigue procedure as given in **Ch 9, Sec 5, 6** or to be assessed by very fine mesh analysis according to **Ch 9, Sec 5, 1** to **4**.	**Part CSR-B&T COMMON STRUCTURAL RULES FOR BULK CARRIERS AND OIL TANKERS** **Part 1 GENERAL HULL REQUIREMENTS** **Chapter 9 FATIGUE** **Section 2 STRUCTURAL DETAILS TO BE ASSESSED** **2. Finite Element Analysis** **2.1 Structural Details to be Assessed** 2.1.3 Details to be checked by screening fatigue assessment The structural details listed in **Table 2** for which FE fine mesh models have been analysed according to yielding requirements given in **Ch 7, Sec 3** are to be assessed using the screening fatigue procedure as given in **Ch 9, Sec 5, 6** or to be assessed by very fine mesh analysis according to **Ch 9, Sec 5, 1** to **4**.	

Amended	Original	Remarks

Table 2 Structural Details for Screening Fatigue Assessment

No	Critical detail	Applicability	
		Oil tanker	Bulk carrier
1	Bracket toe of transverse web frame	Applicable(1)	N/A
2	Toe of horizontal stringer	Applicable(1)	N/A
3	Welded ~~L~~lower hopper knuckle connection in *EA* hold(2) and in *FA* hold(2) not assigned as a ballast hold	N/A	Applicable(1)
4	Connections of transverse bulkhead lower stool to inner bottom in *EA* hold(2) and in *FA* hold(2) where the ballast hold is not assigned to the ship	N/A	Applicable(1)

(1) For details assessed by fine mesh analysis according to **Ch 7, Sec 3, 3.2**.
(2) Cargo hold located closest to the midship

Remarks: It is clarified that the screening fatigue assessment of lower hopper knuckle connection is required for welded type only.

Amended

Section 3 FATIGUE EVALUATION

3. Reference Stresses for Fatigue Assessment

3.3 Thickness Effect

3.3.1

Plate thickness primarily influences the fatigue strength of welded joints through the effect of geometry, and through-thickness stress distribution. The correction factor, f_{thick}, for plate thickness effect is taken as：

- For $t_{n50} \leq 22\ mm$, $f_{thick} = 1.0$
- For $t_{n50} > 22\ mm$, $f_{thick} = (t_{n50}/22)^n$

where:

t_{n50} : Net thickness of the considered member in way

Original

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where:

t_{n50} : Net thickness of the considered member in way

Amended	Original	Remarks
of the hot spot for welded joints or base material free edge, in *mm*. • For simplified stress analysis, the net thickness to be considered for stiffeners is as follows： • Flat bar and Bulb profile：no correction, • Angle bar and *T*-bar：flange net thickness. • For *FE* analysis, the net thickness to be considered is the net thickness of the member where the crack is likely to initiate and propagate. For 90 *degrees* attachments, i.e. cruciform welded joints, transverse *T*-joints and plates with transverse attachment, the net thickness to be considered is to be taken as: $t_{n50} = \min\left(\frac{d}{2}, t_{1n50}\right)$ *n* : Thickness exponent provided in **Table 1** and **Table 4** respectively for welded and non-welded joints. *n* is to be selected according to the considered stress direction. For this selection, $\Delta\sigma_{HS1}$ and $\Delta\sigma_{HS2}$ are considered perpendicular and parallel to the weld respectively. *d* : Toe distance, in *mm*, as shown in **Fig. 2**, taken as: $d = t_{2n50} + 2\ell_{leg}$ t_{1n50} : Net thickness, in *mm*, of the continuous plate as shown in **Fig. 2**. t_{2n50} : Net thickness, in *mm*, of the transverse attach plate where the hot spot is assessed, as shown in **Fig. 2**. ℓ_{leg} : Fillet weld leg length, in *mm*. (Deleted)	of the hot spot for welded joints or base material free edge, in *mm*. • For simplified stress analysis, the net thickness to be considered for stiffeners is as follows： • Flat bar and Bulb profile：no correction, • Angle bar and *T*-bar：flange net thickness. • For *FE* analysis, the net thickness to be considered is the net thickness of the member where the crack is likely to initiate and propagate. For 90 *degrees* attachments, i.e. cruciform welded joints, transverse *T*-joints and plates with transverse attachment, the net thickness to be considered is to be taken as: $t_{n50} = \min\left(\frac{d}{2}, t_{1n50}\right)$ *n* : Thickness exponent provided in **Table 1** and **Table 4** respectively for welded and non-welded joints. *n* is to be selected according to the considered stress direction. For this selection, $\Delta\sigma_{HS1}$ and $\Delta\sigma_{HS2}$ are considered perpendicular and parallel to the weld respectively. *d* : Toe distance, in *mm*, as shown in **Fig. 2**, taken as: $d = t_{2n50} + 2\ell_{leg}$ t_{1n50} : Net thickness, in *mm*, of the continuous plate as shown in **Fig. 2**. t_{2n50} : Net thickness, in *mm*, of the transverse attach plate where the hot spot is assessed, as shown in **Fig. 2**. ℓ_{leg} : Fillet weld leg length, in *mm*. When post-weld treatment methods are applied to improve	This requirement is deleted since the thickness exponent when post-weld treatment methods are applied has been specified in Table 1,

Amended	Original	Remarks
	<u>the fatigue life of considered welded joint, the thickness exponent is provided in 6.</u>	Sect.3, Ch.9.

Amended

4. *S-N* Curves

4.1 Basic *S-N* Curves

4.1.4 In-air environment

The basic design curves in-air environment shown in **Fig. 3** are represented by linear relationships between $\log(\Delta\sigma)$ and $\log(N)$ as follows：

$$\log(N) = \log(K_2) - m \cdot \log(\Delta\sigma)$$

where:

<u>$\log(K_2) = \log(K_1) - 2\delta$</u>

K_1 : Constant related to mean *S-N* curve, as given in **Table 2.**

K_2 : Constant related to design *S-N* curve, as given in **Table 2.**

δ : Standard deviation of $\log(N)$, as given in **Table 2**.

$\Delta\sigma_q$: Stress range at $N = 10^7$ cycles related to design *S-N* curve, in N/mm^2, as given in **Table 2**.

Original

4. *S-N* Curves

4.1 Basic *S-N* Curves

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where:

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$\Delta\sigma_q$: Stress range at $N = 10^7$ cycles related to design *S-N* curve, in N/mm^2, as given in **Table 2**.

Remarks

Simplification of the requirement

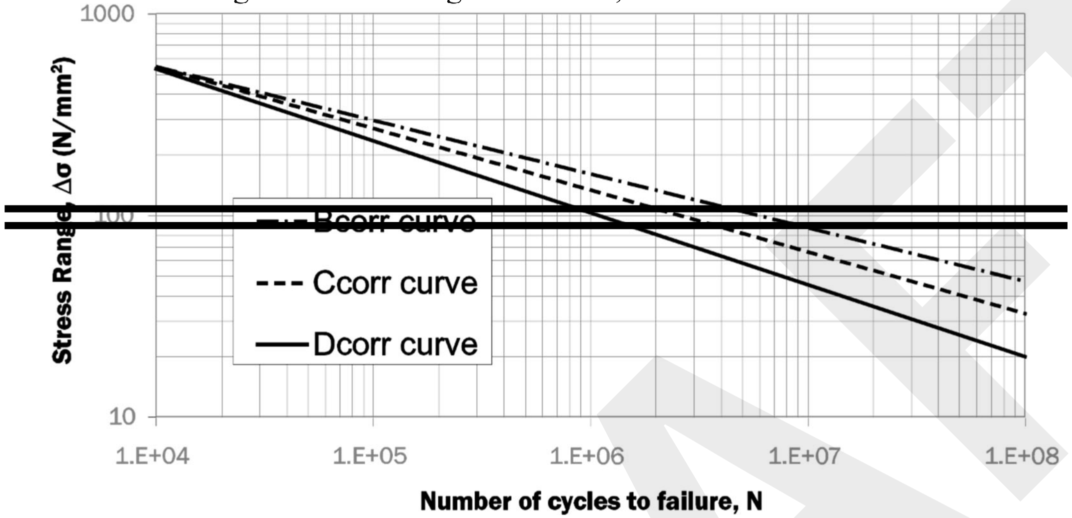
Table 2 Basic *S-N* Curve Data, In-air Environment

