



SSQS

Samsung Shipbuilding Quality Standard

Samsung Shipbuilding Quality Standard 2005

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**SAMSUNG
HEAVY INDUSTRIES**

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HISTORY

| | | |
|-------------|--------------|-----------------------------|
| Sep. | 1979. | The First Edition |
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P R E F A C E

This Samsung Shipbuilding Quality Standard(SSQS) is compiled in an effort to standardize the production and quality control practices for the building of new vessels in Samsung Heavy Industries Co., Ltd.

Considering the importance of the quality control in the shipbuilding industry, the process control policy has been emphasized as the basic quality control policy to minimize potential defects at each production stage and to assure the quality of the final products.

This booklet consists of two sections ;

- Quality Standard
- Scope of Inspection

The Standard mentioned in the booklet will be generally applied to the quality control of the shipbuilding at the Geoje Shipyard.

PART A. QUALITY STANDARD

I . HULL PART 6

1. Material
2. Welding
3. Marking
4. Cutting
5. Fabrication
6. Accuracy of hull form
7. Deformation
8. Details
9. Surface finish condition
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II . PAINTING PART 31

1. Primary surface preparation and pre-priming
2. Secondary surface preparation
3. Painting
4. Ambient condition
5. D.F.T Measurement
6. Time for D.F.T Measurement

III . OUTFITTING PART 37

1. Main machinery
2. Auxiliary machinery
3. Piping
4. Sheet metal outfitting

I. HULL PART

1. MATERIAL

1-1. Rolled plate

1-1-1. Definition of imperfection and defect

- An imperfection is some feature which introduces an irregularity in an otherwise uniform structure.
- A defect is a specific imperfection which impairs the suitability of that structure for its intended purpose.

In order to determine if a particular imperfection is actually a defect, there must be some standard which defines the acceptable limits of that imperfection. When its size or concentration exceeds these limits, it is deemed a defect. We can therefore think of a defect as simply a rejectable imperfection.

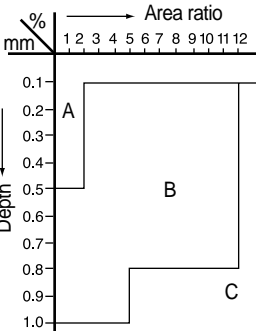
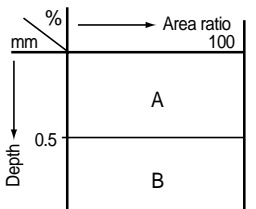
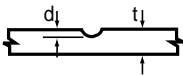
Imperfections related to the following discontinuities.

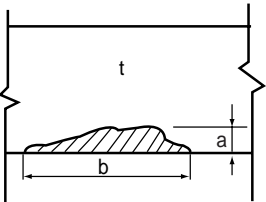
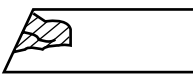
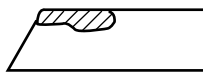
: Pitting, rolled in scale, indentations, roll marks, scratches and grooves

Defects related to the following discontinuities.

: Cracks, shells, seams, spills, blisters, hot tears and sand patches

| Object | Detail | Correction / Remarks |
|---|--------|---|
| 1-1-2. Surface Imper- fections | Pit | <p data-bbox="361 211 575 249">Grade of pitting</p> <div data-bbox="373 352 620 664"> <p data-bbox="373 757 620 832">Area ratio (%) = $\frac{\text{Area of pitting}}{\text{Total area of steel surface}} \times 100$</p> </div> <div data-bbox="655 211 1241 1328"> <ol style="list-style-type: none"> 1. Grade A : Repair is unnecessary. 2. Grade B : <ol style="list-style-type: none"> 1) Outer surface of shell plates: To be repaired by grinding (if necessary) (When painting with epoxy can not be done, grinding is to be carried out.) 2) Others : Repair is unnecessary. 3. Grade C : <ol style="list-style-type: none"> 1) Outer surface of shell plates : To be repaired by grinding 2) Others : Painting with epoxy to be carried out 4. Grade D: Repair method is to be determined after discussion with owner and class. <ul style="list-style-type: none"> * Recommended repair method : Grinding followed by welding 5. The ground area shall not exceed the tolerances as follows. <ol style="list-style-type: none"> 1) Single ground area : 0.25 m² 2) Total ground area : 2% of the total surface area 6. Repaired area by welding shall not exceed : <ol style="list-style-type: none"> 1) Single ground area : 0.125 m² 2) Total ground area : 2% of the total surface area of the side involved </div> |

| Object | | Detail | Correction / Remarks |
|------------------------------|-----------------------------|--|--|
| 1-1-2. Surface Imperfections | Flaking | <p>Grade of surface flaking</p>  | <p>1. Grade A : Repair is unnecessary. Grade B : To be repaired if necessary Grade C : To be repaired</p> <p>2. Repair method Depth of defects : d Plate thickness : t 1) $d < 0.07t$ (max. 3mm) ... Removed by grinding 2) $0.07t \leq d \leq 0.2t$... Grinding followed by welding (The welded area should be less than 2% of the total surface area.)</p> |
| | Indentation (other defects) | <p>Grade of indentation</p>   | <p>1. Grade A : Repair is unnecessary. Grade B : Repair is necessary.</p> <p>2. Repair method Depth of defects : d Plate thickness : t 1) $d < 0.07t$ (max. 3mm) : Grinding 2) $0.07t \leq d \leq 0.2t$: Welding and grinding</p> <p>3. The welded area should be less than 2% of the total area of a plate.</p> |

| Object | Detail | Correction / Remarks |
|-------------------|---|--|
| 1-1-3. Lamination | <p>Local lamination</p> <p>$a \leq 1t$</p>  <p>"b" is the length of the defect on the flame-cut edge. "a" is the other dimension. "t" is the plate thickness.</p> | <p>In case where the range of lamination is limited, it can be chipped out and built-up by welding as shown in (a).</p> <p>(a) </p> <p>In case where the range of lamination is limited, but is also near the plate surface, it is preferable to make the built-up welding as shown in (b).</p> <p>(b) </p> <p>It must be carefully examined whether the procedure is acceptable or not, in case where the degree of the lamination is more severe and defective.</p> |
| | <p>Severe lamination requiring a local exchange of plate</p> <p>$a > 1t$</p> | <p>It is recommended to exchange locally the plate, in case where the range of lamination is fairly extensive. The standard minimum breadth of plate to be exchanged :</p> <p>Shell and strength deck plating in way of cruciform or T-joints 1,600mm Shell, strength deck plating and other primary members 800mm Other structural members 300mm</p> |

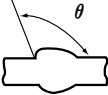

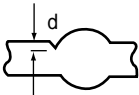
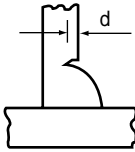
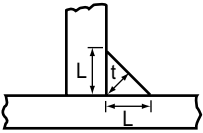
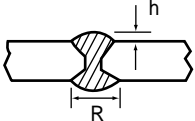
1-2. Cast steel

| Object | Detail | Correction / Remarks |
|-----------------------|---|--|
| Defects of cast steel | <p>In case where examined defect is over 20% of thickness, or over 25mm deep and 150mm long</p> | <p>In case where cavity, crack and other injurious defects are found,</p> <ol style="list-style-type: none"> 1) Remove the defects by gouging. 2) Gouged areas shall be welded in accordance with maker's recommendation and/or an approved WPS. 3) Repaired areas shall be checked by magnetic particle testing or ultrasonic testing. |

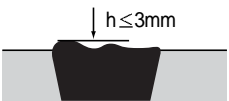
2. WELDING

2-1. Shape of bead

Unit : mm

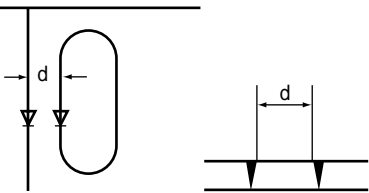
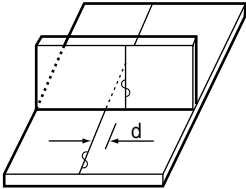
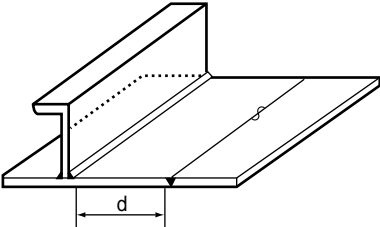
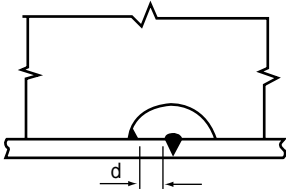
| Item | Details | | Tolerance limits | Remarks |
|-----------------------------------|---|--|---|---|
| 2-1-1. Over-lap | Butt |  | $\theta \leq 90^\circ$ | In case $\theta > 90^\circ$, grinding or welding is necessary to make $\theta \leq 90^\circ$. |
| | Fillet |  | | |
| 2-1-2. Under cut | Butt |  | $d \leq 0.5$ (Length of less than 90mm continuous) | Where $0.5 < d \leq 1$ undercut to be ground smooth (Localised only) Where $d > 1$ undercut to be filled by welding (Carefully avoid short bead for high tensile steels) |
| | Fillet |  | | |
| 2-1-3. Leg length and throat |  | | $L \geq L_0$ $t \geq t_0$ If $0.9L_0 \leq L < L_0$ or $0.9t_0 \leq t < t_0$, the extent is to be less than 10% | L_0 : Designed leg length t_0 : Designed throat |
| Item | Details | | Standard range | Tolerance limits |
| 2-1-4. Height of reinforcement |  | | $h \leq 0.2R$ | max. $h = 6$ |

Unit : mm

| Item | Details | Tolerance limits | Corrections / remarks |
|--|---|------------------|--|
| 2-1-5. Irregularity of multi weld |  | $h \leq 3$ | <p>When the surface irregularity exceeds 3mm, apply grinding until the irregularity becomes less than 3mm. (This repair standard is applicable to fillet welds also)</p> |

2-2. Preparation of welding

Unit : mm

| Item | Details | | Tolerance limits | Remarks |
|--|---|-----------------|------------------|---------|
| 2-2-1. Distance between two butt welds |  | | $d \geq 30$ | |
| |  | | $d \geq 0$ | |
| 2-2-2. Distance between butt weld and fillet weld |  | Main structure | $d \geq 10$ | |
| | | Other structure | $d \geq 0$ | |
| |  | Main structure | $d \geq 5$ | |
| | | Other structure | $d \geq 0$ | |

2-3. Short bead

Unit : mm

| Item | Details | Tolerance limits | Corrections / remarks |
|--|--------------------------------------|------------------|--|
| 2-3-1. Damage part of base metal | • Normalized 50HT | ≥ 50 | <p>* In case where short bead is used unavoidably, preheating is necessary at $100 \pm 25^{\circ}\text{C}$.</p> <p>* Where short bead is made erroneously, remove the bead by grinding, and weld over tolerable bead length after confirming crack.</p> |
| | • Cast steel | ≥ 30 | |
| | • Mild steel | ≥ 10 | |
| 2-3-2. Repair part of welding bead and tack welding | • TMCP 50HT (Ceq. $\leq 0.36\%$) | ≥ 10 | |
| | • Normalized 50HT | ≥ 50 | |
| | • Cast steel | ≥ 30 | |
| | • Mild steel | | |
| | • TMCP 50HT (Ceq. $\leq 0.36\%$) | | |

2-4. Repair of arc strike

| Details | Tolerance limits | Corrections |
|--|------------------|--|
| <ul style="list-style-type: none"> • Normalized 50HT • Cast steel • TMCP 50 HT • Grade E of mild steel | Prohibited | In case where arc strike is made erroneously, remove the hardened zone by grinding |

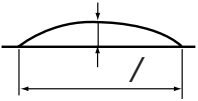
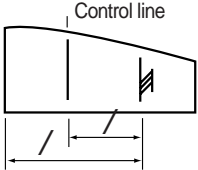
2-5. Pre-heating

| Details | Limits of atmospheric temperature | min. preheating temperature |
|---|-----------------------------------|-----------------------------|
| <ul style="list-style-type: none"> • Mild steel • TMCP 50HT (Ceq. $\leq 0.36\%$) | $T \leq -5^{\circ}\text{C}$ | min. 50°C |
| <ul style="list-style-type: none"> • Normalized 50HT | $T \leq 5^{\circ}\text{C}$ | min. 50°C |
| <p>* Remark : 1. When Ceq. of touched metals is different, the higher Ceq. has to be taken. 2. Cast steel & all other steel grades, specific temperature of Cast steel shall be followed by approved WPS independently atmospheric temperature, if required in approved WPS.</p> | | |

3. MARKING

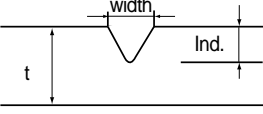
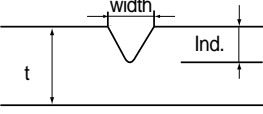
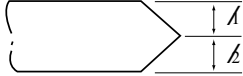
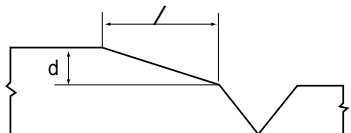
3-1. Cutting line and fitting line

Unit : mm

| Section | Item | Standard range | Tolerance limits | Remarks |
|---|---|----------------|------------------|----------------|
| 3-1. Cutting line and fitting line | Size and shape | ± 1.0 | ± 2.5 | |
| | Straightness  | ± 1.0 | ± 1.5 | min. $\neq 5m$ |
| | Location of member and mark for fitting  | $\neq \pm 2.0$ | $\neq \pm 3.0$ | |


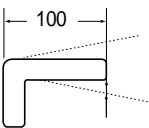
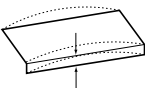
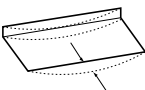

