



舟山中远船务工程有限公司  
*ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.*



版本 1

REV. 1

## 舟山中远造船质量标准

**Cosco(zhoushan)shpiyard shipbuilding quality standard**

浙江. 舟山中远船务工程有限公司

**ZHE JIANG COSCO (ZHOUSHAN) SHIPYARD CO., LTD**

内控



# 舟山中远船务工程有限公司

## ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.

### 船舶建造质量标准

#### SHIPBUILDING QUALITY STANDARD

#### 总则

#### General

##### 1. 总述

##### Description

1.1 凡按本标准建造的船舶，其施工、检验和试验，除另有规定外，均按合同规定的图样、技术文件和本标准的规定进行。

The operation, inspection and test of the ships, which are fabricated according to this standard, must be carried out according to the drawing described in contract, technical document and this standard if there are no other specific descriptions.

1.2 船级社规定审核的材料，本公司必须具有材料制造厂所提供的船级社认可的质量证书。否则，本公司应按船级社规定的有关要求，在验船师在场的情况下复验合格后才能使用。

The materials must be approved according to classification society requirement. We should have the quality certificate of materials from manufactory and approved by classification society, otherwise the materials can be used after being re-inspection in presence of surveyor according to classification society relation requirement.

1.3 在合同规定的图样、技术文件和本标准中未注明技术要求的产品或零部件，均按中华人民共和国国家标准，或相应的专业标准（部标准）、企业标准的要求或工厂惯例进行。

As for the technological requirement of these products and accessory which not mentioned in the draft and technologic document of contract regulation, then the draft, technologic document and this standard, must be subjected to PRC standard, or relative professional standard (department standard), requirement of enterprise standard and factory convention.

1.4 对各种试验方法，本标准不作详细规定，除另有规定外一般可按工厂的技术文件进行。系泊与航行试验按中华人民共和国国家标准，及船东与验船师认可的系泊机航行试验大纲进行。

The various test methods are not included in this standard. In general, test should be implement according to the technological documents of the factory, except additional requirement. Mooring test and sea trial is to be carried out according to national standard and outline of mooring test and sea trial approved by Owner and supervisor.

1.5 对批量建造的船舶，其倾斜试验、系泊试验及航行试验的项目，在船东和验船师认可的情况下，可从第二艘船起适当减少。

For a set of ships constructions, the items of inclining test, mooring test and sea trial may properly reduce from second vessel under the approval by Owner and supervisor.

##### 2. 检验与建造

##### Inspection and construction

2.1 船东在按本标准规定进行检查、验收时，对本标准未作规定的专用设备的检查、验收，可事先与本公司协商决定。

The Owner takes an inspection and acceptance to the equipment according to this standard, as for the inspection and acceptance of the special equipment that not mentioned in this standard, Owner should discuss to decide with us before inspection and acceptance.

2.2 除规定每周按检验计划执行检验任务外，本公司还可用书面要求船东到场检验，一般应在隔日提出需检验的项目、时间和地点。

We can also ask Owner to be present for inspecting in written, except regular inspection according to inspection plan of weekly. In general, we should supply inspection item, time and place in advance by one day.

船东现场检验期间，本公司应提供所有保证实施检验的条件。

During the inspection in presence of surveyor on the spot, we should ensure the inspection condition in good order.



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船东应在指定的时间和地点进行检验。事先接到本公司检验通知未表示异议，而届时又未到现场，则验船师或本公司验收合格后即认为所检验项目有效。

The inspection should be taken in appointed time and place for owner. If Owner has no objection about the notice sent by us before inspection, but he is absent for the inspection due to himself. So the inspection item will be considered effective after approved by supervisor or us.

2.3 本公司应与船东紧密地联系，向船东提供详细的造船进度、试验项目和试验程序等资料。船东在检验中发现问题，应及时向本公司提出。

We should be frequently touch with Owner. And we should supplied detail progress of ship construction, test item and test procedure etc to Owner. If there are something problems discovered by Owner during inspection. Owner should point it out to us in time

### 3. 转包设备

#### Subcontract equipment

3.1 在规定的检验项目内，对船东选定需要检验的转包设备，本公司应将制造厂预定的试验或检查的时间、地点通知船东。

In regular inspection item, we should notified Owner about the planned test or inspection time and place of the subcontract equipment which are chosen for inspection by Owner.