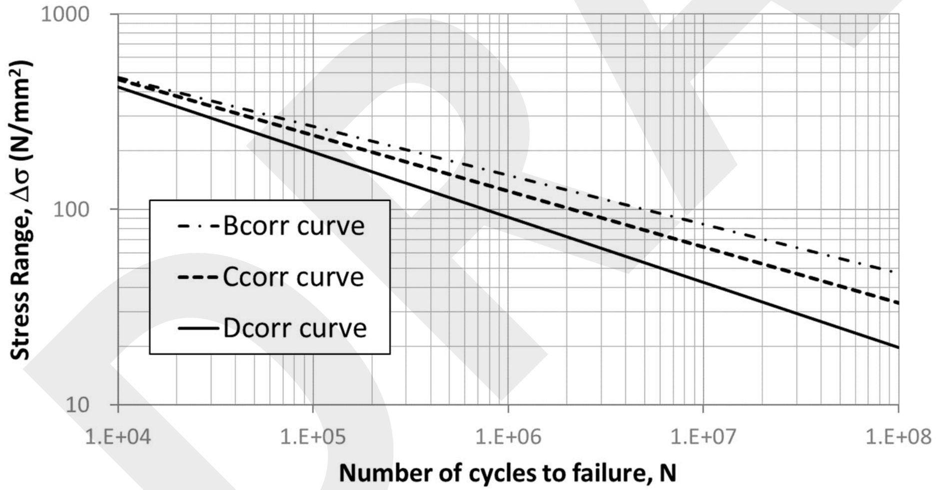
Class	~~K_1~~		m	~~Standard deviation~~ δ	K_2	Design stress range at 10^7 cycles	Design stress range at 2×10^6 cycles
	K_1	$\log_{10}K_1$		~~$\log_{10}\delta$~~	~~K_2~~	$\Delta\sigma_q$ N/mm^2	N/mm^2
B	2.343*E*15	15.3697	4.0	0.1821	1.01*E*15	100.2	149.9
C	1.082*E*14	14.0342	3.5	0.2041	4.23*E*13	78.2	123.9
D	3.988*E*12	12.6007	3.0	0.2095	1.52*E*12	53.4	91.3

Remarks: Simplification of the requirement

Amended	Original	Remarks
4.1.5 Corrosive environment The basic design curves for corrosive environment shown in **Fig. 4** are represented by linear relationships between log($\Delta\sigma$) and log(N) as follows: $\log(N) = \log(K_2) - m \cdot \log(\Delta\sigma)$ N : Predicted number of cycles to failure under stress range $\Delta\sigma$. K_2 : Constant related to design *S-N* curve as given in **Table 3**.	4.1.5 Corrosive environment The basic design curves for corrosive environment shown in **Fig. 4** are represented by linear relationships between log($\Delta\sigma$) and log(N) as follows: $\log(N) = \log(K_2) - m \cdot \log(\Delta\sigma)$ N : Predicted number of cycles to failure under stress range $\Delta\sigma$. K_2 : Constant related to design *S-N* curve as given in **Table 3**.	

Amended	Original	Remarks
Fig. 4 Basic Design *S-N* Curves, Corrosive Environment		This figure is updated to align with Table 3, Sec.3, Ch.9.

