

**PROCEDURE FOR
QUALITY CONTROL OF HATCH COVER**

	PROJECT NAME & HULL NO.	TOTAL SHEETS (WITH COVER)
	HATCH COVER	15 SHEETS

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<p>1. SCOPE This procedure covers all activities of inspection from receiving material to shipment of hatch covers.</p> <p>2. APPLICABLE AND STANDARD</p> <ul style="list-style-type: none"> - Building Specification - Rule of Classification Society - MacGREGOR Standard - MSQS (Manxiang Shipbuilding Quality Standard) <p>3. QUALITY CONTROL OF EACH PROCESS It will be carried out the Quality Control of each process as per following methods:</p> <p>1) Drawing Control</p> <ul style="list-style-type: none"> - All drawings relevant to hatch covers have prepared and supplied by Manxiang shipyard on the basis of the MacGREGOR'S drawings and relevant class requirements. - All relevant drawings including revised drawings should be distributed to concerned department by Production Control Section of Manxiang and controlled the drawings in accordance with procedure of Manxiang. <p>2) Material Receiving Control</p> <ul style="list-style-type: none"> - Steel plates, profiles, welding consumables should be purchased from vendors which were approved by Manxiang.. - All materials relevant fabrication hatch covers should be carried out the incoming inspection after arrival at Manxiang. <ul style="list-style-type: none"> · to be inspected the quantity, appearance, packing condition and contamination · to be checked mill certificates for raw materials - Steel materials(plates and profiles) should be washed by pressed fresh water to remove the sea water as soon as possible. 			

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<p>3) Cutting Control</p> <ul style="list-style-type: none">- All materials to being cut should be checked identification of materials by production members before cutting material.<ul style="list-style-type: none">· Mark No. dimension and steel grade.- Accuracy and edge preparation condition should be checked by the production members after cutting material.- Periodical inspection of cutting materials should be carried out by QA personnel of Manxiang.. <p>4) Assembly Control</p> <ul style="list-style-type: none">- Assembly of hatch covers should be done in accordance with drawings and standard relevant and controlled by foreman and/or senior foreman.<ul style="list-style-type: none">· Materials, work sequence, fit up condition, welding condition, cleaning, primary coating etc.- All welding works should be done in approved WPS (welding procedure specification) by qualified welders.- Periodical patrol for assembly conditions should be done by QA personnel of Manxiang. at least 1 time for a day during fabrication of hatch covers. <p>5) Assembly Inspection</p> <ul style="list-style-type: none">- Fit up inspection for butt welding joints should be done by QA of Manxiang. and prepared records.- Welding and structural inspection of hatch covers should be done QA of Manxiang. at each stage.<ul style="list-style-type: none">· Sub-assembly stage and assembly stage.- Each void spaces should carry out the QA inspection for welding and cleaning condition before closing cover.- All full penetration welding joints should be carried out the proper NDT method of full or random by qualified NDT Personal of Manxiang..- Dimensional and leveling measurements should be done by Accuracy Control personnel of Manxiang. and prepared check sheets.			

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<p>6) Painting Control</p> <ul style="list-style-type: none"> - Oil contamination on the hatch covers should be removed with chemical cleaning before blasting or sweep blasting , and Controlled the cleanness by paint engineer and/or paint QA inspector of Manxiang.. - The blasting shop and painting shop should be controlled the relative humidity and temperature by paint engineer and /or Paint QA inspector of Manxiang.. - Free edge condition of main structural members, stiffeners and openings should be controlled ground-off to 1C or requirement of building specification prior to the first coat in accordance with the painting specification. - Prior to paint, mixing and thinning of paints should be confirmed by paint engineer and/or paint QA inspector of Manxiang. in accordance with paint maker's recommendation. - The storage condition of paint materials should be controlled by paint engineer periodically in accordance with paint maker's recommendation. - The tools concerning painting work should be cleaned after use and controlled the condition by paint engineer. - After completion of painting, paint film of hatch covers should be protected from any kind of damage during stock or handling hatch covers. <p>7) Shipment Control</p> <ul style="list-style-type: none"> - Special care should be taken to prevent damage during loading hatch covers on barge. - All hatch covers should be packed and loaded on the barge as storage plan. - The loading condition on the barge should be checked by QA personnel of Manxiang.. 			