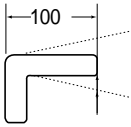
4. CUTTING

Unit : mm

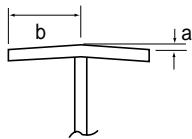
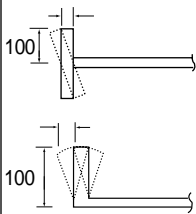
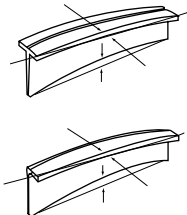
| Section | Item | | | Standard range | Tolerance limits |
|-------------------|-----------------------------|---|--|----------------|------------------|
| 4-1. Notch | Free edge | 1) Upper edge of sheer strake 2) Free edge of strength deck within 0.6 L \oslash and opening of shell plate 3) Main longitudinal strength members | | - | Not allowed |
| | | Longitudinal and transverse strength members | | - | Ind. ≤ 1 |
| | | Other | | - | Ind. ≤ 3 |
| | Weld groove | Butt Weld | <div> $w \leq 3$  </div> | - | Ind. ≤ 1.5 |
| | | | <div> $w > 3$  </div> | - | Ind. ≤ 2.5 |
| | | Fillet weld | | - | Ind. ≤ 3 |
| 4-2. Dimension | Straight-ness of plate edge | Both side submerged arc welding | | ± 0.4 | ± 0.5 |
| | | Manual welding, semi automatic welding | | ± 1.0 | ± 2.5 |
| | Depth of groove | Deviation of \angle and \angle between designed depth and actual depth  | | ± 1.5 | ± 2.0 |
| | Length of taper | Deviation of \angle between designed length and actual length  | | $3d \pm 0.5d$ | $3d \pm 1.0d$ |
| | Size of member | General members compared with correct size | | ± 3.5 | ± 5.0 |
| | | Especially for the depth of floor and girder of double bottom compared with correct size | | ± 2.5 | ± 4.0 |
| | | Breadth of face bar compared with correct size | | ± 2.0 | $-3.0 \sim +4.0$ |

5. FABRICATION

Unit : mm

| Section | Subsection | Item | Standard range | Tolerance limits | Remarks |
|------------------------------|--|---|----------------------|----------------------|---------|
| 5-1. Flanged longitudinal | Breadth of flange and web |  Compared with correct size | ± 3.0 | ± 5.0 | |
| | Angle between flange and web |  Compared with template | ± 2.5 per 100 | ± 4.5 per 100 | |
| | Curvature or straightness in the plane of flange |  per 10m in length | ± 10 | ± 25 | |
| | Curvature or straightness in the plane of web |  per 10m in length | ± 10 | ± 25 | |
| 5-2. Flanged bracket | Breadth of flange |  Compared with correct size | ± 3.0 | ± 5.0 | |
| | Angle between flange and web |  Compared with template | ± 3.0 per 100 | ± 5.0 per 100 | |

Unit : mm

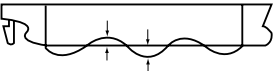
| Section | Subsection | Item | Standard range | Tolerance limits | Remarks |
|---------------------------|--|---|-------------------------|-------------------------|----------------------------------|
| 5-3. Built-up sections | Distortion of face plate |  | $a = 2 + \frac{b}{100}$ | $a = 5 + \frac{b}{100}$ | |
| | Deviation of squareness between face plate and web |  | ± 1.5 per 100 | ± 3.0 per 100 | |
| | Longitudinal and transverse distortion at face plate and web |  | ± 5 | ± 8 | per span between primary members |

5-4. Line heating

| Section | Item | | Standard range | Remarks |
|--|--|--|---|---------------------------------------|
| Max. heating temperature on surface | <ul style="list-style-type: none"> Normalized 50HT | Water cooling just after heating | under 650°C | |
| | | Air cooling after heating | under 900°C | |
| | | Air cooling and subsequent water cooling after heating | under 900°C (Starting temperature of water cooling to be under 500°C) | |
| | TMCP 50HT (Ceq. ≤ 0.36%) AH, DH | Water cooling just after heating or air cooling | under 1000°C | Within 3 cycles as far as practicable |
| | TMCP 50HT (Ceq. ≤ 0.36%) EH | Water cooling just after heating or air cooling | under 900°C | Within 2 cycles as far as practicable |
| | * Note : Air cooling means by compressed air. Heating means by flame torch. | | | |

6. ACCURACY OF HULL FORM

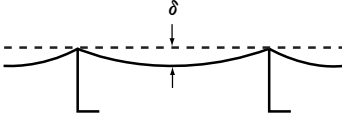
Unit : mm

| Item | Details | Standard range | Remarks |
|------------------|---|----------------------|--|
| Length | Length between perpendiculars | ± 50 per 100m | Applied to ships of 100m length and above. For the convenience of the measurement, the point where the keel is connected to the curve of the stem may be substituted for the fore perpendicular in the measurement of the length. |
| Breadth | Moulded breadth amidship | ± 15 | Applied to ships of 15 meter breadth and above. To be measured on the upper deck. |
| Depth | Moulded depth amidship | ± 10 | Applied to ships of 10 meter depth and above. |
| Flatness of keel | Deformation for the whole length  | ± 25 | Up (-) and Down (+) against the check line of keel sighting. |

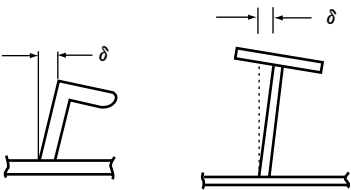
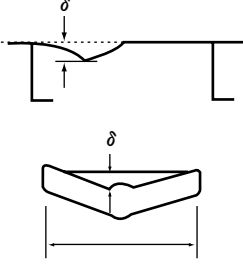
7. DEFORMATION

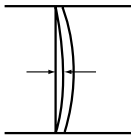
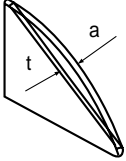
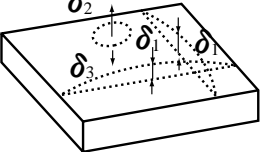
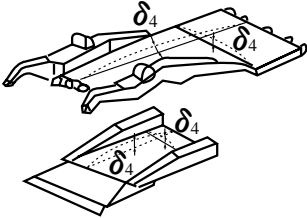
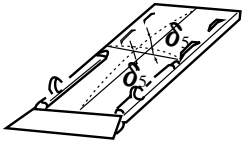
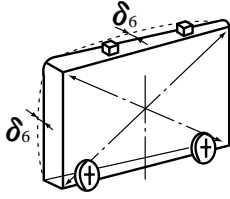
7-1. Deformation

Unit : mm

| Area | Item | Standard range | Tolerance limits | Remarks |
|------------------------------|--|----------------|------------------|--|
| Shell plate | Parallel part (side shell) | ± 4 | ± 7 | For length of frame space, longi. space, stiffener space, any of the above is not applicable for over 1.8m length. |
| | Parallel part (bottom shell) | ± 4 | ± 7 | |
| | Fore and aft part | ± 5 | ± 7 | |
| Double bottom tank top plate | | ± 4 | ± 7 |  |
| Bulkhead | Longi. bulkhead, trans-bulkhead & swash bulkhead | ± 6 | ± 8 | |

Unit : mm

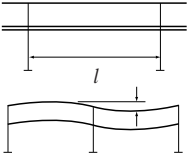
| Area | Item | Standard range | Tolerance limits | Remarks |
|--|--|----------------|------------------|---------|
| Strength deck | Parallel part (Between 0.6L amidship) | ± 4 | ± 7 | |
| | Fore and aft part | ± 6 | ± 9 | |
| | Covered part | ± 7 | ± 9 | |
| Second deck | Bare part | ± 6 | ± 8 | |
| | Covered part | ± 7 | ± 9 | |
| Forecastle deck, poop deck | Bare part | ± 4 | ± 7 | |
| | Covered part | ± 6 | ± 9 | |
| Superstructure deck | Bare part | ± 4 | ± 6 | |
| | Covered part | ± 7 | ± 9 | |
| House wall | Outside wall | ± 4 | ± 7 | |
| | Inside wall | ± 6 | ± 8 | |
| | Covered part | ± 7 | ± 9 | |
| Interior member | Web of girder, trans. | ± 5 | ± 7 | |
| Floor and girder of double bottom | | ± 5 | ± 7 | |
| Unfairness of interior members after welding (beam, frame, stiffener, floor girder, etc.) |  | - | ≤ 8 | |
| Angular distortion of welding joint after welding  | Skin plate between 0.6L amidship | - | ≤ 6 | |
| | Fore and aft shell plating and transverse strength member | - | ≤ 7 | |
| | Span of frame or beam | - | ≤ 8 | |

| Item | Details | | Standard range | Tolerance limits | Remarks |
|--------------------------------------|---|---|----------------|------------------|--|
| H-type Pillar | Distortion between decks |  | ± 4 | ± 6 | |
| Tripping bracket and small stiffener | Distortion at the part of free edge |  | $a \leq t/2$ | max. 8 | |
| Vehicles loading apparatus | Hoistable deck (Liftable deck)  | Deflection of deck δ_1 | +5 0 | +10 -5 | δ_4, δ_5 to be measured on the top plate of girder |
| | | Deformation of deck | δ_2 | +5 +10 | |
| | | | δ_3 | -2 -5 | |
| | Stern ramp  | Transverse and longitudinal deflection δ_4 | - | ± 5 | |
| | Midship ramp  | Transverse and longitudinal deflection δ_5 | - | ± 5 | |
| | Bulkhead door  | Transverse and longitudinal deflection δ_6 | - | ± 3 | δ_6 = actual measurement value |
| | Fixed ramp | | ± 6 | ± 8 | |

Remarks : Maker's instruction shall prevail regarding the above deformation of ramps.

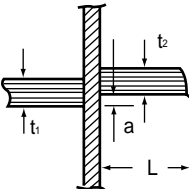
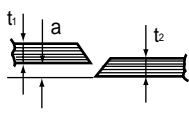
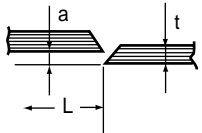
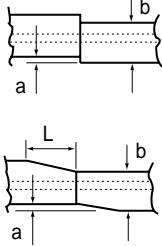
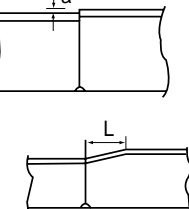
7-2. Deformation per basic length

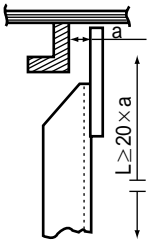

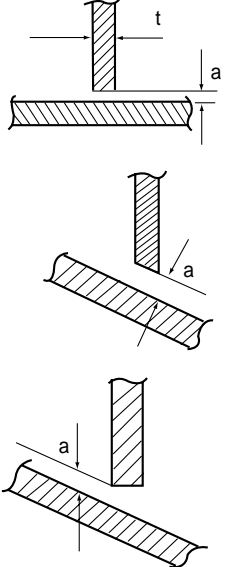
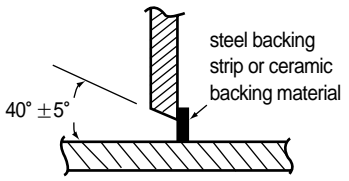
Unit : mm

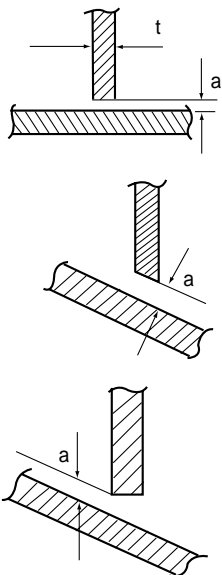
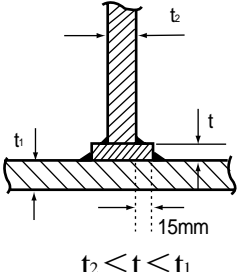
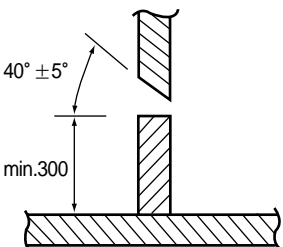
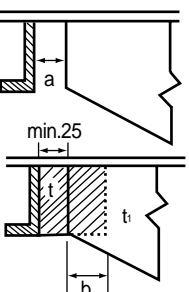
| Area | Item | Standard range | Tolerance limits | Remarks |
|-------------------------------------|-------------------|-----------------|------------------|--|
| Shell plate | Parallel part | $\pm 2 // 1000$ | $\pm 3 // 1000$ |  <ul style="list-style-type: none"> • To be measured between one trans. space (min. $\neq 3\text{m}$) • Measured length is about 5m for bulk-head, outside wall etc. |
| | Fore and aft part | $\pm 3 // 1000$ | $\pm 4 // 1000$ | |
| Deck and top plate of double bottom | - | $\pm 3 // 1000$ | $\pm 4 // 1000$ | |
| Bulkhead | - | $\pm 4 // 1000$ | $\pm 5 // 1000$ | |
| Accommodation | Deck | $\pm 3 // 1000$ | $\pm 4 // 1000$ | |
| | Outside wall | $\pm 2 // 1000$ | $\pm 3 // 1000$ | |
| Others | - | $\pm 5 // 1000$ | $\pm 6 // 1000$ | |

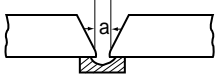
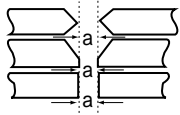
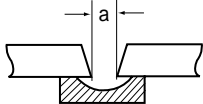
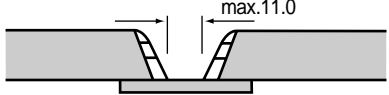
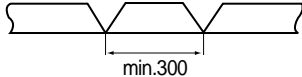
8. DETAILS

Unit : mm

| Object | | Detail | Tolerance limits | Corrections / Remarks |
|---|---------------|---|---|--|
| 8-1. Misalignment between components on each side of through going component | |  $t_1 \leq t_2$ | Strength members $a \leq \frac{t_1}{3}$ Others $a \leq \frac{t_1}{2}$ | 1. $\frac{t_1}{3} < a \leq \frac{t_1}{2}$ (in case of strength member) the weld throat to be increased by 10% 2. $a > \frac{t_1}{2}$ Position to be adjusted. adjustment length $L \geq 50 \times a$ |
| 8-2. Misalignment in block/section joint (Shell plate, deck, bottom, inner bottom, bulkhead, etc.) | |  $t_1 \leq t_2$ | Strength members $a \leq 0.15t_1$ (max. 3) Others $a \leq 0.2t_1$ (max. 3) | The plates are to be adjusted. |
| 8-3. Misalignment in joints between longitudinal profiles. | web |  | Primary members $a \leq 0.15t$ (max. 3) Secondary members $a \leq 0.2t$ (max. 3) | Adjustment length $L \geq 30 \times a$ or adjustment by welding |
| | Flange |  | $a \leq 0.04b$ (max.8) | When $0.04b < a \leq 8$, grind corners to smooth taper over distance min. $L=3a$ When $a > 8$, release and adjust the plate min. $L=50a$ |
| | Height of web |  | $a \leq 3$ | 1. $3 < a \leq 6$ Make a smooth shape by build-up. 2. $a > 6$ Release and adjust over min. $L=50a$ for primary structure and $L=30a$ elsewhere and weld after knuckling the flange. |