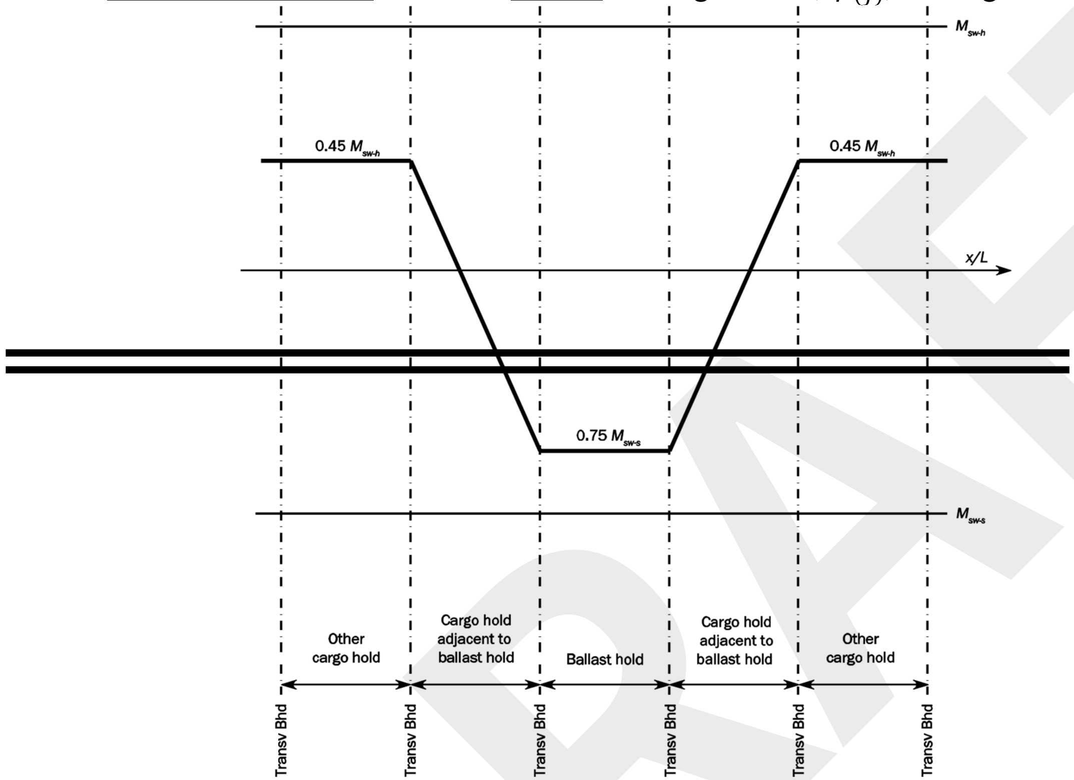




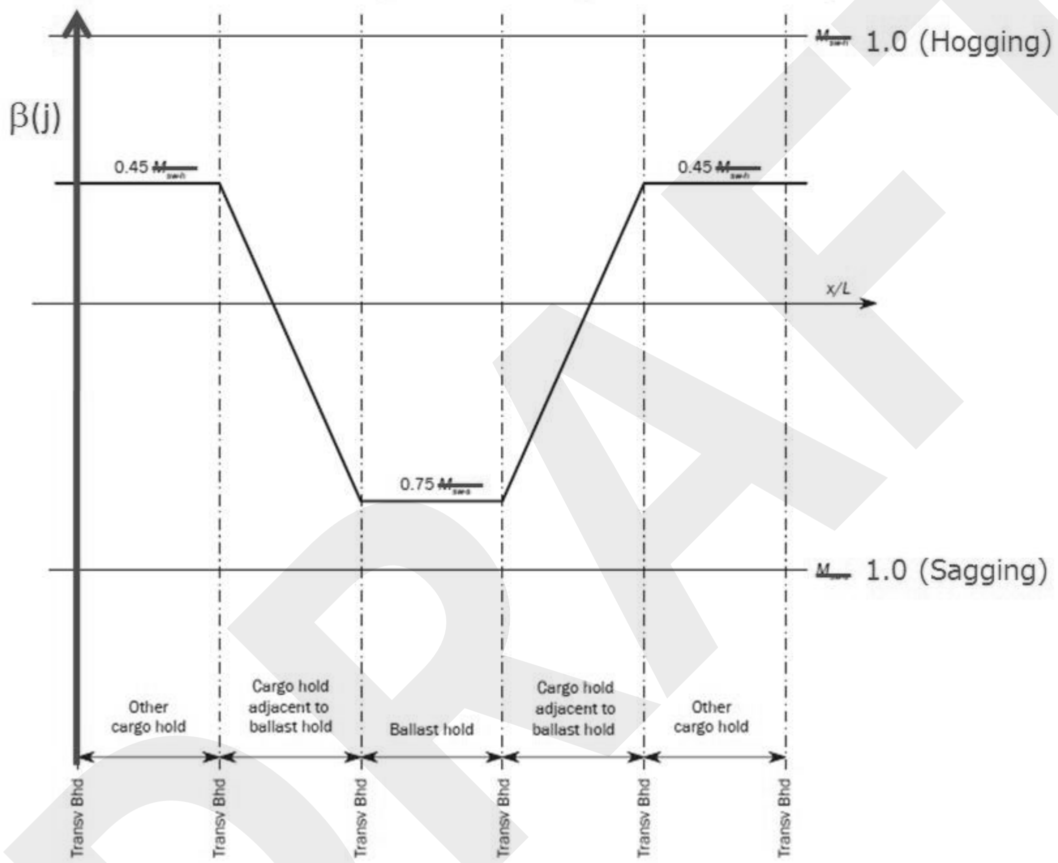
Amended	Original	Remarks
5. Fatigue Damage Calculation **5.2 Elementary Fatigue Damage** 5.2.1 The elementary fatigue damage for each fatigue loading condition (*j*) is to be calculated independently for both protected in-air environment and unprotected corrosive environment, based on the fatigue stress range obtained for the predominant load case as follows: $D_{E(j)} = \frac{\alpha_{(j)} \cdot N_D}{K_2} \frac{\Delta\sigma_{FS,(j)}^m}{(\ln N_R)^{m/\xi}} \cdot \mu_{(j)} \cdot \Gamma\left(1+\frac{m}{\xi}\right)$ where: N_D : Total number of <u>stress</u> cycles <u>due to wave loads assumed</u> during the design fatigue life, taken as: $N_D = 31.557 \times 10^6 (f_0 T_D)/(4\log L_{CSR})$ (Omitted) **Section 4 SIMPLIFIED STRESS ANALYSIS** **3. Hull Girder Stress** **3.2 Stress due to Still Water Hull Girder Bending Moment** 3.2.1 The hull girder hot spot stress due to still water bending moment, in N/mm^2, in loading condition (*j*) is obtained from the following formula:	**5. Fatigue Damage Calculation** **5.2 Elementary Fatigue Damage** 5.2.1 The elementary fatigue damage for each fatigue loading condition (*j*) is to be calculated independently for both protected in-air environment and unprotected corrosive environment, based on the fatigue stress range obtained for the predominant load case as follows: $D_{E(j)} = \frac{\alpha_{(j)} \cdot N_D}{K_2} \frac{\Delta\sigma_{FS,(j)}^m}{(\ln N_R)^{m/\xi}} \cdot \mu_{(j)} \cdot \Gamma\left(1+\frac{m}{\xi}\right)$ where: N_D : Total number of <u>wave</u> cycles <u>experienced by ship</u> during the design fatigue life, taken as: $N_D = 31.557 \times 10^6 (f_0 T_D)/(4\log L_{CSR})$ (Omitted) **Section 4 SIMPLIFIED STRESS ANALYSIS** **3. Hull Girder Stress** **3.2 Stress due to Still Water Hull Girder Bending Moment** 3.2.1 The hull girder hot spot stress due to still water bending moment, in N/mm^2, in loading condition (*j*) is obtained from the following formula:	The definition is updated since the total number of wave cycles does not depend on the ship length and the stress cycles due to wave loads are used for fatigue assessment.

Amended	Original	Remarks
$$\sigma_{GS,(j)} = \frac{f_c \cdot f_{NA} \cdot K_a \cdot \beta_{(j)} \cdot M_{sw} \cdot (z - z_n)}{I_{y-n50}} 10^{-3}$$ where: *M_{sw}*: Permissible still water vertical bending moment, in *kNm*, as defined in **Ch 4, Sec 4** at the hull girder load calculation point of the considered longitudinal position. $\beta_{(j)}$: Fraction of permissible still water vertical bending moment, as defined in **Table 1**.	$$\sigma_{GS,(j)} = \frac{f_c \cdot f_{NA} \cdot K_a \cdot \beta_{(j)} \cdot M_{sw} \cdot (z - z_n)}{I_{y-n50}} 10^{-3}$$ where: *M_{sw}*: Permissible still water vertical bending moment, in *kNm*, as defined in **Ch 4, Sec 4** at the hull girder load calculation point of the considered longitudinal position. $\beta_{(j)}$: Fraction of permissible still water vertical bending moment, as defined in **Table 1**.	

Amended	Original	Remarks
Fig. 1 Distribution of Fraction of Permissible Still Water Vertical Bending Moment, $\beta_{(j)}$, for Fatigue Assessment in way of Ballast Hold		



Amended-Original Requirements Comparison Table
(Common Structural Rules for Bulk Carriers and Oil Tankers, 1 January 2024, Corrigenda 1)

Amended	Original	Remarks
		

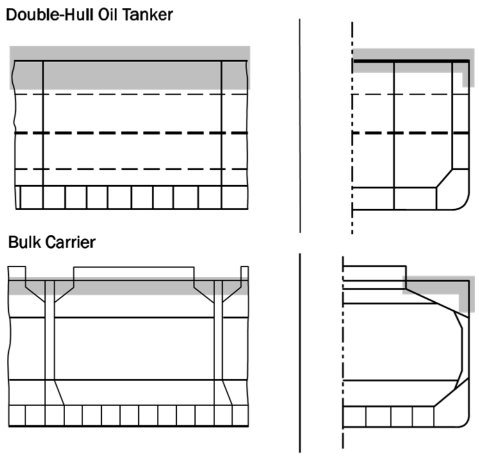
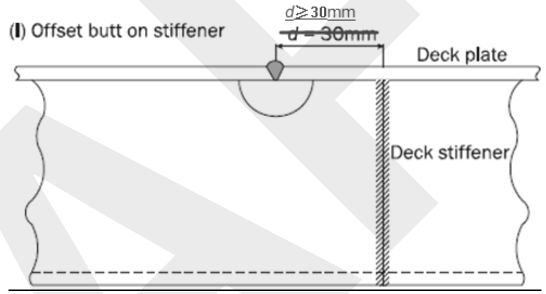
Amended	Original	Remarks
4. Local Stiffener Stress **4.1 Stress due to Stiffener Bending** 4.1.2 Stress due to static pressure The hot spot stress due to local static pressure, in N/mm^2, for loading condition (j) is obtained from the following formula: $\sigma_{LS,(j)} = \frac{K_b K_n s \ell_{bdg}^2 (\eta_S P_{S,(j)} + \eta_{Is} P_{Is,(j)} + \eta_{bs} P_{bs,(j)}) \left(1 - \frac{6x_e}{\ell_{bdg}} + \frac{6x_e^2}{\ell_{bdg}^2}\right)}{12 Z_{eff-n50}}$ where: $P_{S,(j)}$: Static external pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 5, 1.2**. $P_{ls,(j)}$: Static liquid tank pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 6, 1.1.1**. Pressure acting on both sides could be simultaneously considered if relevant in the loading condition. <u>For the deck longitudinal stiffeners of bulk carriers, no internal pressure from the topside tank is considered.</u> $P_{bs,(j)}$: Static dry bulk cargo pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 6, 2.4.1**. η_S,η_{Is},η_{bs}: Pressure normal coefficients, taken as: η = 1 when the considered pressure is applied on the stiffener side, η = −1 otherwise.	**4. Local Stiffener Stress** **4.1 Stress due to Stiffener Bending** 4.1.2 Stress due to static pressure The hot spot stress due to local static pressure, in N/mm^2, for loading condition (j) is obtained from the following formula: $\sigma_{LS,(j)} = \frac{K_b K_n s \ell_{bdg}^2 (\eta_S P_{S,(j)} + \eta_{Is} P_{Is,(j)} + \eta_{bs} P_{bs,(j)}) \left(1 - \frac{6x_e}{\ell_{bdg}} + \frac{6x_e^2}{\ell_{bdg}^2}\right)}{12 Z_{eff-n50}}$ where: $P_{S,(j)}$: Static external pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 5, 1.2**. $P_{ls,(j)}$: Static liquid tank pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 6, 1.1.1**. Pressure acting on both sides could be simultaneously considered if relevant in the loading condition. $P_{bs,(j)}$: Static dry bulk cargo pressure, in kN/m^2, in loading condition (j) specified in **Ch 4, Sec 6, 2.4.1**. η_S,η_{Is},η_{bs}: Pressure normal coefficients, taken as: η = 1 when the considered pressure is applied on the stiffener side, η = −1 otherwise.	Incorporate the requirement for dynamic liquid tank pressure in 4.1.1, Sec.4, Ch.9.