如果本公司认为制造厂的质量保证体系完善，所提供的设备符合质量要求，则可建议船东免除参加制造厂对所提供设备的试验和检查。但本公司需向船东提供制造厂设备出厂合格证或产品证书。

If the manufactory's quality guarantee system is considered complete and the supplied equipment accod the quality requirement, there is no need for Owner to test and inspect the equipment at the manufactory. In this case, we need to provide certificate or certificate of product at manufactory.

3.2 转包设备应符合船级社规范的要求或相应的国家标准、专业标准（部标准）、企业标准及本标准的规定。

Subcontract equipment should be in accordance with classification society requirement, relative national standard, professional standard (department standard), requirement of enterprise standard and this standard

### 4. 无损检查

#### Non-destructive test

#### 4.1 一般要求

##### General requirement

4.1.1 无损检查的项目，应符合船级社规范、技术规格书和本标准的规定。

Non-destructive test item should be in accordance with classification society rules, technical specification and this standard

4.1.2 船级社规定需作无损检查的材料，原则上应在制造厂进行，并出具有关证书。

The materials are needed to take no-destruction test according to classification society requirement. This test should be taken in the manufactory in principle, and the certificate should be issued at the same time.

4.1.3 对要求作无损检查的物件，凡在图样上没有标注者，船厂可按惯例进行。

If there are no marks on the objects that require to be taken non-destructive test, the shipyard can carry out the test according to the usual practice.

#### 4.2 无损检查要求

##### Requirement of non-destructive test

4.2.1 船厂应按船级社规范及已批准的图样对焊缝进行射线探伤检查。射线探伤标准可按船级社规范或相应标准的规定。

The shipyard should carry out the x-ray defection on welding seam according to classification society rules and approved design. The standard of x-ray defection should in accordance classification society rules or relative standard.

4.2.2 根据需要，可用超声波探伤检查代替射线探伤检查，亦可采用磁粉法、着色渗透法，或其他方法进行探伤检查。

Based on situation, ultrasonic defection may be used instead of x-ray defection. Magnetic test,



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penetration colored and other methods also may be adopted.

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### 第一篇 建造精度

#### Chapter 1 Construction Accuracy

##### 范围

##### Notes

本标准适用于以柴油机为动力常规钢质海船的建造，对于专业性的。特殊用途及内河运输的船舶可参照使用。

This standard applies mainly to the conventional sea-going steel ship driven by diesel plant. The construction of these ships for professional and special use and inland river transport may also reference to this standard.

本标准规定了船体建造、涂装、船体舾装、轮机安装、电气安装、管系等方面的建造精度及质量标准。This standard includes construction accuracy and quality standard of hull construction, painting, hull outfitting, installation of machinery, installation of electricity and piping and so on.

##### 船体建造精度

##### 1. Construction accuracy of hull

##### 通则

##### 1.1 General

本章内容已考虑到对船体强度的保证和生产成本的控制，即提高构件尺寸的精度要由强度和生产成本两个因素来决定。

1.1.1 This chapter bases on the guarantee of hull strengthen and the control of product cost. That is to say, the improvement of members dimension accuracy should be decided on hull strengthens and product cost.