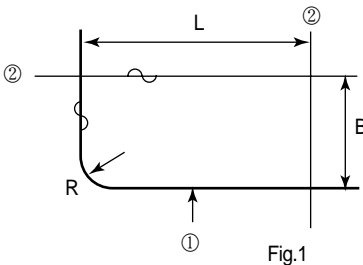
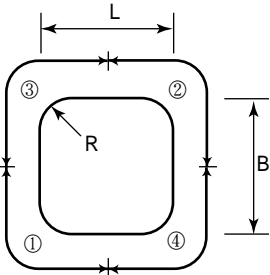
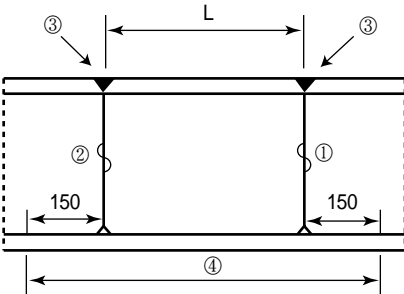
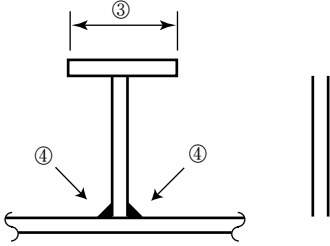
| Object | Detail | Tolerance limits | Corrections / Remarks |
|--|---|------------------|---|
| 8-4. Overlap brackets |  | $a \leq 3$ | <ol style="list-style-type: none"> $3 < a \leq 5$ Adjust before welding $a > 5$ Release and adjust in length $L \geq 20 \times a$ |
| 8-5. Gap for overlap joint |  | $a \leq 3$ | <ol style="list-style-type: none"> $3 < a \leq 5$, increase leg length (Planned leg length + a) $a > 5$, Refitting |
| 8-6. Gap before welding of fillet joint | <p>Fillet weld</p>  | $a \leq 3$ | <ol style="list-style-type: none"> When $3 < a \leq 5$ The weld leg length to be increased as much as the gap opening exceeding 3mm $L = L_0 + (a - 3)$ (L : Increased leg length L_0 : Designed leg length) When $5 < a \leq 16$ <ol style="list-style-type: none"> 1) Weld with bevel preparation to make bevel edge of web to $40^\circ \pm 5^\circ$, attach steel backing strip or ceramic backing material, and remove it after welding. Then, weld the opposite side after gouging.  |

| Object | Detail | Tolerance limits | Corrections / Remarks |
|--|---|------------------|--|
| 8-6. Gap before welding of fillet joint |  | $a \leq 3$ | <p>2) Liner treatment Subject to CLASS acceptance and not to be used in areas of tensile stress perpendicular to liner</p>  <p>$t_2 \leq t \leq t_1$</p> <p>3. When $a > 16$ Partial renewal</p>  <p>$40^\circ \pm 5^\circ$ min.300</p> |
| 8-7. Gap before welding of joint between bracket/intercoastal and frame, beam, stiffener, etc. and in way of slot |  | $a \leq 3$ | <p>1. When $3 < a \leq 5$, the weld leg length to be increased as much as the gap opening exceeding 3.</p> <p>2. When $5 < a \leq 10$, bevel $40^\circ \pm 5^\circ$ and build up by welding.</p> <p>3. When $a > 10$, fit the collar plate as shown in detail. $t \geq t_1$ $b : 2t + 25(\text{min.}50)$.</p> |

| Object | Detail | Tolerance limits | Corrections / Remarks |
|--------------------|---|------------------------|--|
| 8-8. Butt joint | 1. One side SAW  | $a \leq 3$ | 1. $3 < a \leq 8$ First or second pass by FCAW with ceramic backing 2. $a > 8$ Refitting or re-preparation after build-up |
| | 2. Both side SAW  | $a \leq 1.5$ | 1. $1.5 < a \leq 5$: Sealing bead is to be done. 2. $a > 5$: Refitting |
| | 3. FCAW  | $3.4 \leq a \leq 11.4$ | 1. $11.4 < a \leq 25$  Build-up the gap with welding on one or both sides of the preparation, with backing material to maximum gap of 11.0. 2. $a > 25$ Partial renewal  |

8-9. Repair by insert plate

Unit : mm

| Detail | Repair standard | Remarks |
|--|--|---------|
| <p>8-9-1. Repair by insert plate</p>  <p>Fig.1</p>  <p>Fig.2</p> | <p> $L = \text{min. } 300$ $B = \text{min. } 300$ $R = 5 \times \text{Plate thickness and min. } 100$ </p> <ol style="list-style-type: none"> 1) Seam with insert piece is to be welded first. 2) Original seam is to be released and welded over for a min. 100. 3) Welding sequence $\textcircled{1} \rightarrow \textcircled{2} \rightarrow \textcircled{3} \rightarrow \textcircled{4}$ | |
| <p>8-9-2. Repair by built up section by insert plate</p>   | <p> $L = \text{min. } 300$ </p> <ol style="list-style-type: none"> 1) Welding sequence $\textcircled{1} \rightarrow \textcircled{2} \rightarrow \textcircled{3} \rightarrow \textcircled{4}$ 2) Web butt weld scallop to be filled during final pass ④ | |

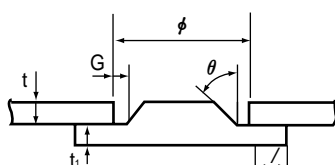
8-9-3. Treatment of hole made erroneously

(D : Diameter, B : Width of holes)

| Sub-section | Item | Method | Remarks |
|------------------------------|----------------------------------|---------|----------------------------------|
| D < 200 B < 300 | Strength member in skin plate | ㉑ | Open the hole to over 75 ϕ |
| | | or ㉒ | Open the hole to over 300 ϕ |
| | Others | ㉒㉓ or ㉔ | |
| D \geq 200 B \geq 300 | Strength member in skin plate | ㉒ | |
| | Others | ㉒ or ㉓ | |
| Serration, scallop, slot | - | ㉒ or ㉓ | |

Method of treatment

㉑ : Spigot patch



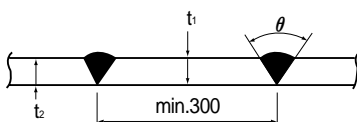
$$\theta = 40^\circ \pm 5^\circ$$

$$G = 4 \sim 6$$

$$t_1 = 1/2t \sim t$$

$$L = 50$$

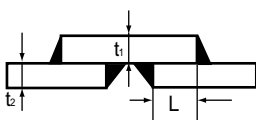
㉒ : Closing by butt weld



$$\theta = 40^\circ \pm 5^\circ$$

$$t_1 \geq t_2$$

㉓ : Closing by lapping piece



$$t_1 \geq t_2$$

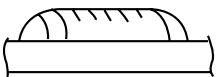
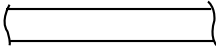
$$L = 50$$

㉔ : In case where it is difficult from structural point of view to open a hole over 300, it is to be welded carefully by low hydrogen electrode after preheating and to be confirmed by non-destructive testing.

9. SURFACE FINISH CONDITION

| Section | Area | Scope of staging sockets and lifting eye piece to be removed | Remarks |
|---------------------------|---|---|--|
| 9-1. Staging sockets | In tank | Not to be removed | <ul style="list-style-type: none"> •Lifting eye pieces concerned with fatigue strength to be removed. •Method of removing <ol style="list-style-type: none"> ① Parts of ruining appearance and passages to be flush to base plate. ② Others to be done by gas cutting at the bond zone. <div data-bbox="934 862 1202 1041" data-label="Image"> </div> |
| | In engine room | Not to be removed, except disturbance to passages or cargo handling | |
| | In hold | Ditto | |
| | Exposed parts of shell, upper deck etc. | To be removed | |
| 9-2. Lifting eye piece | In tank | Not to be removed, except disturbance to passages or cargo handling | <p>but, the parts being especially important for strength to be soft toe.</p> |
| | In engine room | Ditto | |
| | In hold | Ditto | |
| | Exposed parts of shell, upper deck etc. | To be removed | |

Note : The details will be prepared for each project, respectively.

| Item | Details | Standard treatment | |
|--|---|--|--------------------------|
| | | Area | Remarks |
| 9-3. Welding bead for repair of notches |  | Non-exposed areas (Cargo hold, H.F.O & W.B.tanks, Void, etc.) | Remain welding beads |
| |  | Exposed areas | Weld and flush grind off |

10. MARKING ON SHIP SIDE

Unit : mm

| Item | Details | Standard range | Tolerance limits | Remarks |
|----------------------|-----------------|----------------|------------------|------------------------------------|
| marking on ship side | Draft marks | ± 1.0 | ± 2.0 | To be checked at marking condition |
| | Freeboard marks | ± 0.5 | ± 0.5 | |

II . PAINTING PART

1. PRIMARY SURFACE PREPARATION AND PRE-PRIMING

| Item | Details | Standard treatment | |
|--------------------------------------|---|--|--|
| | | Grade | Thickness of priming |
| 1-1. Steel plates and sections | Hull structural members of steel thickness 6mm and above | Shot and grit blasting ISO 8501-1-Sa 2½ | An average $15 \pm 5 \mu\text{m}$ dry film thickness of inorganic zinc shop primer. |
| 1-2. Outfitting | Pipes, Supports, Seats, etc | Pickling or Power tooling ISO 8501-1- St 2 | No pre-priming shall be applied basically |

2. SECONDARY SURFACE PREPARATION

2-1. Surface preparation grade

| Grade | Standard |
|------------|--|
| Sa 2½ | It shall comply with ISO standard and then correspond in appearance to the photographs designated Sa 2½. |
| T/UP Sa 2½ | Damaged shop primed area and welding line to be treated to Sa 2½. Intact shop primed area shall remain as it is. Any remaining traces of contamination shall show only as slight stains in the form of spots or stripes. |
| Sa 1 | It shall comply with ISO standard and then correspond in appearance to the photographs designated Sa 1. |
| Pt3 | It shall comply with JSRA standard and then correspond in appearance to the photographs designated Pt3. |
| Pt2 | It shall comply with JSRA standard and then correspond in appearance to the photographs designated Pt2. |

Abbr.) T/UP : Partial treatment for damaged and rusted spot

2-2. Standard grade of surface cleaning

| Items | Standard |
|--------------------------------|---|
| Oil and fat | The remaining traces may be visible |
| Zinc salt | Irremovable by soft hand touch |
| Fume by welding or gas cutting | Irremovable by soft hand touch |
| Chalk marks | To be removed, but the traces removed may be visible |
| Talc chalk marks | Not to be removed |
| Marking paints | Marking paints compatible with subsequent coats should not be removed |
| Other foreign matters | The remaining traces may be visible |

2-3. Damaged parts after pre-erection and erection

| Details | Standard | |
|--|---|---|
| | Grade | Remarks |
| Rusted, burnt and joint area | Power tooling - Pt2 or Pt3 (JSRA) | In general, surrounding areas to be feathered to ensure adhesion between coats as shown in Fig. |
| Mechanically damaged area | Light disc-feathering or hand sand-papering | |
| Intact coating immediately adjacent areas for repair | Feathered with disc or sand -papering. | |

Fig.

The diagram illustrates the required feathering of repair areas. It shows a cross-section of a steel surface with a central defect labeled 'welding joint line or burnt damage'. On either side of this defect, there are two layers of coating: the '1st coat' and the '2nd coat'. The edges of the repair area are shown being feathered into the surrounding intact coating layers, a process labeled 'light disk feathering'. The steel substrate is indicated by a horizontal line at the bottom.

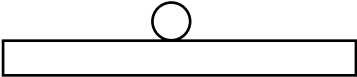
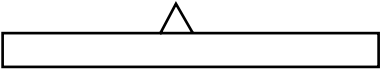

2-4. Preparation of edges and treatment of welding spatter

1) Sharp edge

One pass grinding (1C) shall be applied at hull fabrication shop for Water Ballast Tank, Fresh Water Tank and exposed area.

For other dry space sharp edge shall not be treated to 1C.

2) welding spatters

| | | |
|------------------------|---|---|
| Unstable spatter |  | Spatters shall be removed by hand & power tools. |
| Stable but sharp angle |  | Sharp angle spatter shall be ground off until the angle becomes obtuse. |
| Stable and obtuse |  | Spatter shall be left. |

3) Rolled edges

Rolled edges of section shall not be smoothed by mechanical tools.

3. PAINTING

| Items | Standard | Remarks |
|--------------------|---|---|
| Painting appliance | Airless spray, roller and brush | Airless spray to be adopted mainly, but roller and brush also can be used where they are more suitable |
| Stripe coat | All kind of hole and free edge - to be coated with roller or brush after main coat | The stripe coating for various tank such as Water Ballast Tank etc shall be applied in accordance with the paint specification. |
| | For manual welding or irregular welding line of wet space one time stripe coat shall be applied with roller or brush after or before 2nd coat as below - Water tight boundary and around frame - all manual welds to be striped - Other weld bead - rough bead(which cannot be painted properly with airless spray) only to be striped. | |
| | Behind angle - stripe coat shall be applied with roller after or before 2nd coat | In case of low D.F.T touch up shall be applied. |

4. AMBIENT CONDITION

| Items | Standard | Remarks |
|-------------------|--|--|
| Ambient condition | Surface temperature - No limitation | In all cases, Limitation on max. or min. surface temperature in the manufacturer's instructions shall be followed (Depend on products) |
| | Relative humidity - Below 85% | |
| | Dew point - steel temperature should be 3°C above dew point | Surface must be free from condensation |

5. D.F.T MEASUREMENT

| Details | Standard |
|---------------------|--|
| Dry film thickness | Total Dry Film Thickness specified in the painting specification shall be attained at least 90% of measuring point, and the film thickness on the remaining 10% measuring point shall not be less than 90% of this specified film thickness. |
| Measuring point | In general, the five (5) separate spot measurements shall be made over every 10m ² in tanks and for each 20m ² in other spaces. The average of five (5) separate spot measurements must be within the specified thickness, while single spot measurements are permitted to be 90% of the specified thickness. |
| Non-measuring areas | No measurement of Dry Film Thickness shall be made on; 1. Machinery and the like and on non-corrosive materials. 2. Outfittings and pipes with nominal diameter of 250mm and below 3. Pipe supports, machinery seats and small fittings 4. Areas within 50mm from edges of painted steel members, welding beads. |

6. TIME FOR D.F.T MEASUREMENT

The measurement of Dry Film Thickness shall be carried out in accordance with the following table.