Amended	Original	Remarks
4.2 Stress due to Relative Displacement 4.2.6 Stress due to relative displacement derived using FE method The following procedure is based on a cargo hold model complying with **Ch 7, Sec 2, 2** to calculate the stress due to relative displacements. The stress due to relative displacements, in *N/mm²*, for load case *i*1 and *i*2 of loading condition (*j*) for both locations "*a*" and "*f*" is to be calculated directly using the following expression: (Omitted) $I_{Fwd\text{-}n50}$, $I_{Aft\text{-}n50}$: Net moment of inertia, in cm^4, of forward (*Fwd*) and afterward (*Aft*) longitudinall, with effective breadth of attached plating defined in **Ch 9, Sec 4, 4.1.1**. $Z_{Fwd\text{-}n50}$, $Z_{Aft\text{-}n50}$: Net section modulus of forward (*Fwd*) and afterward (*Aft*) stiffener, in cm^3, with effective breadth of attached plating defined in **Ch 9, Sec 4, 4.1.1**. (Omitted) **Section 5 FINITE ELEMENT STRESS ANALYSIS** **3. Hot Spot Stress for Details Different from Web-stiffened Cruciform Joints** **3.1 Welded Details** 3.1.1 (Omitted) For hot spot type "*b*", the stress distribution is not dependent on the plate thickness; the structural hot spot stress, σ_{HS}, is derived from a	**4.2 Stress due to Relative Displacement** 4.2.6 Stress due to relative displacement derived using FE method The following procedure is based on a cargo hold model complying with **Ch 7, Sec 2, 2** to calculate the stress due to relative displacements. The stress due to relative displacements, in *N/mm²*, for load case *i*1 and *i*2 of loading condition (*j*) for both locations "*a*" and "*f*" is to be calculated directly using the following expression: (Omitted) $I_{Fwd\text{-}n50}$, $I_{Aft\text{-}n50}$: Net moment of inertia, in cm^4, of forward (*Fwd*) and afterward (*Aft*) longitudinal. $Z_{Fwd\text{-}n50}$, $Z_{Aft\text{-}n50}$: Net section modulus of forward (*Fwd*) and afterward (*Aft*) stiffener, in cm^3 (Omitted) **Section 5 FINITE ELEMENT STRESS ANALYSIS** **3. Hot Spot Stress for Details Different from Web-stiffened Cruciform Joints** **3.1 Welded Details** 3.1.1 (Omitted) For hot spot type "*b*", the stress distribution is not dependent on the plate thickness; the structural hot spot stress, σ_{HS}, is derived from a	It is clarified that the effective breadth of attached plating defined in 4.1.1, Sec.4, Ch.9 is included for the calculation of section properties of stiffeners.

Amended	Original	Remarks
finite element analysis with mesh density 10×10 *mm* and is obtained by the following formula: $\sigma_{HS} = 1.12 \cdot \sigma$ where: σ: Beam element stress, in *N/mm*^{2}, read out at a distance of 5 *mm* from the intersection line.	finite element analysis with mesh density 10×10 *mm* and is obtained by the following formula: $\sigma_{HS} = 1.12 \cdot \sigma$ where: σ: Surface principal stress, in *N/mm*^{2}, read out at an absolute distance from the intersection line of 5 *mm*.	It is clarified that the beam element stresses are used for the assessment for hot spot type b since the beam elements are used for the assessment in such cases.
Section 6 DETAIL DESIGN STANDARD **3. Scallops in way of Block Joints** **3.1 Design Standard B** 3.1.1 Scallops in way of block joints in the cargo tank/hold region, located on the stiffeners fitted on strength deck, and side above 0.9*D* from the baseline, are required to be designed according to the design standard B as shown in **Table 2**.	**Section 6 DETAIL DESIGN STANDARD** **3. Scallops in way of Block Joints** **3.1 Design Standard B** 3.1.1 Scallops in way of block joints in the cargo tank/hold region, located on the stiffeners fitted on strength deck, and side above 0.9*D* from the baseline, are required to be designed according to the design standard B as shown in **Table 2**.	

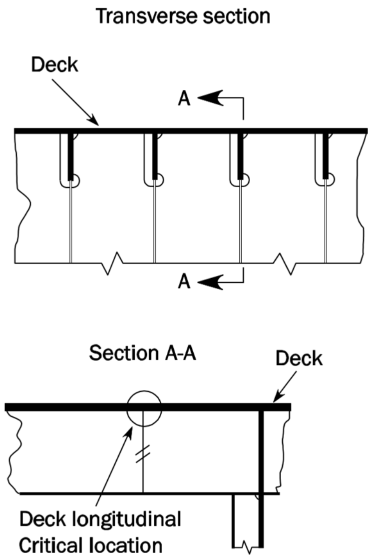
Amended	Original	Remarks

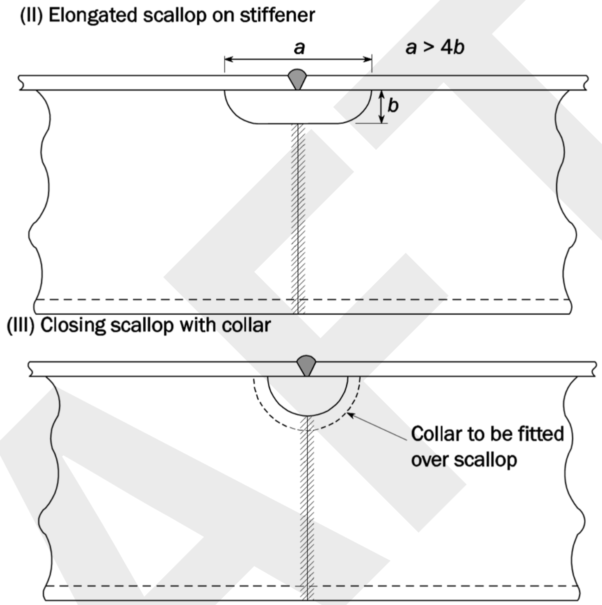
Table 2 Design Standard B – Scallops in way of Block Joints

Welding of deck stiffeners in way of block joints	
Critical areas	Design standard B
	
Critical locations	

Amended-Original Requirements Comparison Table
(Common Structural Rules for Bulk Carriers and Oil Tankers, 1 January 2024, Corrigenda 1)