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<p>8) Non-Conformity Control</p> <p>If found Non-Conformity at any stage of inspection, such Non-Conformity shall be managed as following;</p> <p>(1) Minor defect</p> <ul style="list-style-type: none"> - It is meaning of simple defect occurred from single process - The rectification of the defect/s shall be treated in accordance with builder's practice. <p>(2) Major defect</p> <ul style="list-style-type: none"> - It is meaning of major deviation from Specifications or Drawings. - It may required the cooperation of all concerned parties to find the solution (Owner, Class, Design Dep't of Manxiang). - In this case, rectification procedure shall be submitted to owner and classification society for approval. <p>4. INSPECTIONS OF EACH PROCESS</p> <p>1) Material Receiving Inspection</p> <ul style="list-style-type: none"> - Steel materials (steel plates and profiles) should be inspected by production members of Manxiang: <ul style="list-style-type: none"> . quantity, appearance, packing condition and contamination - If found any problem, the production manager shall give information of the problem to concerned department and take action of the following treatment in accordance with yard's practice. <p>2) In-process Inspection by Line QC</p> <ul style="list-style-type: none"> - Prior to QA inspection, Line QC belonging to production department shall inspect the fabricating condition of hatch covers at each stage in accordance with "Self Inspection Report" and prepare the "Self Inspection Report" after self inspection. - All non-conformities found by Line QC should be repaired and confirmed by line QC before QA inspection. - The Line QC shall submit the "Application for QA Inspection" to QA department on 1 day before to being QA inspection. 			

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<p>2) In-Process Inspection by QA</p> <ul style="list-style-type: none"> - QA inspector shall prepare the inspection items after review of drawing, specification and standard, and confirm the results of NDT and dimensional accuracy inspection. - QA inspector shall review the “Self Inspection Report” prepared by Line QC. - QA inspector shall perform the QA inspection for structure and welding of hatch cover. - All non-conformities found by QA inspector shall be recorded on the “Self Inspection Report” by QA inspector and QA inspector shall confirm the non-conformities after completion of rectification. - QA inspector shall issue the NCR (Non Conformity Report) to production department, if found major non-conformities. <p>3) NDT (Non- Destructive Testing)</p> <ul style="list-style-type: none"> - Foreman of production department shall submit the “Application for NDT” to QA department on 1day before to being NDT. - QA department shall apply the proper NDT method (UT, MT and/or PT) by qualified NDT personnel for welding lines of Hatch covers in accordance with drawing, specification, class rule requirement and /or yard’s practice. - The result of NDT should be reported and maintained by NDT personnel. - NDT personnel shall investigate the reason and countermeasure for welding defects, if found major welding defects. - All NDT activities including confirmation for repaired points should be completed before structural QA inspection. <p>4) Dimensional Accuracy Inspection</p> <ul style="list-style-type: none"> - The foreman of production department shall submit the “Application for Accuracy Inspection ” to QA department on 1 day before to being inspection. - Accuracy inspector shall prepare the accuracy check sheets after review of concerned drawing. - Accuracy inspector shall prepare the accuracy check sheets after checking dimension and leveling as per accuracy check sheets. - If found any deviation, accuracy inspector shall discuss with production department for rectification method and countermeasure. - All activities of accuracy inspection shall be completed before structural QA inspection. 			

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5) Official Inspection (by Owner and Class and/or MacGREGOR supervisor)

- QA department of Manxiang shall submit the “Application for Inspection ” to owner, class and MacGREGOR on 14days before to being official inspection.
- Manxiang shall prepare the inspection condition of hatch cover to perform accuracy and structural inspection.
- QA department of Manxiang shall submit the quality reports such as NDT reports and accuracy check sheets in advance.
- The results of official inspection by owner’s representative, class surveyor and/or MacGREGOR supervisor shall be reported on format “Results of Inspection ” by owner’s representative, class surveyor and/or MacGREGOR supervisor.
- The non-conformities pointed out by owner’s representative, class surveyor and/or MacGREGOR supervisor shall be confirmed by QA inspector of SHNC after completion of rectification and submitted the results of confirmation to concerned parties.