对于专业性和特殊用途的船舶可以协商特定的公差

1.1.2 Negotiation special tolerance on ships for professional and special use

检验要求和质量标准

1.2 Requirement and quality standard of inspection

##### 材料

##### 1.2.1 Material

材料缺陷的限定

1.2.1.1 Limit of material defects

材料缺陷的限定按表 1-1-1。

Material defects are to be kept within the limits as defined in table 1-1-1

表 1-1-1  
Table 1-1-1

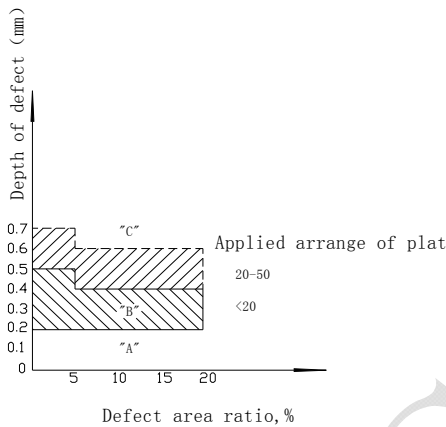
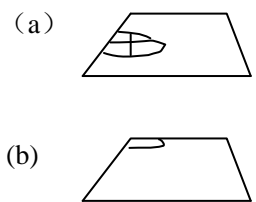
分类 Classify	项 目 Items	说 明 Instruction
钢板表面缺陷（麻点、剥落、结疤、刻痕、气孔） Surface defects of steel plate(Pits, Flaking, Scars, Scratches and Air bubbles)		<p>1. “A” 范围为优良区，只包含有 0.2mm 以下极轻微的不必修整的表面缺陷。</p> <p>1.Zone A is in excellent order, with very slight surface defects less than 0.2mm and no repairing is needed.</p> <p>2. “B” 范围为合格区，包含有一定数量允许存在的表面缺陷，一般不需修整。必要时可作某些修整。在实线内为 20mm 厚度以下的板；虚线内（含直线范围）为 20mm 至 50mm 厚度的板</p> <p>2.Zone B is in good order, with a certain amount of permissible surface defects, and no repairing is needed. Area enclosed by full lines denotes plate with thickness less than 20mm and area enclosed by dotted lines (including straight line) denotes plates with thickness from 20 to 50mm.</p> <p>3. “C” 范围为修整区，即存在某些不允许存在的表面缺陷，必须按规定修整。</p> <p>3.Zone C is in disorder, and repairing is needed, i.e. there are certain amounts of impermissible surface defects that shall be repaired according to the requirement.</p> <p>4. 缺陷修整方法：</p> <p><math>d &lt; 0.07t</math>，磨平（但 <math>d \leq 3\text{mm}</math>）；</p> <p><math>0.07t \leq d \leq 0.2t</math>，焊补后磨平；</p> <p>式中： <math>d</math>—缺陷深度，mm； <math>t</math>—钢板厚度，mm。</p> <p>如果缺陷的深度大于板厚的 20%，面积超过板面积的 2%，则这部分板需按规定进行更换。</p> <p>4.Repairing method for surface defects:</p> <p>For <math>d &lt; 0.07t</math>, by grinding (but in no case <math>d \leq 3\text{mm}</math>)</p> <p>For <math>0.07t \leq d \leq 0.2t</math>, by built-up welding and followed by grinding</p> <p>Where <math>d</math> is depth of defect, mm; <math>t</math> is plate thickness, mm</p> <p>In case the defect depth exceeds 20% plate thickness and defect areas exceed 20% plate area, this part is to be replaced as required.</p>
局部夹层 Local lamination		<p>1. 如 (a) 所示，夹层的范围比较小，可以 批除后再焊补。</p> <p>如 (b) 所示，夹层的范围比较小，且接近钢板表面，则进行焊补。</p> <p>1.In case the range of lamination is fairly small, it can be chipped out and built-up by welding as shown in fig. (a). In case the range of lamination is fairly small and near the plate surface it is preferable to do the built-up welding as shown in fig. (b).</p> <p>2. 在夹层情况比较严重的情况下，必须仔细检验，采取相应的修整方法。</p> <p>2.In case the lamination is servere and defective, it must be carefully examined and repaired by appropriate method.</p> <p>3 如果夹层焊补长度超过钢板边缘长度的 20%，则需用无损探伤检查焊补质量。</p> <p>3.In case the built-up welding length exceeds 20% the edge length of the steel plate, non-destructive inspection is to be done to check the quality.</p>

Table 1-1-1(end)

Classify	Items		Instruction
严重夹层, 需更换钢板的一部分 Severe lamination Require to change part of the plate			1.如果夹层范围相当广泛,则可更换一张钢板的一部分。在个别夹层程度非常严重,且范围广泛,则整张钢板应更换。 1.It is recommended to change part of the plate in case the lamination is fairly extensive. 2.标准规格的钢板需更换的最小宽度或长度: 外板和强力甲板: 在舳 0.6L 区域内为 1600mm; 在舳 0.6L 区域外为 800mm。 其他结构件为 300mm 或板厚的 10 倍,取其大者。 2.Minimum breath or length of the part of standard size plate to be replaced are: For shell plate or strength deck plate: Within 0.6Lamidship:1600mm; Outside 0.6Ladmiship: 800mm。 For other members: 300mm or 10 times plate thickness, whichever greater. The whole plate must be replaced in case the lamination is extremely severe and extensive.
铸钢缺陷 Casting steel defect	表面缺陷 Surface defect	缺陷深度为厚度的 20%或深度为 25mm 以上及长度为 150mm 以上的铸钢件缺陷 In case the depth of defect is over 20% plate thickness or the defect is over 25mm in depth and 150mm length	若发现气泡、裂纹或其他损伤缺陷,清除该缺陷后,应用无损探伤法检查后,采用适当方法进行修补。 Non-destructive test, or at should be done after removing defect. Repaire method is to be taken.
		气孔、裂纹及其他有售缺陷 Air bubbles, cracks and other hazardous defects	