Amended	Original	Remarks



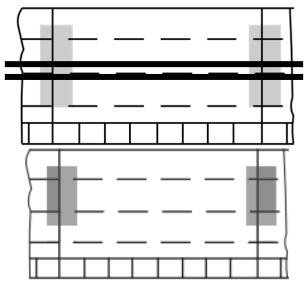
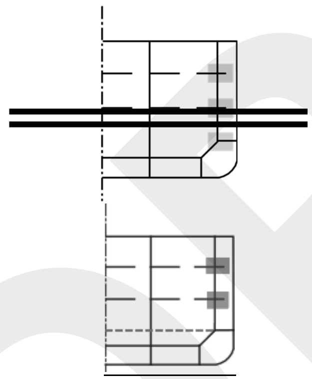
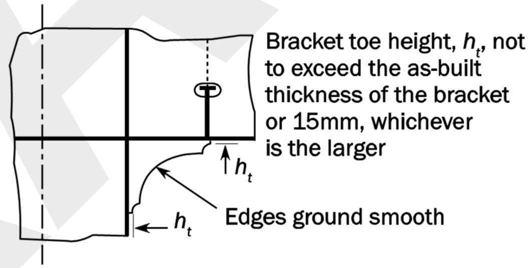


Note 1 : Alternative scallop geometry to that shown in option II may be accepted subject to demonstration of satisfactory fatigue life based on hull girder loads taking into account additional stress concentration factor in way of weld

Critical location	Welding of deck stiffeners in way of block joints in cargo tank region, the strength deck and side above 0.9 *D* from the baseline.
Detail design standard	All scallops are to be fitted according to detail design standard B.
Building tolerances	Ensure alignment of all structural members according to *IACS Recommendation No. 47*.
Welding requirements	Full penetration butt weld, free of undercut or notches, around the web and flange of the longitudinal stiffener at block joints, particularly in way of the weld termination at the scallop for option II.

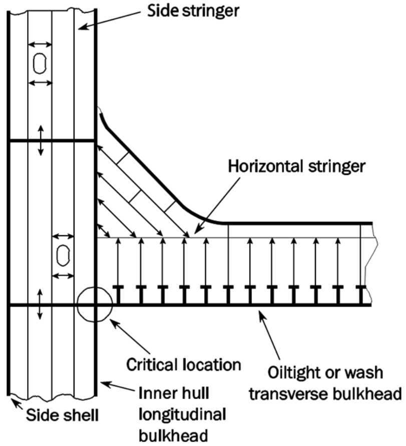
Amended	Original	Remarks
5. Horizontal Stringer Heel **5.1 Design Standard I** 5.1.1 The horizontal stringer heel location between transverse oil-tight/swash bulkhead plating and inner hull longitudinal bulkhead plating for double hull oil tankers are required to be designed according to design standard I, as shown in **Table 9**.	**5. Horizontal Stringer Heel** **5.1 Design Standard I** 5.1.1 The horizontal stringer heel location between transverse oil-tight/swash bulkhead plating and inner hull longitudinal bulkhead plating for double hull oil tankers are required to be designed according to design standard I, as shown in **Table 9**.	The figure is updated to align with Table 3, Sec.2, Ch.9 since it is specified in the table that the stringer closest to the mid depth and for the uppermost one are to be assessed.

Table 9 Design Standard I – Transverse Bulkhead Horizontal Stringer Heel

Connections of horizontal stringer on plane oil-tight transverse bulkheads or wash bulkheads to inner hull longitudinal bulkheads		
Critical areas		Design standard I
		 Note 1: Where a face plate is considered necessary, it is recommended that design features be adopted to reduce the stress concentration at the face plate termination (e.g. taper and soft nose). Adequate fatigue life of the weld on the bracket edge in way of such terminations is to be confirmed.
Critical locations		Note 2: 'Slit type cut-outs are to be adopted in way of the bracket toe as shown.

Amended	Original	Remarks

Amended:



Original:

Alternatively, cut-outs with insert type collars will be accepted. Scallops are to be avoided.'

Critical location	Intersections of webs of transverse bulkhead horizontal stringer and double side tank side stringer forming square corners.
Detail design standard	A soft toe backing bracket is to be fitted. The following bracket sizes are recommended: ・ VLCC: 800×800×30, *R*600 with soft toe as shown in figure above, ・ Other tankers: 800×600×25, *R*550 with soft toe as shown in figure above, where the longer arm length is in way of the inner skin. The specified minimum yield stress for the bracket is not to be less than 315 N/mm^2. The free edge is to be ground smooth with corners rounded.
Building tolerances	The nominal distance between the centres of thickness of the two abutting members should not exceed 1/3 of the as-built plate thickness of the inner hull longitudinal bulkhead.
Welding requirements	Vertical weld between the inner hull plating and transverse bulkhead plating, fillet welding having minimum weld factor 0.44. Welding between the backing bracket and the adjoining plates is to be double sided fillet welding having minimum weld factor 0.44 except in way of the bracket toes. Full penetration welding is to be used for the connection of bracket toes to the inner hull and transverse bulkhead plating for a distance of 200 *mm* from the toes and the weld toes are to be ground smooth in way.

Amended:

6. Bulkhead Connection to Lower and Upper Stool

6.1 Design Standard J, K and L

6.1.1

The welded connection of bulkhead to lower stool of bulk carriers and oil tankers are to be designed according to the design standard J and K respectively, as shown in **Table 10** and **Table 11**.

Original:

6. Bulkhead Connection to Lower and Upper Stool

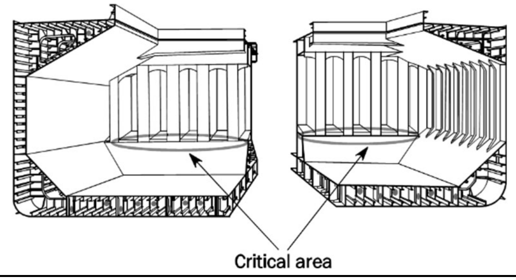
6.1 Design Standard J, K and L

6.1.1

The welded connection of bulkhead to lower stool of bulk carriers and oil tankers are to be designed according to the design standard J and K respectively, as shown in **Table 10** and **Table 11**.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">

Table 10 Design Standard J – Transverse Bulkhead Connection Detail, Bulk Carrier (Ballast hold)

<table>
<tr><td colspan="2">Connections of transverse bulkhead with lower stool</td></tr>
<tr><td>Critical areas</td><td>Design standard J</td></tr>
<tr><td>


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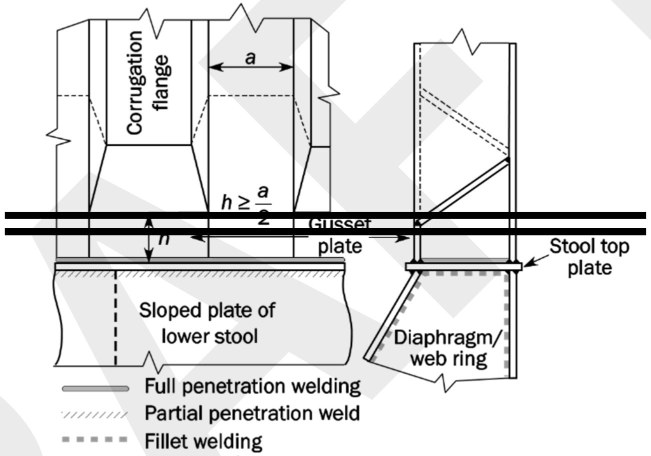
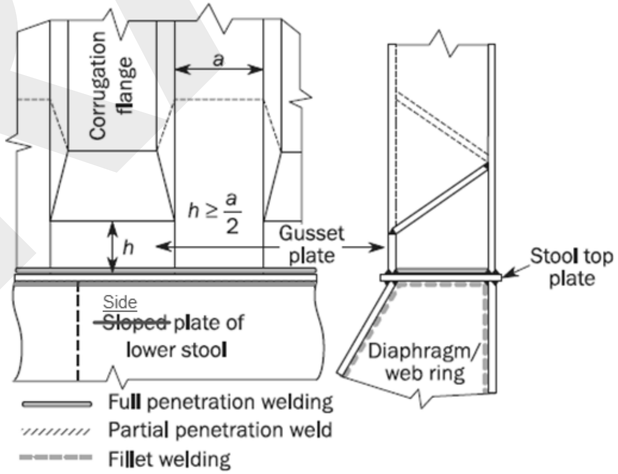
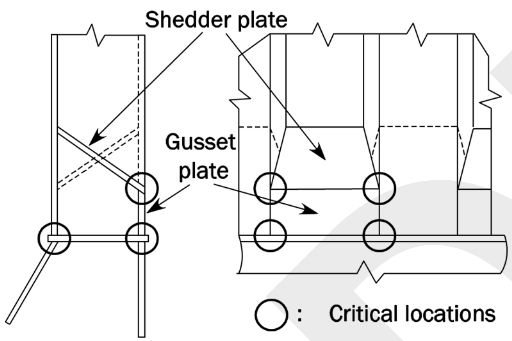