6) Shipment Inspection

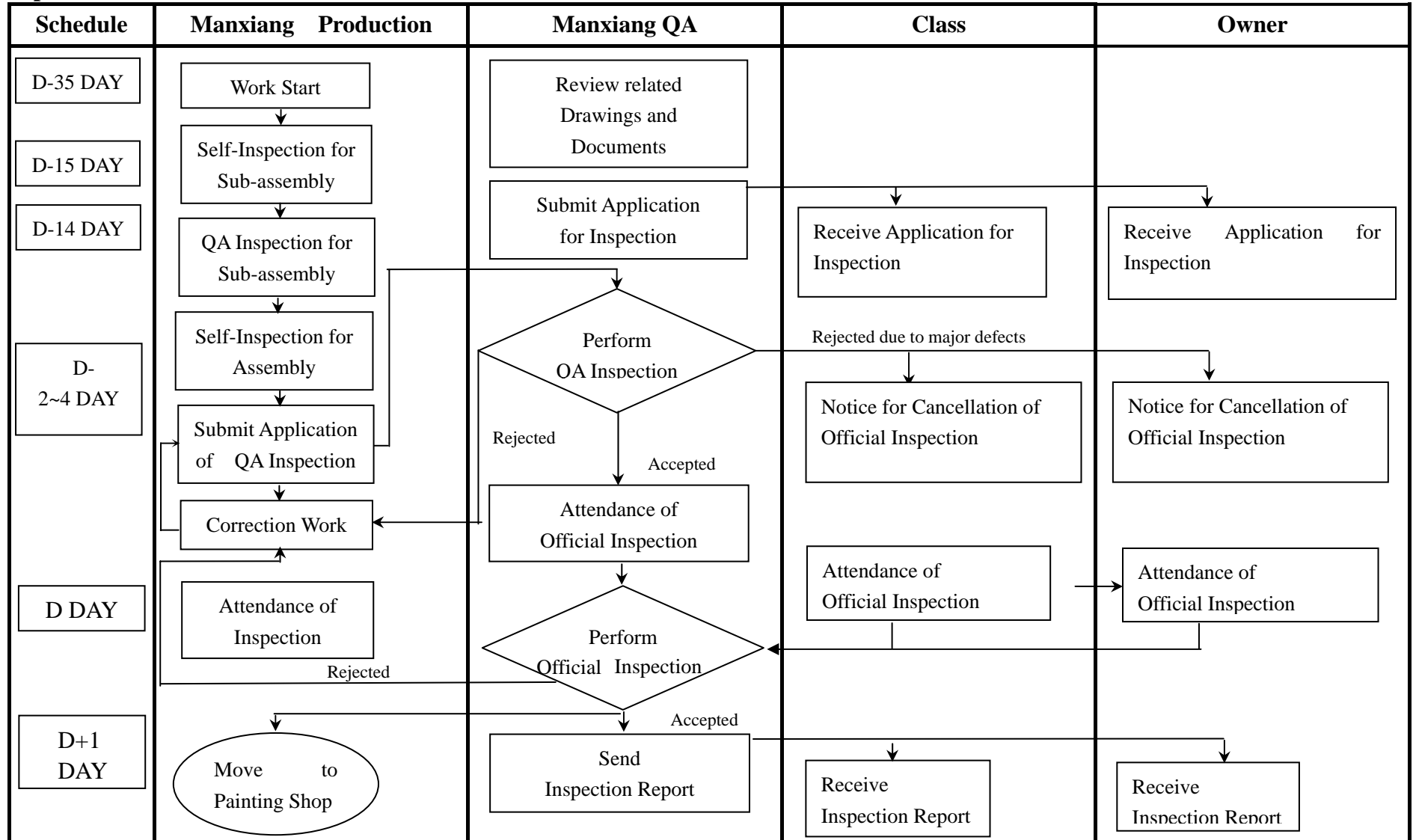
- Before shipment of hatch covers, QA inspector of Manxiang shall reconfirm whether all NCR comments were completion or not.
- If found any incompleteness, QA department shall interrupt the loading of hatch covers on barge and then order rectification of NCR to production department.
- QA department shall prepare all quality documents concerned delivery of hatch covers and the documents send to Owner by barge with hatch covers.
- QA inspector of Manxiang shall carry out the inspection for positions and lashing conditions after loading of hatch covers on barge in accordance with storage plan.