### 1.2.1.2 钢板的厚度负偏差

### 1.2.1.2 Negative thickness tolerance for steel plates

#### 钢板的测厚方法

#### Methods for measuring the thickness of steel plates

钢板的厚度在距离角顶不小于 100mm 和距离钢板边缘不小于 40mm 处测量。钢板的四角及两个横边的中间为必测部位。任何测量点测得的钢板厚度负偏差均不应超过表 1-1-2 所列的允许负偏差。

The measurement of thickness of steel plates should be taken at these places: no more than 100mm from top corner and no more than 40mm from the edge of steel plate. Four corners and middle of horizontal side of the steel plates are essential parts to be measured. Negative thickness tolerance for steel plates surveyed from any measured point should not more than that defined in table 1-1-2.

表 1-1-2

Table 1-1-2

mm

项 目 Items	要 求 Requirement
船体结构钢板厚度负公差 Negative thickness tolerance for steel plates of hull construction	最大为 0.3mm 0.3mm as max.

### 1.2.1.3 缺陷面积的计算

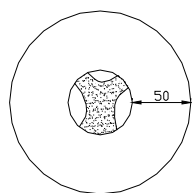
### 1.2.1.3 Calculation for defect area

缺陷面积是指距离边缘 50mm 范围内的影响区面积,见图 1 和 2。

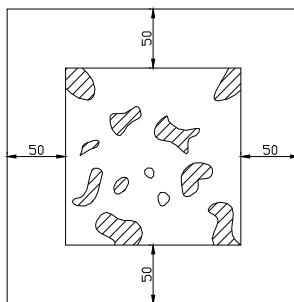
Defect area is the affected area that is 50mm far away from the edge.



See picture 1 and picture 2



Picture1 Isolated point shape defect



Picture2 Accumulated shape defect

孤立点状缺陷面积一般可以近似当作圆形或长方形面积计算，聚集状缺陷可按其组成的几何图形近似为正方形、长方形、三角形、圆形、梯形等面积计算。

Isolated point shape defect area is calculated in similar circle or rectangle. Accumulated shape defect area is calculated in square, rectangle, triangle, circle and trapezium and so on.

### 1.2.1.4 船用型钢

#### 1.2.1.4 Marine steel

船用型钢包括球扁钢、角钢、工字钢、槽钢、扁钢、圆钢、半圆钢、方钢和钢管等，除应符合相应的规定外，其尺度及厚度负偏差均应分别按我国船舶规范和有关的国家标准及冶金专业标准检验。

Marine steel include bulb steel, angle bar, H shape steel, channel steel, flat-bulb steel, round steel, half-round bar steel, square steel and steel pipe and so on should be in accordance with relative regulation, and the negative size and thickness should be in accordance with national ship regulation, national relative standard and the standard of metallurgy field.

型钢表面质量的检验及修整可参照钢板的有关规定执行。

Surface inspection and trim of marine steel should be carried out according to relative regulations on steel plates

### 1.2.2 下料及划线

#### 1.2.2 Cuttings and marking

下料及划线的偏差按表 1-1-3。

The deviation of cuttings and marking is to be kept within the limits as defined in table 1-1-3.

表 1-1-3

Table 1-1-3

mm

分类 Classify	项 目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks
划 线 下 料 Cuttings and marking	下料线条的宽度偏差 Breadth deviation of cuttings line	$\leq 1.0$	$\leq 1.5$	
	中心线、理论线、对合线、检查线、安装位置线的偏差 Deviation of centerline, theoretical line, alignment line, check line and installation position line	$\leq 1.5$	$\leq 2.5$	
	零件下料尺寸偏差 Dimension deviation of members cuttings	长度 Length	$\pm 2.0$	$\pm 3.0$
		宽度 Breadth	$\pm 1.5$	$\pm 2.5$
		对角线 Difference between diagonals	$\pm 2.0$	$\pm 3.0$
		曲线外形 Curved configuration	$\pm 1.5$	$\pm 2.5$
		直线度 Straightness	$l \leq 4m$	$\leq 1.0$
			$4m < l \leq 8m$	$\leq 1.2$
			$l > 8m$	$\leq 2.0$
	角度 Angle	$\pm 1.5$	$\pm 2.0$	指矩形板 For rectangular plate
				指零件的直线边缘 For straight edges of part or member
				以每米计 For every meter