</td></tr>
<tr><td>Critical locations</td></tr>
<tr><td>


</td></tr>
</table>

</td><td>The figure is updated to align with the requirement in this table since it is specified that full penetration welding is to be applied between lower stool top plates and the side plating of lower stools and corrugated bulkheads.</td></tr>
</table>

Amended	Original	Remarks

Critical location	Connections of lower stool shelf plate to lower stool and corrugated transverse bulkheads. Connections of shedder plates to corrugated transverse bulkhead.
Detail design standard	The use of scallops is to be avoided on diaphragms/web at lower stool top plates. Gusset plates are to be fitted to corrugated bulkheads. Gusset plates are to be made out of the same material and have the same as-built thickness as corrugated bulkheads; and, the height of gusset plates is to be greater than half of breadth of the corrugation. To reduce stress concentrations at the crossing of the shedder plates one plate is to be moved higher than the other (as shown in Figure). Alternatively, bracketed stiffener can be fitted at the crossing points underneath the shedder plating facing the ballast hold.
Building tolerances	Ensure alignment between lower stool sloping plates and corrugation faces according to *IACS Recommendation No. 47*.
Welding requirement	Full penetration welding is to be applied between lower stool top plates and the side plating of lower stools and corrugated bulkheads. Partial or full penetration welding is to be applied around gusset plates. However, full penetration welding is to be applied between lower stool top plates and gusset plates. Ensure start and stop of welding is as far away as practicable from the critical corners.

Amended:

8. Lower and Upper Toe of Hold Frame

8.1 Design Standard N

8.1.1

The welded connections of lower and upper bracket toes of hold frame of bulk carriers are to be designed according to design standard N, as shown in **Table 14**.

Original:

8. Lower and Upper Toe of Hold Frame

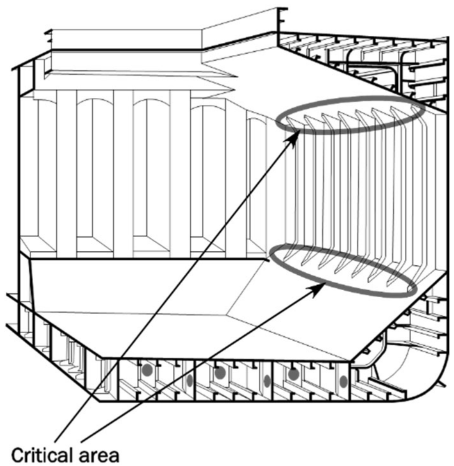
8.1 Design Standard N

8.1.1

The welded connections of lower and upper bracket toes of hold frame of bulk carriers are to be designed according to design standard N, as shown in **Table 14**.

Amended	Original	Remarks

Table 14 Design Standard N – Lower and Upper Toe Detail of Hold Frame - Bulk Carrier

<table>
<tr><td colspan="2">Lower and upper hold frame connections</td></tr>
<tr><td>Critical areas</td><td>Design standard N</td></tr>
<tr><td>
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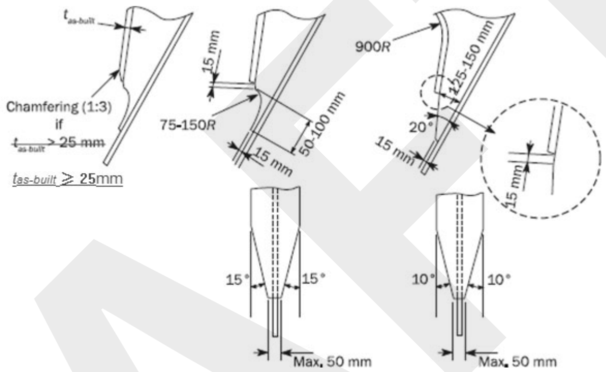
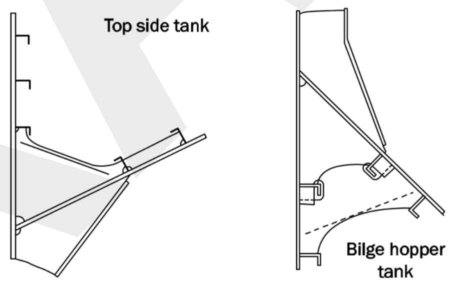
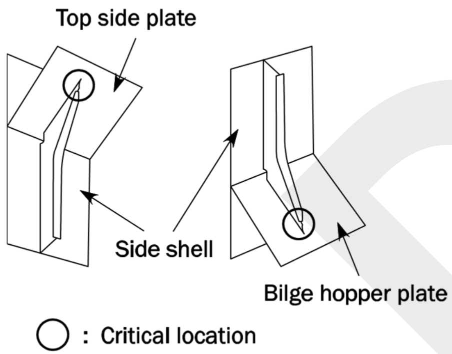
<td rowspan="3">

Examples of the soft and extended toes at the end of hold frames.


Connection of lower and upper end bracket of hold frame.</td></tr>
<tr><td>Critical locations</td></tr>
<tr><td>
</td></tr>
<tr><td>Minimum requirement</td><td>As a minimum the detail design standard N is to be applied. Tapered extended toes are more effective and are to be considered for high tensile steel side shell frame.</td></tr>
</table>

Remarks: It is clarified that chamfering is required when the thickness of the face plates is 25 mm since it is specified in this table that chamfering may be dispensed with if the thickness of the face plates is less than 25 mm.

Amended	Original	Remarks

Critical location	Toe connection of side shell frame lower and upper brackets to the hopper and topside sloping plates, including face plate terminations.
Detail design standard	Alternative geometries than stipulated above are permissible subject to demonstration of satisfactory fatigue performance. However, the maximum angles shown on the figures for thickness chamfering and face width tapering are not to be exceeded. Bracket toe height and the distance between the face plate termination and start of the toe radius (or toe taper) are to be kept to a minimum. The face plates of hold frames at lower or upper brackets are to be tapered and chamfered as shown. While chamfering may be dispensed with if the thickness of the face plates is less than 25 *mm*, it is nevertheless a recommended practice, with a larger gradient if necessary. Frames are to be built-up symmetrical sections with integral upper and lower brackets and are to be arranged with soft or elongated toes as shown. The side frame flange is to be curved (not knuckled) at the connection with the end brackets. Where the frame upper brackets are not positioned directly below a ring web, supporting brackets are to be provided. In the design ensure that if a topside tank stiffener is positioned above the end of frame upper bracket, the stiffener cut-out is avoided or closed with a full collar. Increasing the size of supporting brackets will reduce stress concentrations in the critical area. Where the frame lower brackets are not positioned directly above a ring web, supporting brackets are to be provided. In the design ensure that if a hopper tank stiffener is positioned below the end of the frame lower bracket, the stiffener cut-out is avoided or closed with a full collar. Increasing the size of supporting brackets will reduce stress concentrations in the critical area.
Building tolerances	Ensure alignment between side shell frame lower and upper bracket and transverse ring webs or supporting brackets according to *IACS Recommendation No. 47*. Maximum misalignment is to be not greater than $t_{as\text{-}built}$ /3 where $t_{as\text{-}built}$ is the thinner as-built thickness of the webs to be aligned and misalignment is the overhang of the as-built thinner thickness.
Welding requirement	Welding is to comply with **Ch 12, Sec 3, 3**. In way of the wrap around weld at the face plate termination, care should be taken to ensure no over- run onto the radius part and the toe is free from notches and undercut.