〈Standard for measuring of Dry Film Thickness〉

| Kind of Paint Time Area | | Epoxy | | Alkyd or other conventional paint |
|--|-----|-----------------|---------------------|-----------------------------------|
| | | After A/C paint | After final coating | After A/C paint |
| Bottom shell | | 0 | 0 | - |
| Side shell | | 0 | 0 | - |
| Exposed part | | 0 | - | - |
| Various tank | | - | 0 | - |
| Accommodation E/ casing | out | 0 | - | - |
| | in | - | - | *0 |
| E/ Room, Void, Cofferdam and Dry space | | - | - | *0 |

* In E/R, void, cofferdam and dry space, D.F.T will not be checked always.

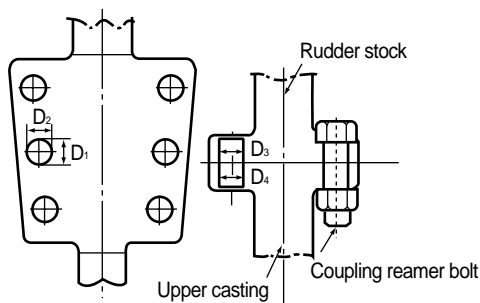
Only painting condition will be inspected to ensure no bare steel or holiday.

Ⅲ . OUTFITTING PART

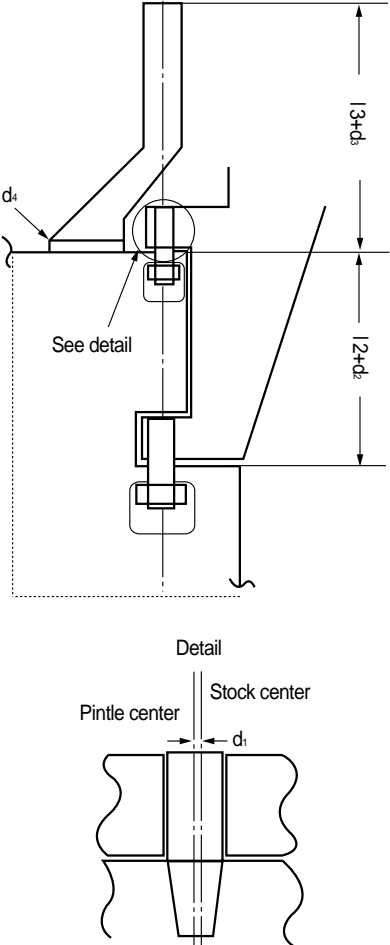
1. MAIN MACHINERY

Unit : mm

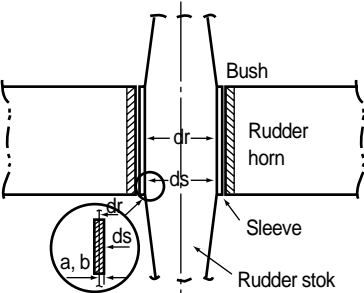
| Section | Item | Standard range | Tolerance limits |
|-------------------------|---|---|--------------------|
| 1-1. Rudder | 1-1-1. Centering a. Diameter of piano wire b. Tension of piano wire c. Tolerance between shaft & rudder centers 1-1-2. Boring a. Eccentricity of rudder horn (upper, lower gudgeon) after boring | 0.4~0.7 50kg ≤ 8 ≤ 0.05 | $\pm 5 \text{ kg}$ |
| 1-2. Steering system | 1-2-1. Rudder upper casting & rudder stock a. Reamer bolt size & hole size a-1 : Roundness D_1-D_2 a-2 : Difference D_3-D_4 (Top diameter to bottom diameter) a-3 : Interference $D=D_b-D_h$ D_b : Bolt diameter D_h : Hole diameter | ≤ 0.01 ≤ 0.02 $0.005 \leq D \leq 0.015$ | |



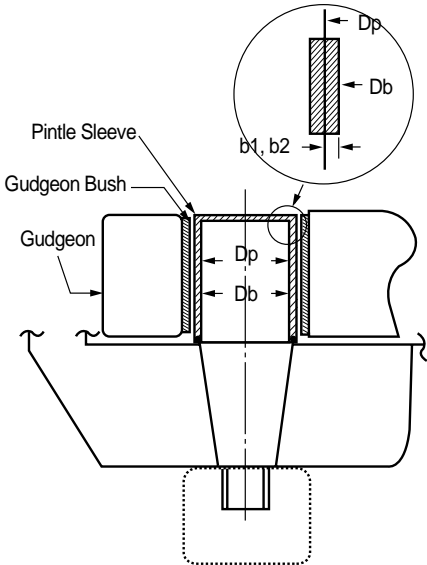
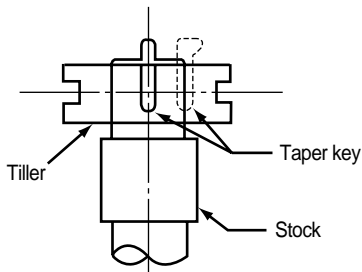
Unit : mm

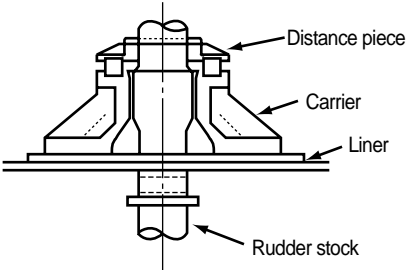
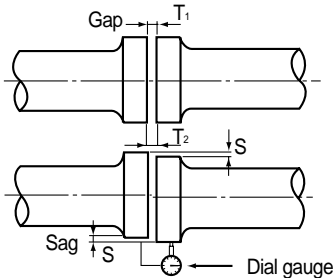
| Section | Item | Standard range | Tolerance limits |
|-------------------------|---|--|---|
| 1-2. Steering system | <p>1-2-2. Jointing</p> <p>a. Contact area ratio(between rudder and stock)</p> <p>b. Over set(pintle center to stock center)</p> <p>c. Length of rudder stock</p> <p>d. Length of rudder</p> <p>e. Total length of rudder with stock</p> <p>f. Gap(stock palm and rudder after tightening of reamer bolt)</p>  | <p>$\geq 70\%$</p> <p>$d_1 \leq 0.3$</p> <p>$d_3 = \pm 3$</p> <p>$d_2 = \pm 5$</p> <p>± 5</p> <p>$d_4 \leq 0.04$</p> | <p>≤ 0.5</p> <p>Clearance within 10mm depth can be allowed.</p> |

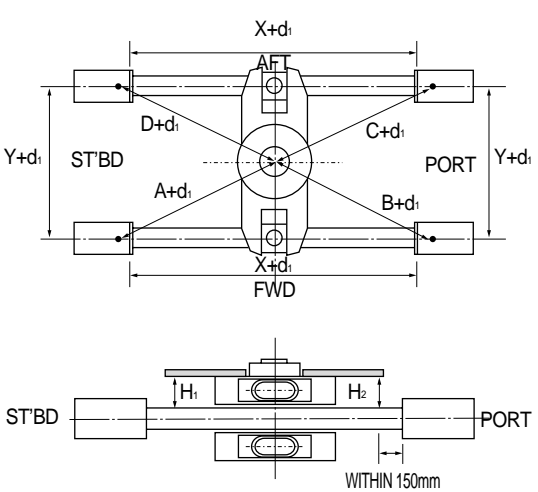
Unit : mm

| Section | Item | Standard range | Tolerance limits |
|-------------------------|--|--|------------------|
| 1-2. Steering system | <p>1-2-3. Sleeve on rudder stock</p> <p>a. "SUS" sleeve(interference) $dr-ds=a$</p> <p>b. "BC" sleeve(interference) $dr-ds=b$</p> <p>Where, dr : stock outer diameter ds : sleeve inner diameter</p>  <p>1-2-4. Pintle</p> <p>a. Contact area ratio on taper cone part $\geq 70\%$</p> <p>b. Interference between pintle and sleeve</p> <p>b_1 : "SUS" sleeve $Dp-Db$ $b_1 = \frac{(5 \sim 10)Dp}{10,000}$</p> <p>$b_2$: "BC" sleeve $Dp-Db$ $b_2 = \frac{(10 \sim 20)Dp}{10,000}$</p> <p>Where, Db : Sleeve inner diameter Dp : Pintle outer diameter</p> | $a = \frac{(5 \sim 10)dr}{10,000}$ $b = \frac{(10 \sim 20)dr}{10,000}$ | |

Unit : mm

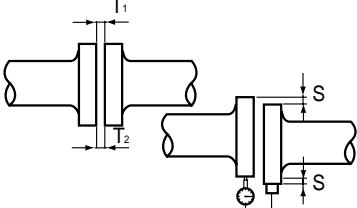
| Section | Item | Standard range | Tolerance limits |
|-------------------------|--|--|--|
| 1-2. Steering system | <p>1-2-4. Pintle DWG.</p>  <p>1-2-5. Gudgeon bush(interference)</p> <p>a. "BC", "SUS" sleeve Dh-Dg</p> <p>b. Lignumvitae or phenol resin Dh-Dg</p> <p>Dh : Bush outer diameter</p> <p>Dg : Gudgeon inner diameter</p> <p>1-2-6. Rudder stock and rudder tiller</p> <p>a. Clearance of taper key</p>  | <p>0.05*</p> <p>0.05*</p> <p>0.005~0.015</p> | <p>* To be in accordance with maker's instruction.</p> |

| Section | Item | Standard range | Tolerance limits |
|-------------------------|---|--|-------------------------|
| 1-2. Steering system | <p>1-2-7. Installation of rudder carrier and stuffing box</p> <p>a. Liner contact area(ratio)</p> <p>b. Clearance between carrier and liner after bolt tightening</p>  <p>1-2-8. Ram cylinder type(steering gear)</p> <p>a. Reamer bolt fitting Db-Dh Db : Bolt outer diameter Dh : Hole inner diameter</p> <p>b. Liner(top liner & chock liner) Clearance after bolt tightening</p> <p>c. Ram cylinder installation horizontal level and distortion d_i : Clearance of ram cylinder</p> <p>d. Coupling's alignment of hyd. oil pump</p> <ul style="list-style-type: none"> • Gap(face) T₁-T₂ • Sag(circum.) S  | <p>$\geq 60\%$</p> <p>≤ 0.05</p> <p>$0.005 \leq D \leq 0.015$</p> <p>< 0.06</p> <p>$\leq 0.07d_i$</p> <p>≤ 0.05</p> <p>≤ 0.05</p> | <p>Maker's standard</p> |

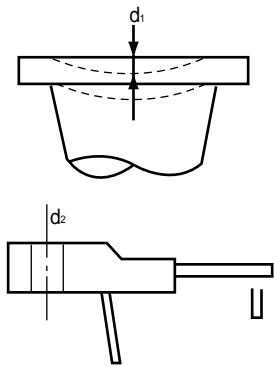
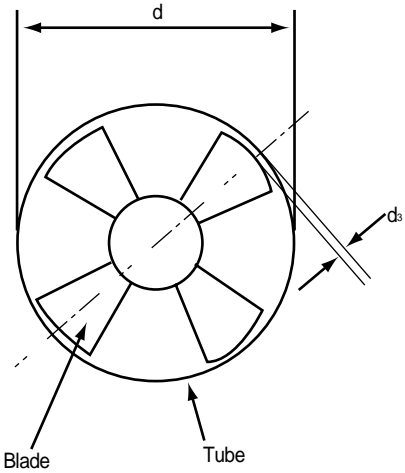
| Section | Item | Standard range | Tolerance limits |
|-------------------------|---|---|---|
| 1-2. Steering system | <p>1-2-9. Rotary vane type(steering gear)</p> <p>a. Taper part of rudder stock and steering gear boss</p> <ul style="list-style-type: none"> • Ratio of contact area <p>b. Travel length of force fitting</p> <p>c. Coupling's alignment(solid type) of hyd. oil pump</p> <ul style="list-style-type: none"> • Gap(face) T1-T2 • Sag(circum) S <p>1-2-10. Alignment of steering gear</p>  <p>1-2-11. Main engine installation</p> <p>1. Contact ratio</p> <ul style="list-style-type: none"> Main engine chock liner Bearing chock liner <p>2. Clearance between liner and base (After holding down bolt tightening)</p> | <p>$\geq 70\%$</p> <p>*</p> <p>≤ 0.05</p> <p>≤ 0.05</p> <p>$d_1 \leq 1$</p> <p>$H_1 - H_2 \leq 0.08$</p> <p>$\geq 70\%$</p> <p>$\geq 60\%$</p> <p>≤ 0.04</p> | <p>* According to maker's recommendation</p> <p>Maker's standard</p> <p>$d_1 \leq 2$</p> <p>$H_1 - H_2 \leq 0.15$</p> <p>$\geq 60\%$</p> <p>$\geq 50\%$</p> |

2. AUXILIARY MACHINERY

Unit : mm

| Section | Item | Standard range | Tolerance limits |
|-------------------------------|--|--|--|
| 2-1. Aux. machinery | <p>2-1-1. Auxiliary machinery(E/R.DK)</p> <p>Installation of aux. machinery shall be carried out in accordance with the following three grades.</p> <p>Feeler guage measurement between seat & machine shall be carried out after tightening of holding down bolts.</p> <p>(1) Grade “A” : Diesel generator, Turbo generator, Shaft generator, Inter shaft bearing, Windlass.</p> <p>(2) Grade “B” : Fresh water pump, Cooling water pump, Fire pump, Fuel oil pump, Ballast pump, Lub oil pump, Bilge & General service pump, Emergency diesel & fire pump, Emergency diesel generator, Air compressor, Cargo pump & motor & turbine.</p> <p>(3) Grade “C” : Other machinery which are not listed “Grade A” and “Grade B”.</p> <p>- Tightness of holding down bolts shall be checked by hammering after installation completed.</p> | <p>≤ 0.04</p> <p>≤ 0.05</p> <p>-</p> | <p>The feeler gauge of standard thickness should not be inserted more than 10mm</p> <p>-</p> |
| 2-2. General aux. pumps | <p>2-2-1. Coupling alignment of aux. pumps (solid type)</p>  | | |