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7) Inspection Procedure for Hatch Cover



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5. INSPECTION STANDARD																			
1) Fit-up Inspection																			
(1) Inspection Method																			
<div><div>- Main structures: Fit up inspection for butt-welding joints shall be performed by QA inspector.</div><div>- Secondary structures: Fit up inspection shall be performed by Line QC and monitored by QA inspector.</div><div>- Reports of fit up inspection for butt welding joints of main structures shall be prepared by QA inspector and the reports shall be submitted to Owner and QA of Manxiang.</div></div>																			
(3) Inspection Items & Tools																			
	<table><tr><th>Item</th><th>Detailed Inspection</th><th>Measuring Tools</th></tr><tr><td>Fit up Inspection</td><td>Gap, alignment, bevel angle and notch etc.</td><td>Gap gauge, steel rule and drawing etc.</td></tr><tr><td>Dead Space Inspection before Covering</td><td>Welding and cleaning condition</td><td>Welding gauge, visual inspection</td></tr><tr><td>First Inspection Before Turnover</td><td>Welding Defect and appearance, welding size, deformation, alignment, edge shape, cleaning condition and primer coating etc.</td><td><div>- Visual inspection</div><div>. Drawing, welding gauge, string, rule</div><div>- Non Destructive Testing (U.T)</div></td></tr><tr><td>Final Inspection</td><td>Welding defect and appearance, welding size, deformation and fairing, alignment, edge shape, cleaning condition and primer coating etc.</td><td><div>- Visual inspection</div><div>. Drawing, welding gauge, string, rule</div><div>- Non Destructive Testing (U.T/M.T/P.T)</div></td></tr><tr><td>Accuracy Inspection</td><td>Length, Breadth, Diagonal, Level</td><td>Drawing, steel tape, level gauge, rule</td></tr></table>	Item	Detailed Inspection	Measuring Tools	Fit up Inspection	Gap, alignment, bevel angle and notch etc.	Gap gauge, steel rule and drawing etc.	Dead Space Inspection before Covering	Welding and cleaning condition	Welding gauge, visual inspection	First Inspection Before Turnover	Welding Defect and appearance, welding size, deformation, alignment, edge shape, cleaning condition and primer coating etc.	<div>- Visual inspection</div> <div>. Drawing, welding gauge, string, rule</div> <div>- Non Destructive Testing (U.T)</div>	Final Inspection	Welding defect and appearance, welding size, deformation and fairing, alignment, edge shape, cleaning condition and primer coating etc.	<div>- Visual inspection</div> <div>. Drawing, welding gauge, string, rule</div> <div>- Non Destructive Testing (U.T/M.T/P.T)</div>	Accuracy Inspection	Length, Breadth, Diagonal, Level	Drawing, steel tape, level gauge, rule
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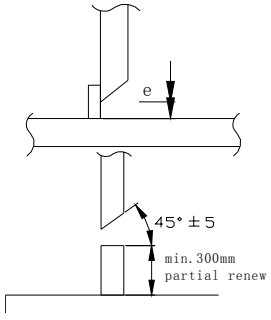
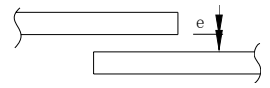
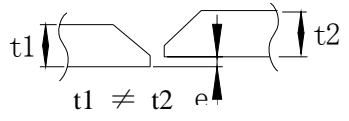
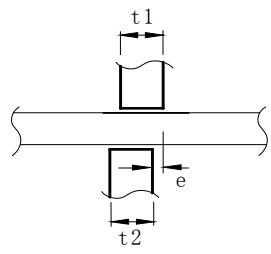
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2) Assembly and Fit Up Inspection Standard