Chapter 12 CONSTRUCTION

Section 3 DESIGN OF WELD JOINTS

2. Tee or Cross Joint

2.4 Partial or Full Penetration Welds

2.4.5 Locations required for full penetration welding

Full penetration welds are to be used in the following

Chapter 12 CONSTRUCTION

Section 3 DESIGN OF WELD JOINTS

2. Tee or Cross Joint

2.4 Partial or Full Penetration Welds

2.4.5 Locations required for full penetration welding

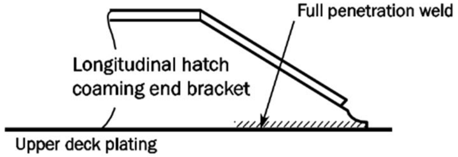
Full penetration welds are to be used in the following

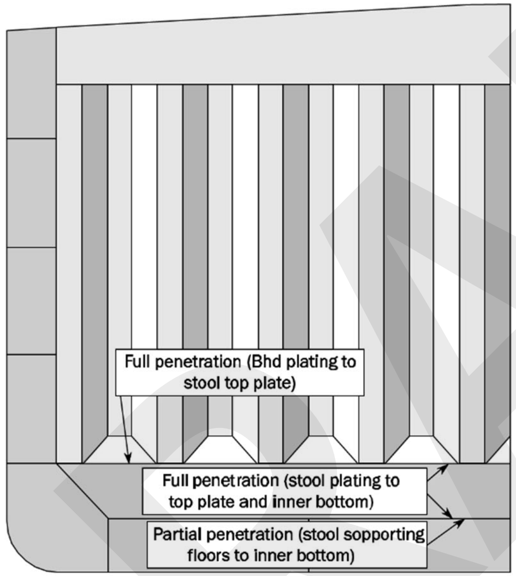
Amended	Original	Remarks
locations and elsewhere as required by the rules, see **Fig. 3**: (a) Floors to hopper/inner bottom plating in way of radiused hopper knuckle. (b) Radiused hatch coaming plate at corners to deck. (c) Connection of vertical corrugated bulkhead to the lower hopper plate and to the inner bottom plate within the cargo hold region, when the vertical corrugated bulkhead is arranged without a lower stool. (d) Connection of structural elements in the double bottom in line with corrugated bulkhead flanges to the inner bottom plate, when the vertical corrugated bulkhead is arranged without a lower stool. (e) Connection of vertical corrugated bulkhead to the lower hopper plate, and connection of structural elements in the lower hopper area in line with corrugated bulkhead flanges to the lower hopper plate, where connections are clear of lower stools. (f) Connection of vertical corrugated bulkhead to top plating of lower stool. (g) Corrugated bulkhead lower stool side plating to lower stool top plate. (h) Corrugated bulkhead lower stool side plating to inner bottom. (i) Connection of structural elements in double bottom to the inner bottom plate in holds intended for the carriage of liquid at sea with a distance of 300 *mm* from the side plating of the lower stool, see **Fig. 3**. (j) Edge reinforcement or pipe penetration both to strength deck, sheer strake and bottom plating within $0.6L_{CSR}$ amidships, when the dimensions of the opening	locations and elsewhere as required by the rules, see **Fig. 3**: (a) Floors to hopper/inner bottom plating in way of radiused hopper knuckle. (b) Radiused hatch coaming plate at corners to deck. (c) Connection of vertical corrugated bulkhead to the lower hopper plate and to the inner bottom plate within the cargo hold region, when the vertical corrugated bulkhead is arranged without a lower stool. (d) Connection of structural elements in the double bottom in line with corrugated bulkhead flanges to the inner bottom plate, when the vertical corrugated bulkhead is arranged without a lower stool. (e) Connection of vertical corrugated bulkhead to the lower hopper plate, and connection of structural elements in the lower hopper area in line with corrugated bulkhead flanges to the lower hopper plate, where connections are clear of lower stools. (f) Connection of vertical corrugated bulkhead to top plating of lower stool. (g) Corrugated bulkhead lower stool side plating to lower stool top plate. (h) Corrugated bulkhead lower stool side plating to inner bottom. (i) Connection of structural elements in double bottom to the inner bottom plate in holds intended for the carriage of liquid at sea with a distance of 300 *mm* from the side plating of the lower stool, see **Fig. 3**. (j) Edge reinforcement or pipe penetration both to strength deck, sheer strake and bottom plating within $0.6L_{CSR}$ amidships, when the dimensions of the	

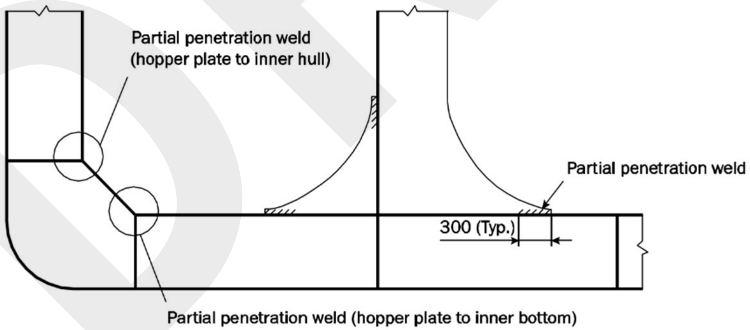
Amended	Original	Remarks
exceeds 300 *mm*. (k) Abutting plate panels with as-built thickness less than or equal to 12 *mm*, forming outer shell boundaries below the scantling draught, including but not limited to: sea chests, rudder trunks, and portions of transom. For as-built thickness greater than 12 *mm*, partial penetration in accordance with **2.4.2**. (l) Crane pedestals and associated bracketing and support structure. (m) For toe connections of longitudinal hatch coaming end bracket to the deck plating, full penetration weld for a distance of 0.15 H_c from toe of side coaming termination bracket is required, where H_c is the hatch coaming height. (n) Rudder horns and shaft brackets to shell structure. (o) Thick flanges of long transverse web frames to side web frames. Thick flanges of long longitudinal girder to bulkhead web frames. 2.4.6 Locations required for partial penetration welding Partial penetration welding as defined in **2.4.2**, is to be used in the following locations. (see examples in **Fig. 3**): (a) Connection of hopper sloping plate to longitudinal bulkhead (inner hull) or horizontal girder in double side space. (b) End connection of longitudinal/transverse bulkhead primary supporting member including buttress structure to the double bottom and both end connections of backing bracket, where it is fitted. (c) Corrugated bulkhead lower stool supporting floors to inner bottom.	opening exceeds 300 *mm*. (k) Abutting plate panels with as-built thickness less than or equal to 12 *mm*, forming outer shell boundaries below the scantling draught, including but not limited to: sea chests, rudder trunks, and portions of transom. For as-built thickness greater than 12 *mm*, partial penetration in accordance with **2.4.2**. (l) Crane pedestals and associated bracketing and support structure. (m) For toe connections of longitudinal hatch coaming end bracket to the deck plating, full penetration weld for a distance of 0.15 H_c from toe of side coaming termination bracket is required, where H_c is the hatch coaming height. (n) Rudder horns and shaft brackets to shell structure. (o) Thick flanges of long transverse web frames to side web frames. Thick flanges of long longitudinal girder to bulkhead web frames. 2.4.6 Locations required for partial penetration welding Partial penetration welding as defined in **2.4.2**, is to be used in the following locations. (see examples in **Fig. 3**): (a) Connection of hopper sloping plate to longitudinal bulkhead (inner hull) or horizontal girder in double side space. (b) End connection of longitudinal/transverse bulkhead primary supporting member including buttress structure to the double bottom and both end connections of backing bracket, where it is fitted. (c) Corrugated bulkhead lower stool supporting floors to inner bottom.	