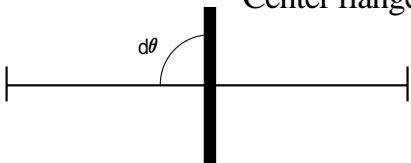
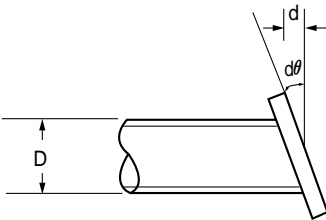
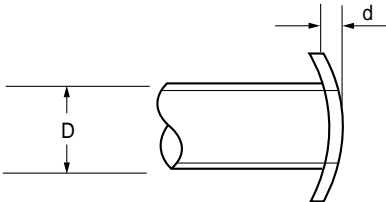
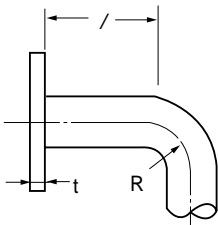
Unit : mm

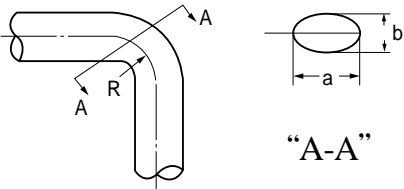
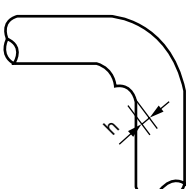
| Section | Item | Standard range | Tolerance limits |
|--|--|----------------------------------|------------------|
| 2-3. Bow thruster (If any discrepancy is found between the SSQS and maker's standard, the maker's standard shall prevail.) | a. Gap(face) $T_1 - T_2$ | ± 0.05 | Maker's standard |
| | b. Sag(circum) S | ± 0.05 | |
| | 2-3-1. Installation of shaft | | |
| | a. Plane of flange d_1 b. Difference of bolt hole on flange d_2  | $d_1 \leq 0.4$ $d_2 \leq 0.6$ | - - |
| | 2-3-2. Clearance between tube and blade | | |
| |  | $d_3 \geq \frac{d}{600}$ | - |

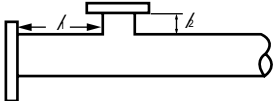
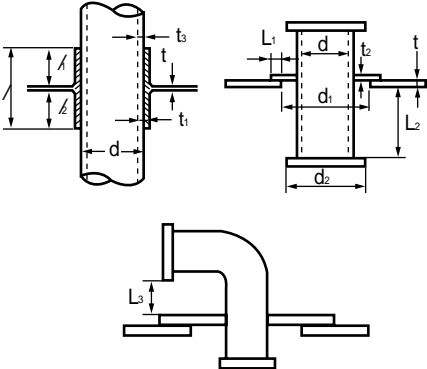
3. PIPING

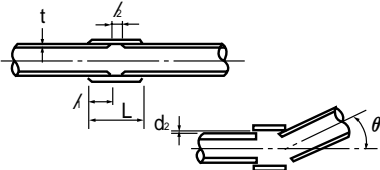
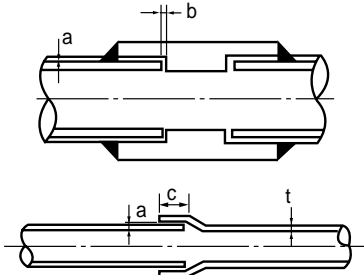
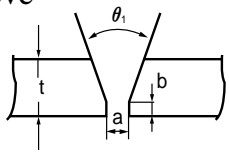
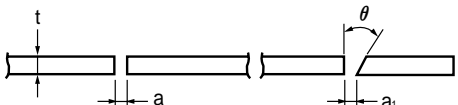
Unit : mm

| Section | Item | Standard range | Remarks |
|-----------------------------|--|---|---|
| 3-1. Pipe fabrication | 3-1-1. Cutting, bending & etc. a. Straight pipe | $d_1 = \pm 2$ | 1. $L, L \dots$ Indicated length on the drawing |
| | b. Bending pipe | $d_2 = \pm 2$ $d_3 = \pm 2$ $d_4 = \pm 2$ $d_5 = \pm 2$ | 2. $\theta_1, \theta_2 \dots$ Indicated angle on the drawing |
| | (Two directional bending) | $d\theta_1 = \pm 1^\circ$ $d\theta_2 = \pm 1^\circ$ $d\theta_3 = \pm 1^\circ$ $ \theta_2 - \theta_3 \leq 2^\circ$ | 3. $d_1, d_2 \dots$ Tolerance between Indicated length on the drawing and actually made one |
| | (Three directional bending) | $d_6 = \pm 2$ $d_7 = \pm 2$ $d_8 = \pm 2$ $d\theta_4 = \pm 1^\circ$ $d\theta_5 = \pm 1^\circ$ | 4. $d\theta_1, d\theta_2 \dots$ Tolerance between angle on the drawing and actually made one |
| | c. Branch pipe | $d_9 = \pm 2$ $d_{10} = \pm 2$ $d_{11} = \pm 2$ $d\theta_6 = \pm 1^\circ$ | |

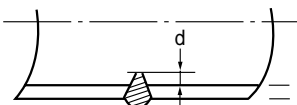
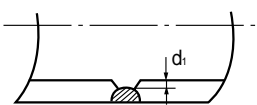

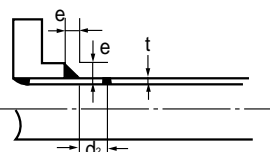
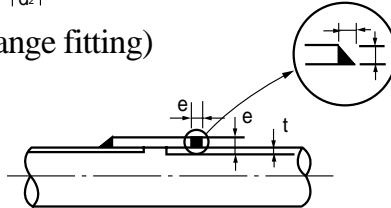
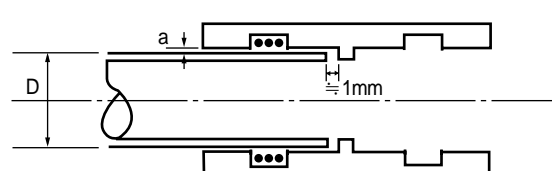
| Section | Item | Standard range | Remarks |
|-----------------------------|--|---|---|
| 3-1. Pipe fabrication | d. Penetration piece | | |
| |  <p>Center flange</p> | $d\theta \leq \pm 0.5^\circ$ | |
| | 3-1-2. Fitting of flange | | |
| | a. Angle of flange to pipe | | |
| |  | $d\theta \leq \pm 0.5^\circ$ | $-d \leq \max. 2$ D : Pipe normal diameter |
| | b. Bending of flange | | |
| |  | a) $d \leq 1.5$ when $D \geq 500$ b) $d \leq 1.0$ when $200 \leq D < 500$ c) $d \leq 0.5$ when $D < 200$ | d: Bend dimension |
| | c. Distance between flange and bending area | | |
| |  | $\geq t$ $R \geq 2D$ | |
| | Note : Elbow piece can be connected to the flange directly | | |

| Section | Item | Standard range | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|--|---|--------|----------|-----------|-------------|---------------|---------------|------------------|---------------|---------------|----------|--------------|---------------|--------|----------|-----------|-------------|---------------|---------------|------------------|---------------|---------------|----------|---------------|---------------|
| 3-1. Pipe fabrication | <p>3-1-3. Transformation by bending</p> <p>a. Ellipticity (E)</p>  <p> $* E = \frac{ a - b }{D} \times 100\%$ $* B = \frac{t - t_1}{t} \times 100\%$ </p> <p>where D : Outer diameter of pipe B : Thickness reduction ratio t : Original pipe thickness t₁ : Thickness after bending R : Bending radius a : Large diameter b : Small diameter</p> <p>b. Wrinkle</p>  <p>where, h : Wrinkle height D : Outer diameter of pipe</p> | <p>$E \leq 10\%$</p> <p>* In accordance with class rule requirement</p> <p>B : As below</p> <p>Steel pipe bending</p> <table border="1"> <thead> <tr> <th>Radius</th><th>Hot bend</th><th>Cold bend</th></tr> </thead> <tbody> <tr> <td>$R \leq 2D$</td><td>$B \leq 15\%$</td><td>$B \leq 25\%$</td></tr> <tr> <td>$2D < R \leq 3D$</td><td>$B \leq 10\%$</td><td>$B \leq 20\%$</td></tr> <tr> <td>$R > 3D$</td><td>$B \leq 5\%$</td><td>$B \leq 15\%$</td></tr> </tbody> </table> <p>Copper pipe bending</p> <table border="1"> <thead> <tr> <th>Radius</th><th>Hot bend</th><th>Cold bend</th></tr> </thead> <tbody> <tr> <td>$R \leq 2D$</td><td>$B \leq 20\%$</td><td>$B \leq 30\%$</td></tr> <tr> <td>$2D < R \leq 3D$</td><td>$B \leq 15\%$</td><td>$B \leq 20\%$</td></tr> <tr> <td>$R > 3D$</td><td>$B \leq 10\%$</td><td>$B \leq 15\%$</td></tr> </tbody> </table> <p>$h < 2$</p> | Radius | Hot bend | Cold bend | $R \leq 2D$ | $B \leq 15\%$ | $B \leq 25\%$ | $2D < R \leq 3D$ | $B \leq 10\%$ | $B \leq 20\%$ | $R > 3D$ | $B \leq 5\%$ | $B \leq 15\%$ | Radius | Hot bend | Cold bend | $R \leq 2D$ | $B \leq 20\%$ | $B \leq 30\%$ | $2D < R \leq 3D$ | $B \leq 15\%$ | $B \leq 20\%$ | $R > 3D$ | $B \leq 10\%$ | $B \leq 15\%$ |
| Radius | Hot bend | Cold bend | | | | | | | | | | | | | | | | | | | | | | | | |
| $R \leq 2D$ | $B \leq 15\%$ | $B \leq 25\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| $2D < R \leq 3D$ | $B \leq 10\%$ | $B \leq 20\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| $R > 3D$ | $B \leq 5\%$ | $B \leq 15\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| Radius | Hot bend | Cold bend | | | | | | | | | | | | | | | | | | | | | | | | |
| $R \leq 2D$ | $B \leq 20\%$ | $B \leq 30\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| $2D < R \leq 3D$ | $B \leq 15\%$ | $B \leq 20\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| $R > 3D$ | $B \leq 10\%$ | $B \leq 15\%$ | | | | | | | | | | | | | | | | | | | | | | | | |

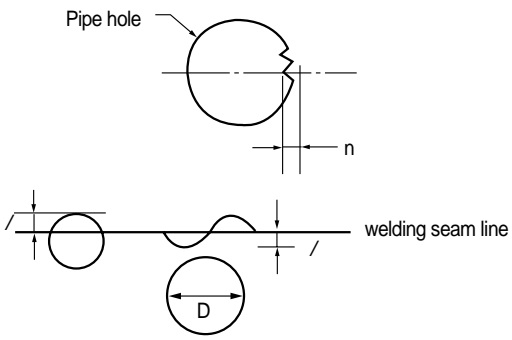
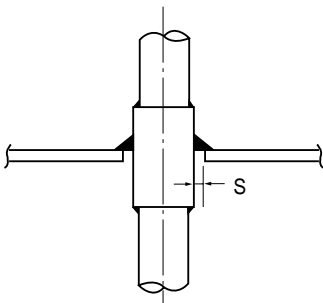
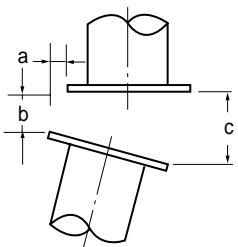
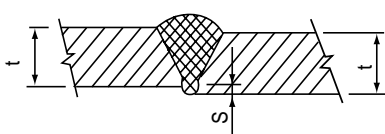
| Section | Item | Standard range | Remarks |
|-----------------------------|--|--|--|
| 3-1. Pipe fabrication | 3-1-4. Distance between the flange and the branch pipes  | $A \geq 30$ $A/2 \geq 30$ | $A/2$: Distance between flange face and the pipe surface can be reduced in unavoidable situation. |
| | 3-1-5. Fitting of penetration piece  | $\neq 100$ when $d \leq 65$ $\neq 150$ when $d \geq 80$ $\neq 200$ when $d \geq 550$ $A, A/2 \geq 15$ $t_2 = 12$ when $t \leq 12$ $t_2 = 15$ when $12 < t < 15$ $t_2 = 20$ when $t \geq 15$ $t_1 \geq t_3$ $L_1 = 30 \pm 5$ when $d \leq 100$ $L_1 = 40 \pm 5$ when $125 \leq d \leq 500$ $L_1 = 50 \pm 5$ when $d \geq 550$ $d_1 = d_2 + 10$ $L_2 \geq 50$ $L_3 \geq 25$ | d : Pipe nominal diameter |

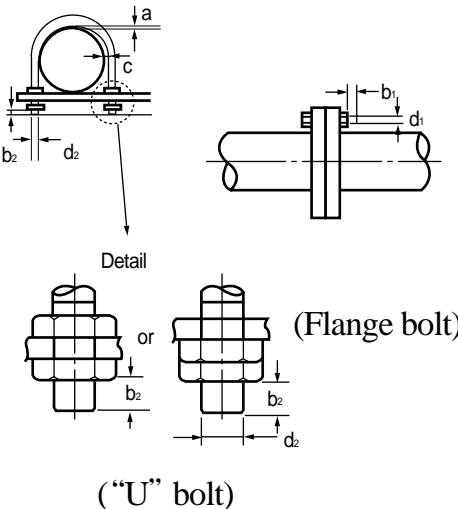
| Section | Item | Standard range | Remarks |
|-----------------------------|---|--|--|
| 3-1. Pipe fabrication | 3-1-6. Sleeve welding Joint | $L \geq 50$ $L \geq 9.5$ when $D \leq 65$ $L \geq 25$ when $D \geq 80$ $L \geq 2$ $d_2 \leq 2.0$ $\theta < 3^\circ$ | Grade of pipes will be decided according to the concerned class rules. |
| |  | | |
| | 3-1-7. Socket welding Joint | $a \leq 0.8$ $b \leq 1.5$ | |
| |  | | |
| | 3-1-8. Solder brazing Joint (Silver brazing) | $0.05 \leq a \leq 0.15$ | |
| | 3-1-9. Welding | $a = 3 \pm 0.5$ $b = 1.6 \pm 0.8$ $\theta_1 = 60^\circ \pm 5^\circ$ | |
| | a. Weld groove | | |
| |  <p>(Grade I pipe)</p>  <p>(Grade II, III & others)</p> | $t < 4.8: a < 2.0$ $t \geq 4.8: a = 1 \sim 4$ $a_1 = 0 \sim 2$ $\theta \geq 30^\circ$ | |