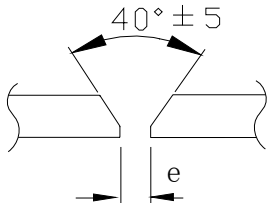
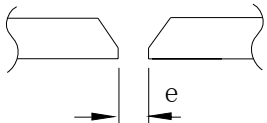
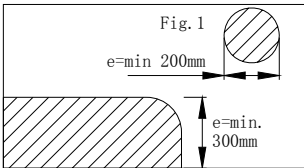
Unit: mm

Item	Figure	Standard Range	Tolerance Limits	Remark
Gap before welding of fillet welding joint		$e < 3$	1) $3 < e \leq 5$ 2) $5 < e \leq 16$ 3) $e > 16$	1) When $3 < e \leq 5$: the welding leg length to be increase of gap opening exceeds 3mm. 2) When $5 < e \leq 16$: welding with bevel preparation to make bevel edge of web to $45^\circ \pm 5$ attach backing strip and remove it after welding. The opposite side will be gouged before welding. 3) When $e > 16$: partial renew.
Gap for Lap joint (collar plate etc)		$e \leq 2$	$e \leq 3$	The leg length of fillet weld shall be increased with the increase of root opening
Misalignment in blocks & section joint. (F/F butt joint, h/cover top plate etc)		$e \leq 0.2t1$	- Strength members: $e \leq 0.15t1$ (max.3mm) - others: $a \leq 0.2t1$ (max.3mm)	The plates are to be adjusted.
Misalignment between compartments on each side of through going compartment.	 $t1 \neq t2$	$e \leq 2\text{mm}$	- Strength members: $e \leq t1/3$ - Others: $e \leq t1/2$	1) $t1/3 \leq e \leq t1/2$: (in case of strength member) the weld throat to be increased by 10% of misaligned amount. 2) $e > t1/2$: Position to be adjusted. Adjustment length $L \geq 50 \times e$

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Item	Figure	Standard Range	Tolerance Limits	Remark
Root Opening (FCAW)			$3.4 < e \leq 11.4$	<p>- $11.4 < e \leq 25$ Build-up edge with backing strip or flat type of ceramic backing material to keep the gap within 5~8mm (to make flush bead by grinding).</p> <p>- $e \geq 25$: partial renew</p>
Root Opening (One side SAW)			$0 \leq e \leq 3$	<p>- $3 < e \leq 8$: First or second pass by FCAW with ceramic backing.</p> <p>- $8 < e$: Refitting or re-preparation after build-up</p>
Renewal of Inserting	 <p style="text-align: center;">Fig.2</p>		<p>1) Fig.1 $\geq 200\text{mm}$</p> <p>2) Fig.2 $\geq 300\text{mm}$</p>	<p>1) In case of Fig.1: Hole diameter to be not less than 200mm</p> <p>2) In case of Fig. 2: Hole width to be not less than 300mm</p>

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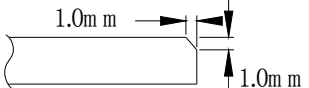
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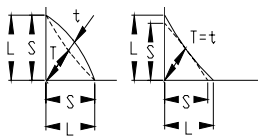
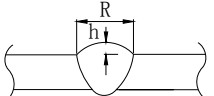
3) Welding Inspection

(1) Nondestructive testing for welding joints should be performed by qualified personnel in accordance with NDT procedure.