Amended	Original	Remarks
(d) Corrugated bulkhead gusset and shedder plates. (e) Lower 15_% of the length of built-up corrugation of vertical corrugated bulkheads (f) Structural elements in double bottom below bulkhead primary supporting members and stool plates, except in way of **2.4.5(i)**. (g) Lower hopper plate to inner bottom. (h) Horizontal stringers on bulkheads in way of their bracket toe and the heel.	(d) Corrugated bulkhead gusset and shedder plates. (e) Lower 15% of the length of built-up corrugation of vertical corrugated bulkheads (f) Structural elements in double bottom below bulkhead primary supporting members and stool plates, except in way of **2.4.5(i)**. (g) Lower hopper plate to inner bottom. (h) Horizontal stringers on bulkheads in way of their bracket toe and the heel.	
Fig. 3 High Stress Areas Welding (examples)		These figures are updated to align with the requirements in 2.4.5 and 2.4.6, Sec.3, Ch.12.

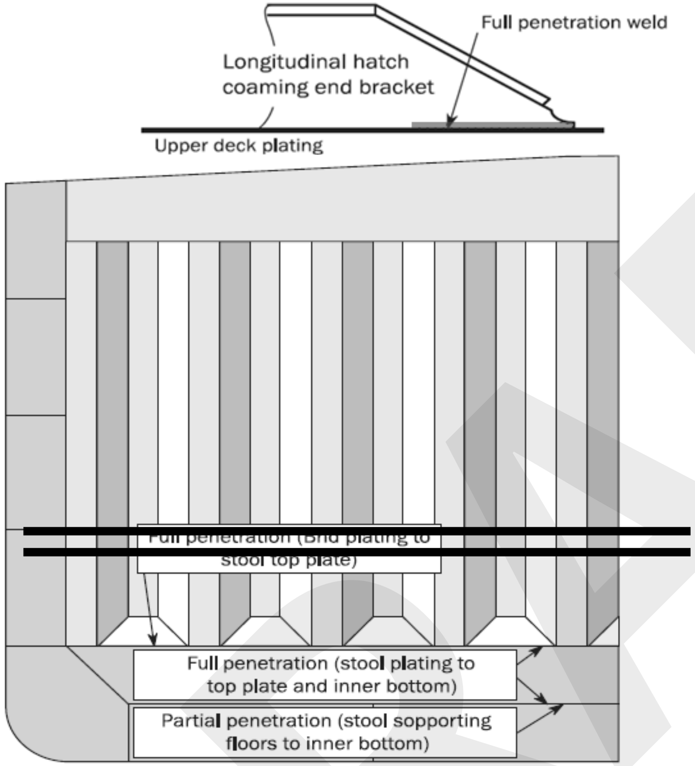
Amended	Original	Remarks

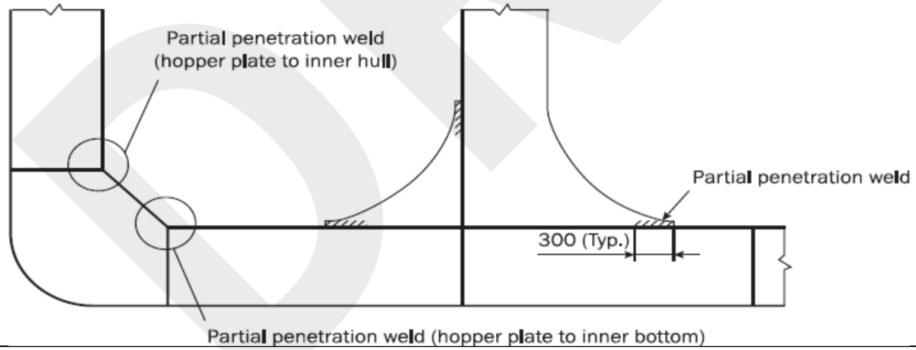






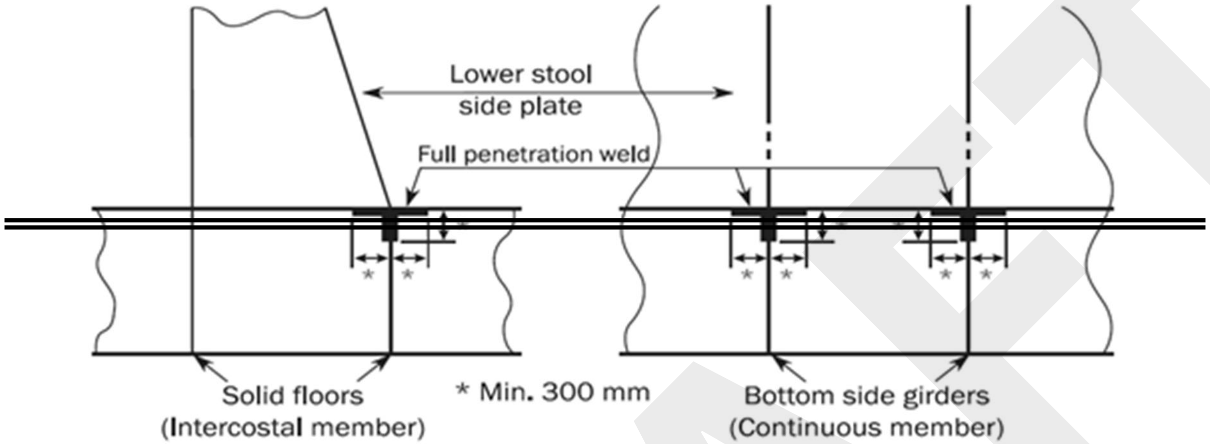
Amended	Original	Remarks

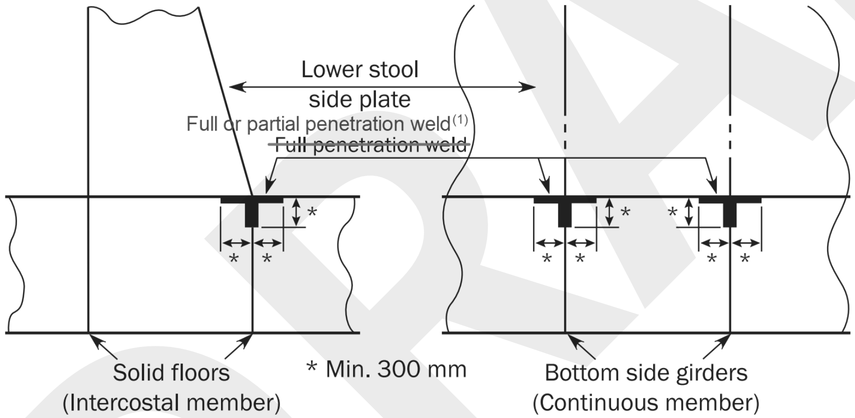




Amended-Original Requirements Comparison Table
(Common Structural Rules for Bulk Carriers and Oil Tankers, 1 January 2024, Corrigenda 1)

Amended	Original	Remarks





<u>Note:</u>
<u>(1) Full penetration weld is to be applied in case of **Ch 12, Sec 3, 2.4.5 i)**. Partial penetration weld is to be applied in case of **Ch 12, Sec 3, 2.4.6 f)**.</u>

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2026.