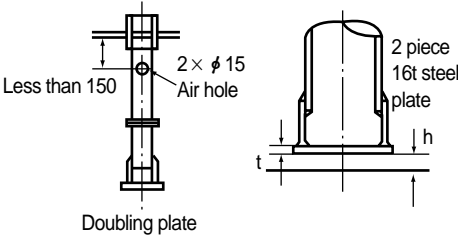
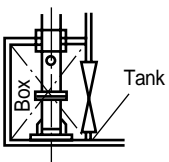
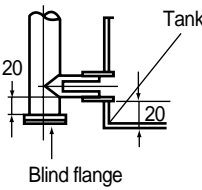
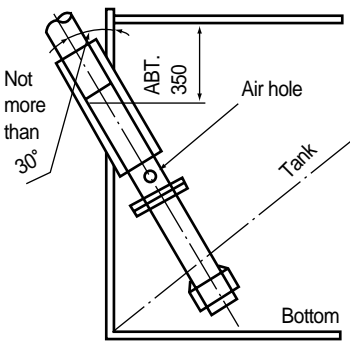
Unit : mm

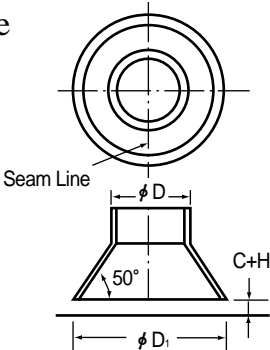
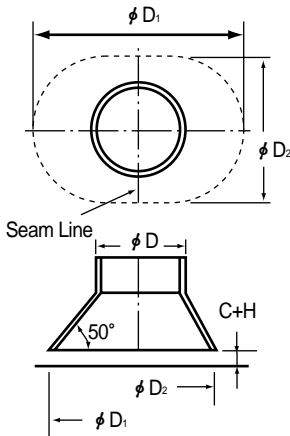
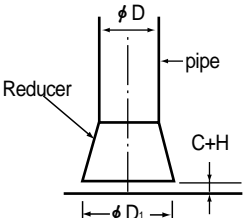
| Section | Item | Standard range | Remarks |
|-----------------------------|---|---|------------------------------------|
| 3-1. Pipe fabrication | b. Back bead of weld | Class I, II pipe | |
| |  | pipe thickness (t, mm) | back height (d, mm) |
| | (Class I, II) | $t \leq 6$ | $d \leq 1.5$ |
| |  | $6 > t$ | $d \leq 3.0$ |
| | (Class III, other pipe) | Class III pipe & others | In accordance with design practice |
| | c. Undercut of weld | $d_1 \leq 0.5$ | |
| |  | $d \leq 0.5$ | |
| | d. Leg length of weld | $e \geq t$ | |
| |  | $d_2 \geq 5$ | |
| | (Flange fitting) | $e \geq t$ | |
| |  | | |
| | (Sleeve jointing) | | |
| | 3-1-10. Al-brass brazing joint | when $D=10 \sim 40$ $0.05 \leq a \leq 0.08$ max. $a=0.15$ when $D=50 \sim 100$ $0.05 \leq a \leq 0.1$ | |
| |  | | |

Unit : mm

| Section | Item | Standard range | Remarks | | | | | | | | | | | | |
|---------------------------|--|--|---|---|-------------------------|------------------------|-------------------------------|-----------|------------|--------------------------------------|--------------------|--------------|--|---------------------------|--|
| 3-2. Pipe fitting | 3-2-1. Pipe hole cutting & penetration | <p>Holes on the main structure $n \leq 0.8$</p> <p>Holes not on the main structure $n \leq 1.5$ $\neq 0.1D$ (min. 50)</p> | Only one side welding to be applied except upp. Deck, Tank BHD & Fore/ Aft BHD. | | | | | | | | | | | | |
| | a. Hole cutting finishing |  | | | | | | | | | | | | | |
| | b. Pipe penetration |  | | $s \leq 5$ | | | | | | | | | | | |
| | 3-2-2. Alignment | | | | | | | | | | | | | | |
| | a. flange |  | | $a \leq 2$ $c-b \leq 2$ | | | | | | | | | | | |
| | b. pipe and Fittings |  | | <table><tr><th>pipe indiameter (D, mm)</th><th>pipe thickness (t, mm)</th><th>internal misalignment (S, mm)</th></tr><tr><td>$D < 150$</td><td>$t \leq 6$</td><td>Smaller value of $S \leq 1$ or $t/4$</td></tr><tr><td>$150 \leq D < 300$</td><td>$t \leq 9.5$</td><td>Smaller value of $S \leq 1.5$ or $t/4$</td></tr><tr><td colspan="2">$300 \leq D$ or $9.5 < t$</td><td>Smaller value of $S \leq 2.0$ or $t/4$</td></tr></table> | pipe indiameter (D, mm) | pipe thickness (t, mm) | internal misalignment (S, mm) | $D < 150$ | $t \leq 6$ | Smaller value of $S \leq 1$ or $t/4$ | $150 \leq D < 300$ | $t \leq 9.5$ | Smaller value of $S \leq 1.5$ or $t/4$ | $300 \leq D$ or $9.5 < t$ | |
| pipe indiameter (D, mm) | pipe thickness (t, mm) | internal misalignment (S, mm) | | | | | | | | | | | | | |
| $D < 150$ | $t \leq 6$ | Smaller value of $S \leq 1$ or $t/4$ | | | | | | | | | | | | | |
| $150 \leq D < 300$ | $t \leq 9.5$ | Smaller value of $S \leq 1.5$ or $t/4$ | | | | | | | | | | | | | |
| $300 \leq D$ or $9.5 < t$ | | Smaller value of $S \leq 2.0$ or $t/4$ | | | | | | | | | | | | | |

| Section | Item | Standard range | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|---|--------------------|---------------|--------------------|---------------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|----|------|-----|------|-----|------|-----|------|--|--|
| 3-2. Pipe fitting | <p>3-2-3. Bolting</p>  <p>3-2-4. Distance between bands of supports</p> <table border="1"> <thead> <tr> <th>Pipe nominal dia:A</th><th>Max. distance</th><th>Pipe nominal dia:A</th><th>Max. distance</th></tr> </thead> <tbody> <tr><td>10</td><td>1.4m</td><td>125</td><td>4.5m</td></tr> <tr><td>15</td><td>1.6m</td><td>150</td><td>5.0m</td></tr> <tr><td>20</td><td>1.8m</td><td>200</td><td>5.0m</td></tr> <tr><td>25</td><td>2.1m</td><td>250</td><td>5.5m</td></tr> <tr><td>32</td><td>2.4m</td><td>300</td><td>6.0m</td></tr> <tr><td>40</td><td>2.6m</td><td>350</td><td>6.0m</td></tr> <tr><td>50</td><td>2.8m</td><td>400</td><td>6.0m</td></tr> <tr><td>65</td><td>3.2m</td><td>500</td><td>7.0m</td></tr> <tr><td>80</td><td>3.5m</td><td>600</td><td>7.0m</td></tr> <tr><td>100</td><td>4.0m</td><td>700</td><td>7.0m</td></tr> </tbody> </table> <p>Above standard distance will be adopted as working guideline that is, the distance can be increased depending on the actual installation condition.</p> | Pipe nominal dia:A | Max. distance | Pipe nominal dia:A | Max. distance | 10 | 1.4m | 125 | 4.5m | 15 | 1.6m | 150 | 5.0m | 20 | 1.8m | 200 | 5.0m | 25 | 2.1m | 250 | 5.5m | 32 | 2.4m | 300 | 6.0m | 40 | 2.6m | 350 | 6.0m | 50 | 2.8m | 400 | 6.0m | 65 | 3.2m | 500 | 7.0m | 80 | 3.5m | 600 | 7.0m | 100 | 4.0m | 700 | 7.0m | <p>* $b_1 \leq \frac{d_1}{2}$</p> <p>* $b_2 \leq \frac{d_2}{2}$</p> <p>$a \leq 2$</p> <p>$0 \leq c \leq 2$</p> | * Marked standard will be adopted as working guideline |
| Pipe nominal dia:A | Max. distance | Pipe nominal dia:A | Max. distance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 1.4m | 125 | 4.5m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 1.6m | 150 | 5.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 1.8m | 200 | 5.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 2.1m | 250 | 5.5m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | 2.4m | 300 | 6.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 2.6m | 350 | 6.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | 2.8m | 400 | 6.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 65 | 3.2m | 500 | 7.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 | 3.5m | 600 | 7.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 4.0m | 700 | 7.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

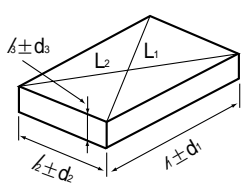
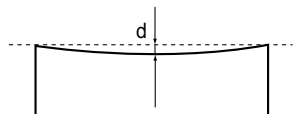
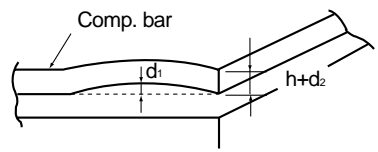
| Section | Item | Standard range | Remarks |
|----------------------|--|------------------------|---------|
| 3-2. Pipe fitting | <p>3-2-5. Sounding pipe</p> <p>a. Straight type</p>  <p>b. Special type</p> <p>b-1. Box type</p>  <p>b-2. Elbow sounding</p>  <p>b-3. Bow sounding type</p>  | <p>t=15 h=20±5</p> | |

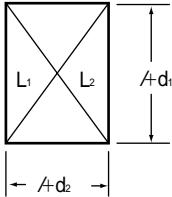
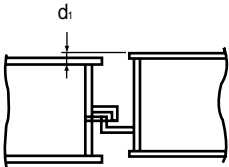
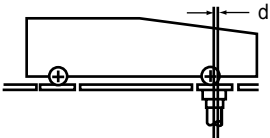
| Section | Item | Standard range | Remarks |
|----------------------|---|-----------------------------|-----------------------------|
| 3-2. Pipe fitting | 3-2-6. Suction bellmouth | | |
| | A-type  | $H = \pm 10$ $H = \pm 5$ | Main line Stripping line |
| | B-type  | $H = \pm 10$ $H = \pm 5$ | Main line Stripping line |
| | C-type  | $H = \pm 5$ | |

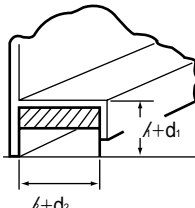
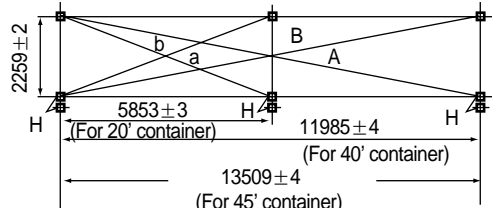
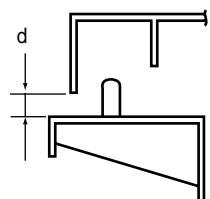
| Section | Item | Standard range | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|--|-----------------------------|--------------------------|--------------------|---------------------|----------------|--------------------|----|----------------|----------------|----------------|---------|-------|-----|----------|-----|-----|----------|-------|-----|-----------|-----|-------|-----------|-----|-----|-----------|-------|------|-----------|----|-----|-------|------|-----|-----|-----|-------|------|-----|-----|-----|-------|------|-----|-----|
| 3-2. Pipe fitting | a. A-type | $H = \pm 10$ $H = \pm 5$ | Main line Stripping line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table><tr><th rowspan="2">Nominal dia</th><th colspan="2">Bellmouth Dimension</th><th rowspan="2">C</th></tr><tr><th>D</th><th>D₁</th></tr><tr><td>80</td><td>89.1</td><td>200</td><td>15</td></tr><tr><td>100</td><td>114.3</td><td>275</td><td>20</td></tr><tr><td>125</td><td>139.8</td><td>400</td><td>20</td></tr><tr><td>150</td><td>165.2</td><td>450</td><td>25</td></tr><tr><td>200</td><td>216.3</td><td>550</td><td>35</td></tr></table> | | | Nominal dia | Bellmouth Dimension | | C | D | D ₁ | 80 | 89.1 | 200 | 15 | 100 | 114.3 | 275 | 20 | 125 | 139.8 | 400 | 20 | 150 | 165.2 | 450 | 25 | 200 | 216.3 | 550 | 35 | | | | | | | | | | | | | | | | | |
| | Nominal dia | | | | Bellmouth Dimension | | | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | D | D ₁ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 80 | | | 89.1 | 200 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 100 | | | 114.3 | 275 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 125 | | | 139.8 | 400 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 150 | 165.2 | 450 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 200 | 216.3 | 550 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b. B-type | $H = \pm 10$ $H = \pm 5$ | Main line Stripping line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table><tr><th rowspan="2">Nominal dia</th><th colspan="3">Bellmouth Dimension</th><th rowspan="2">C</th></tr><tr><th>D</th><th>D₁</th><th>D₂</th></tr><tr><td>250</td><td>276.4</td><td>675</td><td>400</td><td>50</td></tr><tr><td>300</td><td>318.5</td><td>860</td><td>550</td><td>50</td></tr><tr><td>350</td><td>355.6</td><td>865</td><td>550</td><td>80</td></tr><tr><td>400</td><td>406.4</td><td>1000</td><td>600</td><td>80</td></tr><tr><td>450</td><td>457.2</td><td>1170</td><td>600</td><td>100</td></tr><tr><td>500</td><td>508.6</td><td>1240</td><td>750</td><td>100</td></tr><tr><td>550</td><td>558.3</td><td>1410</td><td>750</td><td>120</td></tr></table> | | | Nominal dia | Bellmouth Dimension | | | C | D | D ₁ | D ₂ | 250 | 276.4 | 675 | 400 | 50 | 300 | 318.5 | 860 | 550 | 50 | 350 | 355.6 | 865 | 550 | 80 | 400 | 406.4 | 1000 | 600 | 80 | 450 | 457.2 | 1170 | 600 | 100 | 500 | 508.6 | 1240 | 750 | 100 | 550 | 558.3 | 1410 | 750 | 120 |
| | Nominal dia | | | | Bellmouth Dimension | | | | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | D | D ₁ | D ₂ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 250 | | | 276.4 | 675 | 400 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 300 | | | 318.5 | 860 | 550 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 350 | | | 355.6 | 865 | 550 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 400 | | | 406.4 | 1000 | 600 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 450 | 457.2 | 1170 | 600 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 500 | 508.6 | 1240 | 750 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 550 | 558.3 | 1410 | 750 | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. C-type | $H = \pm 5$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table><tr><th rowspan="2">Nominal dia</th><th>Bellmouth Dimension</th><th rowspan="2">C</th></tr><tr><th>D × D₁</th></tr><tr><td>40</td><td>40 × 65</td><td>15</td></tr><tr><td>50</td><td>50 × 80</td><td>15</td></tr><tr><td>65</td><td>65 × 100</td><td>20</td></tr><tr><td>80</td><td>80 × 125</td><td>25</td></tr><tr><td>100</td><td>100 × 150</td><td>35</td></tr><tr><td>125</td><td>125 × 200</td><td>40</td></tr><tr><td>150</td><td>150 × 250</td><td>45</td></tr><tr><td>200</td><td>200 × 300</td><td>65</td></tr></table> | | | Nominal dia | Bellmouth Dimension | C | D × D ₁ | 40 | 40 × 65 | 15 | 50 | 50 × 80 | 15 | 65 | 65 × 100 | 20 | 80 | 80 × 125 | 25 | 100 | 100 × 150 | 35 | 125 | 125 × 200 | 40 | 150 | 150 × 250 | 45 | 200 | 200 × 300 | 65 | | | | | | | | | | | | | | | |
| | Nominal dia | | | | Bellmouth Dimension | | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | D × D ₁ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 40 | | | 40 × 65 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | 50 × 80 | | | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 65 | 65 × 100 | | | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 | 80 × 125 | | | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 100 × 150 | | | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 125 | 125 × 200 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 150 × 250 | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 200 | 200 × 300 | 65 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