(2) Inspection Item

	Item	Description	Measuring instrument
Before Welding	Beveling	Angle, cleanness, notch	Welding gauge
	Root gap	Fillet joint & butt joint	Scale , gap gauge
	Tack weld	Welding size and defect	Visual inspection
During/After Welding	Welding condition	W.P.S	Ampere meter, temperature gauge
	Visual	Welding size, defects, appearance, spatter, primer coating	Welding gauge, lantern
	Non-Destructive Testing	Internal & external welding defect	U.T, M.T or P.T
	Edge grinding		Visual & bare hand Condition : 1C

(3) Welding Inspection Standard

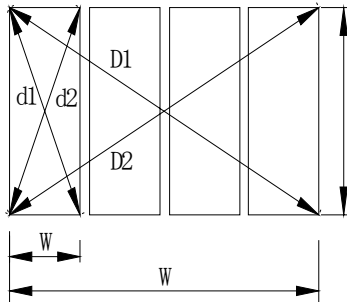
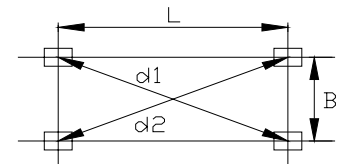
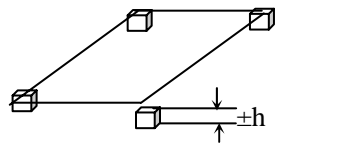
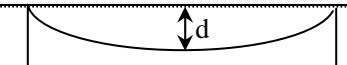
Item	Figure	Standard	Tolerance Limits	Remark
Leg length and throat for fillet weld			$L \geq L_0$ $T \geq T_0$ If $0.9L_0 \leq L < L_0$ or $0.9T_0 \leq T < T_0$, the extent is to be less than 10%	L_0 : Designed leg length T_0 : Designed throat
Height of reinforcement of butt weld			$h \leq 0.2R$	Max. h = 6

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4) Accuracy Inspection

ITEM	FIGURE	TOLERANCE LIMITS	REMARK
Overall dimension of panel		<ul style="list-style-type: none"> - 1000 ~2000mm: ± 4 mm - ~4000mm: ± 6 mm - ~8000mm: ± 8 mm - ~12000mm: ± 10 mm - ~16000mm: ± 12 mm 	<ul style="list-style-type: none"> - Max. allowable tolerance of diagonal: <ul style="list-style-type: none"> • ≤ 10mm / panel $d1 - d2$ • ≤ 13mm / hold $d1 - d2$ - The tolerance to be applied both of panel and hold
		<ul style="list-style-type: none"> - 1000 ~2000mm: ± 4 mm - ~4000mm: ± 6 mm - ~8000mm: ± 8 mm - ~12000mm: ± 10 mm - ~16000mm: ± 12 mm - ~20000mm: ± 8 mm - ~24000mm: ± 10mm - 24000 mm ~ : ± 12 mm 	
Dimension between container sockets		± 4 mm	
		± 2 mm	
		<ul style="list-style-type: none"> - For 20 feet: ≤ 5 mm - For 40 & 45 feet: ≤ 6 mm 	- $ d1 - d2 $
Levels of container sockets		<ul style="list-style-type: none"> - h: max. 4mm • Vertical distance of the fourth point from the plan which is formed by the other 3 points is max. $\pm h$. 	
Level of top plate		$d = \pm 4$ mm	

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ITEM		FIGURE	TOLERANCE LIMITS	REMARK		
Packing holder	Width		+1 ~ -2 mm			
	Flatness		- L < 5000 mm: ± 3 mm - 5000 ~8000 mm: ± 4 mm - 8000 mm ~ : ± 5 mm			
Skirt plate	Straightness (level)		- L < 5000 mm: ± 3 mm - 5000 ~8000 mm: ± 4 mm - 8000 mm ~ : ± 5 mm			
Support pad/mating plate	Level		± 2 mm			
	Inclination		-Trans. Direction: $\leq 5/1000$ -Long. Direction: $\leq 3/1000$			
	Location		± 3.0 mm from MVP	MVP: Main vertical datum plane		
Fitting position			± 3.0 mm	Base line: Datum Line (MVP/CVP) CVP: Cross vertical datum plane		

For More Quality Standards Of Hatch Cover See MSQS (Manxiang Shipbuilding Quality Standard).