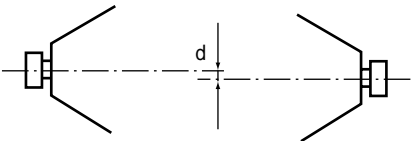
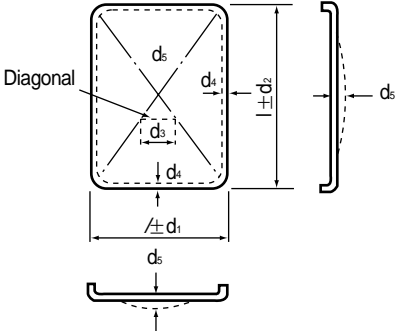
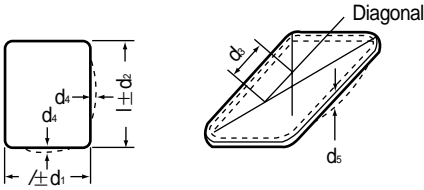
4. SHEET METAL OUTFITTING

Unit : mm

| Section | Item | Standard range | Remarks | |
|--------------------------------|---|--|---------|--|
| 4-1. Hatch cover | 4-1-1. Hatch cover | | | |
| | <div></div> <div>a. Length deviation d_1</div> <div>b. Width deviation d_2</div> <div>c. Height deviation d_3</div> <div>d. Diagonal deviation L_1-L_2</div> | $d_1, d_2 \pm (3+\frac{4}{10,000} L)$ ± 3 ≤ 10 | | |
| | 4-1-2. Deflection | <div></div> | ± 4 | |
| | 4-1-3. Fitting dimension of compression bar | <div></div> | | |
| | a. Distance from center line d_1 | ± 5 | | |
| b. Compression bar level d_2 | ± 4 | | | |

| Section | Item | Standard range | Remarks |
|------------------------|--|---|---------|
| 4-1. Hatch cover | 4-1-4. Hatch coaming | | |
| |  <p>1) Dimension</p> <p>a. Length deviation d_1</p> <p>b. Width deviation d_2</p> <p>c. Diagonal deviation $L_1 - L_2$</p> | ± 10 ± 10 ≤ 15 | |
| | 2) Level of top plate deviation | ± 3 | |
| | 4-1-5. Inter-connection | | |
| |  <p>a. Alignment of top plates deviation d_1</p> | ≤ 5 | |
| | 4-1-6. Position of jack head | | |
| |  <p>a. Off-set(wheel & jack center line) : d</p> | ± 5 | |

| Section | Item | Standard range | Remarks | | | | | | | | | | | | |
|------------------------|---|---------------------|--------------------------------|---------------------|---|-----|----------|---|-----|----------|---|---|---------|--|--|
| 4-1. Hatch cover | 4-1-7. Water tight structure | | | | | | | | | | | | | | |
| | a. Packing gutter(height) deviation d_1 | ± 2 | | | | | | | | | | | | | |
| | b. Packing gutter(width) deviation d_2 | ± 1 | | | | | | | | | | | | | |
| |  | | | | | | | | | | | | | | |
| | 4-1-8. Dimension for container loading (typical for on deck) | | | | | | | | | | | | | | |
| |  | | | | | | | | | | | | | | |
| | <table><tr><th>No</th><th>Measuring point</th><th>Allowable tolerance</th></tr><tr><td>1</td><td> a-b </td><td>≤ 6</td></tr><tr><td>2</td><td> A-B </td><td>≤ 8</td></tr><tr><td>3</td><td>The level differential of sockets for a container</td><td>± 3</td></tr></table> | No | Measuring point | Allowable tolerance | 1 | a-b | ≤ 6 | 2 | A-B | ≤ 8 | 3 | The level differential of sockets for a container | ± 3 | | |
| No | Measuring point | Allowable tolerance | | | | | | | | | | | | | |
| 1 | a-b | ≤ 6 | | | | | | | | | | | | | |
| 2 | A-B | ≤ 8 | | | | | | | | | | | | | |
| 3 | The level differential of sockets for a container | ± 3 | | | | | | | | | | | | | |
| | 4-1-9. Gap between H/Coaming and H/Cover skirt plate(Non packing type) | | | | | | | | | | | | | | |
| |  | $4 \leq d \leq 20$ | Maker's recommen- dation | | | | | | | | | | | | |

| Section | Item | Standard range | Remarks |
|---------------------|---|---|---------|
| 4-1. Hatch cover | 4-1-10. Level difference of two balanced roller  | $d \leq 5$ | |
| 4-2. Steel door | 4-2-1. Water tight door body a. Tolerance of width or height d_1, d_2 b. Difference between diagonals d_3 c. Straightness of side and deviation d_4 d. Deflection d_5  4-2-2. Small type steel hatch cover a. Height deviation d_1 b. Width or length deviation d_2 c. Difference between diagonals d_3 d. Straightness deviation d_4 e. Deflection d_5  | ≤ 5 ≤ 5 ≤ 5 ≤ 5 0~+10 ≤ 5 ≤ 5 ≤ 5 ≤ 5 | |

PART B. SCOPE OF INSPECTION

| | |
|----------------------|----|
| I . HULL | 61 |
| II . HULL OUTFITTING | 62 |
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ABBREVIATION

Witnessed by

- C : Class surveyor
- O : Owner supervisor
- Q : Q.A inspector
- M : Maker supervisor

I . HULL

| No | Inspection Items | | In Shop | | | | On Board | | | | Remarks |
|----|--|-------------------------|---------|---|---|---|----------|---|---|---|--|
| | | | C | O | Q | R | C | O | Q | R | |
| 1 | Sub-assembly block inspection including leak test | | | | ○ | ○ | | | | | In accordance with approved inspection & Test Plan |
| 2 | Block & P.E block Inspection including leak test for hull structure below super-structure deck | | ○ | ○ | ○ | | | | | | |
| 3 | Block & P.E block Inspection for Deck house & Funnel | | | ○ | ○ | | | | | | |
| 4 | Erection joints inspection for hull structure below super-structure deck | | | | | | ○ | ○ | ○ | | |
| 5 | Erection Joints Inspection for Deck house & Funnel | | | | | | ○ | ○ | ○ | | |
| 6 | Rudder | Construction | | | | | | | | | |
| | | Air Test | ○ | ○ | ○ | | | | | | |
| 7 | Air and/or tank strength test for hull tanks | | ○ | ○ | ○ | | ○ | ○ | ○ | | In accordance with approved Tank Test Plan |
| 8 | Non-Destructive Test (NDT) | | | | | ○ | | | | ○ | In accordance with approved NDT Plan |
| 9 | Keel Sighting before Launching | | | | | | | | ○ | ○ | |
| 10 | Measurement of Hull Dimension | | | | | | ○ | ○ | ○ | ○ | |
| 11 | Confirmation of Hull Marking | Freeboard | | | | | ○ | | ○ | | Marking condition |
| | | Draft | | | | | ○ | ○ | ○ | | |
| | | Ship name & Funnel mark | | ○ | ○ | | | ○ | ○ | | |
| | | BHD. Mark | | ○ | ○ | | | ○ | ○ | | |
| 12 | Bottom Survey before launching | | | | | | ○ | ○ | ○ | | |
| 13 | Inclining Experiment/Dead weight measurement | | | | | | ○ | ○ | ○ | ○ | According to I/E scheme |

II . HULL OUTFITTING

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|--|-------------------------|-----------------------|-------------------------|-----------------------|--|
| | C | O | C | O | |
| 1. Anchor & chains Verification | | | <input type="radio"/> | <input type="radio"/> | |
| 2. Cargo gear & rigging arrangement | | | | | |
| 1) Crane & davit | | | | | * If cargo gear book requested |
| Operation & load test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> * | <input type="radio"/> | 1.0 ton S.W.L, and over |
| 2) Small davits | | | | <input type="radio"/> | |
| Operation | | | | | |
| 3. Hatch, door, window, etc. | <input type="radio"/> * | | | | * Class A or B side scuttle |
| Hose test/Chalk test | | | <input type="radio"/> * | <input type="radio"/> | According to load line regulation |
| 4. Ladder | | | | | |
| 1) Accommodation ladder | | | | | |
| Proof load test | <input type="radio"/> | | <input type="radio"/> * | | * If authority requested |
| Operation | | | | <input type="radio"/> | |
| 2) Pilot ladder | | | | | |
| Construction | <input type="radio"/> | | | | |
| Operation | | | <input type="radio"/> | <input type="radio"/> | Authority for safety equipment certificate. SOLAS item |
| 5. Life saving & fire fighting equipment | | | | | |
| 1) Lifeboat & davit | | | | | |
| Load test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| Equipment check | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 2) Other life saving equipment | | | | | |
| Confirmation | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 3) Rescue boat launching test with ship speed at least 5knot | | | <input type="radio"/> | | |
| 4) Fire fighting system | | | | | |
| Confirmation & testing | | | <input type="radio"/> | <input type="radio"/> | |
| 5) Fire damper & Fire stop install. with operation. | | | <input type="radio"/> | <input type="radio"/> | |
| 6) E/R local fire fighting sys. testing | | | <input type="radio"/> | <input type="radio"/> | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|--|---|--|
| | C | O | C | O | |
| 6. Ventilation 1) Air conditioning system Volume check in cabin 2) Mechanical ventilation volume check | | | <input type="radio"/> * <input type="radio"/> | <input type="radio"/> <input type="radio"/> | * If crew accommodation cert. Required from CLASS. |
| 7. Accommodation facilities 1) A-60 Insulation and draft stop. 2) Galley & laundry equipment operation | | | <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> | Cable and duct penetration shall be confirmed. |
| 8. Deck machinery 1) No load test 2) Windlass load test 3) Auto tension system operation | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> | At sea trial. If applied. |
| 9. Others 1) Tank level gauge function 2) Draft reading gauge function 3) Loading instrument function 4) Anti heeling system function | | | <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> | |
| 10. Cargo hatch cover 1) Hose test 2) Operation test | | | <input type="radio"/> | <input type="radio"/> <input type="radio"/> | |
| 11. Side thruster 1) Blade gap check 2) Seal leak test | | | | <input type="radio"/> <input type="radio"/> | |

III . MACHINERY

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------------------|
| | C | O | C | O | |
| 1. Shafting | | | | | |
| 1) Light beam alignment for shafting | | | <input type="radio"/> | <input type="radio"/> | Case by case |
| 2) Force fitting of stern bush | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Force fitting of propeller | | | <input type="radio"/> | <input type="radio"/> | |
| 4) Check of stern clearance | | | <input type="radio"/> | <input type="radio"/> | By wear down gauge |
| 5) Leak test of stern sealing | | | <input type="radio"/> | <input type="radio"/> | |
| 6) Stern tube L.O system flushing condition | | | | <input type="radio"/> | |
| 7) Coupling bolt fitting | | | | <input type="radio"/> | |
| 8) Shaft jack-up test | | | <input type="radio"/> | <input type="radio"/> | |
| 9) Inter/Propeller shaft final inspection | <input type="radio"/> | | | | |
| 10) Propeller shaft with Propeller contact | <input type="radio"/> | | | | |
| 11) Propeller final machining | <input type="radio"/> | | | | |
| 12) Stern boss/Rudder horn casting final | <input type="radio"/> | | | | |
| 2. Main engine | | | | | |
| 1) Condition check of chock liners or fast | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Holding down bolt tightness check (Before & After sea trial) | | | * | * | * Record to be submitted. |
| 3) Crank shaft deflection (Cold & Hot) | | | <input type="radio"/> | <input type="radio"/> | |
| 4) Flushing condition of L.O system | | | | <input type="radio"/> | |
| 5) Safety device function test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | According to the approved drawing |
| 6) Piston alignment | <input type="radio"/> | <input type="radio"/> | | | |
| 7) Mooring trial | | | <input type="radio"/> | <input type="radio"/> | |
| 8) Shop test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | One set only |
| 9) Overhaul inspection | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 10) Starting test | | | <input type="radio"/> | <input type="radio"/> | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-------------------------|-------------------------|---------------------------|
| | C | O | C | O | |
| 3. Auxiliary boiler | | | | | * Record to be submitted. |
| 1) Hydro test | <input type="radio"/> | <input type="radio"/> | | | |
| 2) Safety device test | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Accumulation test | | | <input type="radio"/> | <input type="radio"/> | |
| 4. Economizer | | | | | |
| 1) Hydro test | <input type="radio"/> | | | | |
| 2) Safety valve setting | | | <input type="radio"/> | <input type="radio"/> | |
| 5. Generator engine | | | | | |
| 1) Crank shaft deflection(Hot condition) | | | <input type="radio"/> * | <input type="radio"/> * | |
| 2) Safety device test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 3) Shop test | <input type="radio"/> | <input type="radio"/> | | | |
| 4) Overhaul inspection after shop trial | <input type="radio"/> | <input type="radio"/> | | | |
| 6. Air compressor & air tanks | | | | | * Record to be submitted. |
| 1) Tank hydro test | <input type="radio"/> | | | | |
| 2) Safety device test | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 3) Automatic control test | | | | <input type="radio"/> | |
| 5) Air charging test | | | <input type="radio"/> | <input type="radio"/> | |
| 7. Cargo turbine/pump & water ballast pump | | | | | |
| 1) Safety device test | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 2) Capacity check | | | <input type="radio"/> * | <input type="radio"/> | |
| 8. Stripping pump | | | | | |
| 1) Operating test | | | <input type="radio"/> | <input type="radio"/> | |
| 9. Tank cleaning system (machine, heater, pump) | | | | | |
| Operating test | | | | <input type="radio"/> | |
| 10. ODME Function test | | | <input type="radio"/> | <input type="radio"/> | |
| 11. Steering gear | | | | | |
| 1) Pipe piece/Actuator hydro test | <input type="radio"/> | <input type="radio"/> | | | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-------------------------|-------------------------|---------------------------|
| | C | O | C | O | |
| 2) Safety valve setting 3) Operation test 4) Installation | | | <input type="radio"/> | <input type="radio"/> | At sea trial |
| 12. Air-con & refrigerator, provision plant | | | | | |
| 1) System vacuum test | | | | <input type="radio"/> | |
| 2) Safety device test | | | | <input type="radio"/> | At sea trial |
| 3) Running test | | | | <input type="radio"/> | |
| 13. Oily water separator Safety device function | | | <input type="radio"/> | <input type="radio"/> | |
| 14. Incinerator Safety device function | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 15. Emergency fire pump | | | | | |
| 1) Shooting test | | | <input type="radio"/> | <input type="radio"/> | * If engine driven |
| 2) Running test(4hrs) | | | <input type="radio"/> * | <input type="radio"/> * | |
| 16. Sewage treatment unit Operating & safety device test | | | <input type="radio"/> | <input type="radio"/> | |
| 17. Bilge suction test (E/R, Hold, Pump Room) | | | <input type="radio"/> | <input type="radio"/> | |
| 18. F.O/L.O/D.O Purifier | | | | | |
| 1) Running test | | <input type="radio"/> | | | |
| 2) Automatic control test | | | | <input type="radio"/> | |
| 3) Safety device test | | | | <input type="radio"/> | |
| 19. Engine room crane | | | | | |
| 1) Operation test | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Load test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> * | <input type="radio"/> | * 1.0 ton S.W.L, and over |
| 20. Quick closing valve for oil tank Operation test | | | <input type="radio"/> | <input type="radio"/> | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-------------------------|-----------------------|--|
| | C | O | C | O | |
| 21. Inert gas generating system 1) Safety device function 2) Blower capacity test | | | <input type="radio"/> | <input type="radio"/> | By pitot tube |
| | | | <input type="radio"/> | <input type="radio"/> | |
| 22. Power pack for hydro oil system Safety device function | <input type="radio"/> | | <input type="radio"/> | <input type="radio"/> | |
| 23. C.P.P system 1) Pipe flushing & hydro test | | | <input type="radio"/> * | <input type="radio"/> | * Hydro test for class I & II grade pipes |
| 2) Safety device function | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Operating -Pitch control(remote & manual) | | | <input type="radio"/> | <input type="radio"/> | |
| -Pump operating | | | | <input type="radio"/> | |
| 24. Personnel lift(elevator) Safety & operating test | | | <input type="radio"/> * | <input type="radio"/> | * If certificate requested at contract stage |
| 25. Rudder 1) Stock final, machining/NDT | <input type="radio"/> | | | | Case by case Case by case |
| 2) Pintle/neck bush fitting | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 3) Force fitting of pintle/stock | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 4) Stock/bearing clearance check | | | <input type="radio"/> | <input type="radio"/> | |
| 6) Tiller fitting | | | <input type="radio"/> | <input type="radio"/> | |
| 7) Jumping stopper clearance check | | | * | * | * Record to be submitted |
| 8) Contact area between rudder stock & tiller | | | | | |
| | <input type="radio"/> | | | | |
| 26. Workshop machinery Operation test | | | | <input type="radio"/> | |
| 27. Ship side V/V operation | | | <input type="radio"/> | <input type="radio"/> | |
| 28. Hydraulic power pack for remote control valves | | | | | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|--|--------------|---|----------|--------|---------|
| | C | O | C | O | |
| 1) Safety device test 2) V/V operation test | ○ | | ○ ○ | ○ ○ | |

IV . PIPING

| Inspection Items | In Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-----------------------|-----------------------|---|
| | C | O | C | O | |
| 1. Steam line | | | | | Class I & II grade pipes shall be hydro test/ NDT in shop or onboard to meet the class rule requirements. |
| 1) Installation inspection | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Hydrostatic test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 2. Air line | | | | | |
| 1) Installation inspection | | | <input type="radio"/> | <input type="radio"/> | Application for the installation inspection will not be prepared. |
| 2) Hydrostatic test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 3. Feed water line for boiler | | | | | |
| 1) Installation inspection | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Hydrostatic test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 4. Heating coil in tanks | | | | | |
| Hydrostatic test or air test | | | <input type="radio"/> | <input type="radio"/> | |
| 5. F.O supply lines | | | | | |
| 1) Installation inspection | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Hydrostatic test | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |
| 6. F.O transfer line air test or hydro test | | | <input type="radio"/> | <input type="radio"/> | |
| 7. Cargo line, Stripping line, Tank cleaning line, Crude oil washing line | | | | | |
| 1) Installation inspection | | | <input type="radio"/> | <input type="radio"/> | |
| 2) hydrostatic test | | | <input type="radio"/> | <input type="radio"/> | |
| 8. Main engine L.O line, stern tube L.O line, Camshaft L.O line flushing | | | | <input type="radio"/> | |
| 9. Pipe line in living quarter | | | | | |
| Flooding or leak test | | | | <input type="radio"/> | |
| 10. OX/AC line | | | | | |
| Leak test with installation inspection | | | <input type="radio"/> | <input type="radio"/> | |

V . ELECTRIC

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|-----------------------|-----------------------|-------------------------|-------------------------|--------------------------|
| | C | O | C | O | |
| 1. Main generator | | | | | |
| 1) Shop test | <input type="radio"/> | <input type="radio"/> | | | |
| 2) Insulation resistance test (Cold & Hot condition) | | | <input type="radio"/> * | <input type="radio"/> * | * Record to be submitted |
| 3) Parallel operation test | | | <input type="radio"/> | <input type="radio"/> | |
| 4) Governor test | | | <input type="radio"/> | <input type="radio"/> | |
| 5) Auto control test | | | <input type="radio"/> | <input type="radio"/> | |
| 6) Safety device test for generator engine | | | <input type="radio"/> | <input type="radio"/> | |
| 7) Load characteristic test | | | <input type="radio"/> | <input type="radio"/> | |
| 2. Emergency generator | | | | | |
| 1) Shop test | <input type="radio"/> | <input type="radio"/> | | | |
| 2) Insulation resistance test (Cold & Hot condition) | | | <input type="radio"/> * | <input type="radio"/> * | * Record to be submitted |
| 3) Governor test | | | <input type="radio"/> | <input type="radio"/> | |
| 4) Safety device test for generator engine | | | <input type="radio"/> | <input type="radio"/> | |
| 5) Load characteristic test | | | <input type="radio"/> | <input type="radio"/> | |
| 3. Shaft generator | | | | | |
| 1) Shop test | <input type="radio"/> | | | | |
| 2) Insulation resistance test | | | <input type="radio"/> * | <input type="radio"/> * | * Record to be submitted |
| 3) Safety device test | | | <input type="radio"/> | <input type="radio"/> | |
| 4) M/E holding R.P.M | | | <input type="radio"/> | <input type="radio"/> | |
| 5) Parallel operation test | | | <input type="radio"/> | <input type="radio"/> | |
| 6) Load characteristic test | | | <input type="radio"/> | <input type="radio"/> | |
| 4. Main switch board | | | | | |
| 1) Fabrication & shop test | <input type="radio"/> | <input type="radio"/> | | | |
| 2) Generator protection test | | | <input type="radio"/> | <input type="radio"/> | |
| a. Over current trip | | | | | |
| b. Reverse power trip | | | | | |
| c. Preferential trip | | | | | |
| d. Under voltage trip | | | | | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|--|-----------------------|-----------------------|-----------------------|-----------------------|--------------|
| | C | O | C | O | |
| 3) Safety alarm test | | | <input type="radio"/> | <input type="radio"/> | At sea trial |
| a. Low/high voltage alarm | | | | | |
| b. Low/high frequency | | | | | |
| 4) Black out test with sequential start test | | | <input type="radio"/> | <input type="radio"/> | |
| 5) Interlock test | | | <input type="radio"/> | <input type="radio"/> | |
| 5. Emergency switchboard | | | | | |
| 1) Fabrication & shop test | <input type="radio"/> | <input type="radio"/> | | | |
| 2) Generator protection device test | | | <input type="radio"/> | <input type="radio"/> | |
| a. Over current trip | | | | | |
| b. Under voltage trip | | | | | |
| 6. Bow thruster | | | <input type="radio"/> | <input type="radio"/> | |
| 1) Safety device | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Pitch control test | | | | <input type="radio"/> | |
| 3) Operation | | | | | |
| 7. Stand by auto starting of auxiliary machine | | | <input type="radio"/> | <input type="radio"/> | |
| 8. Sensor test | | | | | |
| 1) Pressure sensor test | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Temperature sensor test | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Level sensor test | | | <input type="radio"/> | <input type="radio"/> | |
| 9. Lighting equipment function | | | | | |
| 1) Navigation & signal light | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Emergency light | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Day time signal light | | | <input type="radio"/> | <input type="radio"/> | |
| 10. Communication equipment and alarm system | | | | | |
| 1) Auto telephone | | | | <input type="radio"/> | |
| 2) Sound power telephone | | | <input type="radio"/> | <input type="radio"/> | |
| 3) Public addressor & talk back system | | | <input type="radio"/> | <input type="radio"/> | |
| 4) Fire detection system | | | <input type="radio"/> | <input type="radio"/> | |
| 5) General alarm | | | <input type="radio"/> | <input type="radio"/> | |
| 6) CO ₂ alarm/Foam alarm | | | <input type="radio"/> | <input type="radio"/> | |
| 7) Extension alarm | | | <input type="radio"/> | <input type="radio"/> | |
| 8) Engine order telegraphy | | | <input type="radio"/> | <input type="radio"/> | |

| Inspection Items | Maker's Shop | | On Board | | Remarks |
|---|--------------|---|-------------------------|-------------------------|---|
| | C | O | C | O | |
| 9) Rudder angle indicator | | | <input type="radio"/> | <input type="radio"/> | |
| 10) Em' cy engineer call | | | <input type="radio"/> | <input type="radio"/> | |
| 11) Hospital call/Ref. chamber call | | | <input type="radio"/> | <input type="radio"/> | |
| 11. Navigation equipment | | | | | |
| 1) Whistle | | | <input type="radio"/> | <input type="radio"/> | |
| 2) Magnetic compass | | | | <input type="radio"/> | |
| 3) Gyro compass, autopilot | | | | <input type="radio"/> | |
| 4) Searching Equipment | | | | <input type="radio"/> | |
| 5) Electric clock | | | | | |
| 6) Navigator | | | | | |
| 7) Automatic identification system | | | <input type="radio"/> | <input type="radio"/> | |
| 8) Voyage data recorder | | | <input type="radio"/> | <input type="radio"/> | |
| 12. Radio equipment | | | | | |
| 1) Radio telegraph plant | | | <input type="radio"/> * | <input type="radio"/> | * On behalf of government |
| 2) V.H.F telephone | | | <input type="radio"/> * | <input type="radio"/> | |
| 3) Satellite communicator | | | <input type="radio"/> * | <input type="radio"/> | |
| 4) Communal aerial system | | | | <input type="radio"/> | |
| 5) Ship security alert system | | | | <input type="radio"/> | |
| 13. Insulation resistance test for main circuits | | | * | * | * Record to be submitted |
| 14. Emergency stop for F.O pumps & ventilation fan | | | <input type="radio"/> | <input type="radio"/> | |
| 15. E/R, Accommodation, on deck cable installation inspection | | | <input type="radio"/> * | <input type="radio"/> * | * Application for the inspection will not be prepared except behind of wall pannel or ceiling |
| 16. Battery charger function | | | <input type="radio"/> * | <input type="radio"/> * | * If over 5kw |
| 17. Dead ship start | | | <input type="radio"/> | <input type="radio"/> | |
| 18. Reef. Com. Monitoring system check | | | | <input type="radio"/> | |
| 19. MGPS/ICCP | | | | <input type="radio"/> | |

VI . PAINTING

| Location | Stage | Inspection Witnessed by | | | |
|---|-------|-------------------------|----------------------------|---------------------|----------------------------|
| | | Block | | Hull | |
| | Item | Surface preparation | Finish After final coating | Surface preparation | Finish After final coating |
| Flat & Side bottom | | O.Q.M | O.Q.M | O.Q.M | O.Q.M |
| Topside | | O.Q.M | Q.M | O.Q.M | O.Q.M |
| Main deck | | O.Q.M | Q.M | O.Q.M | O.Q.M |
| Accommodation outside | | O.Q.M | O.Q.M | O.Q.M | O.Q.M |
| W.B. tanks | | O.Q.M | O.Q.M | O.Q.M | O.Q.M |
| F.W. tanks | | - | - | O.Q.M | O.Q.M |
| Cargo holds | | O.Q.M | O.Q.M | O.Q.M | O.Q.M |
| Cargo tanks (where to be coated) | | O.Q.M | O.Q.M | O.Q.M | O.Q.M |
| <p>O : Owner supervisor Q : Q.A Inspector M : Paint maker supervisor</p> <p>Note : 1. In general, the Owner supervisor shall have free access to monitor the progress of workmanship provided that it does not disturb the work to SHI. 2. The others except above mentioned shall be inspected by the Builder' s QA inspectors and/or paint manufacture' s supervisors.</p> | | | | | |

SAMSUNG SHIPBUILDING QUALITY STANDARD

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