		开孔切口 Cut out, opening	$0 \leq 1.5$	$0 \leq 2.0$	
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1.2.3 分段划线尺寸偏差按表 1-1-4。

1.2.3 Deviation of marking dimension of block structure is to be kept within the limits as defined in table 1-1-4

表 1-1-4

Table 1-1-4

mm

项 目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks
平面分段划线与图样尺寸的偏差 Deviation of marking line of panel block, compared with designed dimension	$\pm 2.5$	$\pm 3.5$	
分段上构件划线位置与图样标注位置的偏差 Deviation of marking line of members on block, compared with designed position			

1.2.4 气割

1.2.4 Gas cutting

气割偏差按表 1-1-5。

Deviation of gas cutting is to be kept within the limits as defined in table 1-1-5.

表 1-1-5

Table 1-1-5

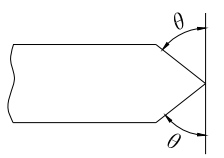
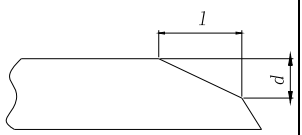
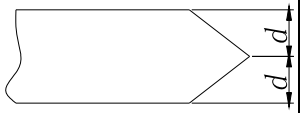
mm

分 类 Classify		气 割 Gas cutting				
		项 目 Items		标准范围 Standard	允许极限 limits	备 注 Remark
气割表面粗糙度 Surface roughness of gas cutting	构件自由边 Free edge of members	Important members	自动、半自动切割 Automatic, semiautomatic cutting	0.10	0.20	1.型钢的机械切割按手工气割 1.For steel section, tolerance of mechanical cutting is the same as those for manual cutting. 2. 除去自由边毛刺 2.Burrs on free edge shall be removed.
			手工切割 Manual cutting	0.15	0.30	
		Secondary members	自动、半自动切割 Automatic, semiautomatic cutting	0.10	0.20	
			手工切割 Manual cutting	0.50	1.00	
	焊接接头 Connecti on of welding	Important members	自动、半自动切割 Automatic, semiautomatic cutting	0.10	0.20	
			手工切割 Manual cutting	0.40	0.80	
		Secondary members	自动、半自动切割 Automatic, semiautomatic cutting	0.10	0.20	
			手工切割 Manual cutting	0.80	1.50	

Table 1-1-5(end)

mm

分 类 Classify		气 割 Gas cutting			
		项 目 Items		项 目 Items	

Notch of gas cutting 气割缺口	Free edges of members 构件自由边	在舫 0.6L 区域内舷顶列板的上缘； 强力甲板以及外板上所有开口的边缘；特别重要的纵材及悬臂梁 Upper edge of sheer strake, strengthen deck, and free edge of opening on shell plate within 0.6L amidship; extremely important longitudinals and cantilever beams		—	无缺口 No notch	1. “缺口”是指大于该表面粗糙度 3 倍的凹口。 1. “notch” is defined as groove 3 times of the surface roughness. 2. 修补方法 2. Repairing methods: a. 用砂轮磨平； b. 必要时可采用堆焊法修补，但必须避免短焊缝 a. Finishing by grinding; b. Bead welding may be applied where required, but short bead is to be carefully avoided.
		重要的纵横强力构件 Important longitudinals and transverses		—	<1.0	
		其 他 Others		—	<3.0	
	焊接接缝边 Weld edge	对接接缝 Butt weld	舫 0.6L 区域内的外板、强力甲板 Shell plate and strength deck within area of 0.6L amidship	—	<2.0	用砂轮或焊补修整缺口。 L 为船长 Notch is to be repaired by grinding or built-up welding. L is ship length.
			其 他 Others	—	<3.0	
		角焊缝 Fillet weld		—	<3.0	
Dimension of gas cutting 气割尺寸	板边缘垂直线度 Straightness of plate edge	自动焊缝 Automatic weld seam		≤0.4	≤0.5	
		半自动焊缝及手工焊缝 Semi-automatic and manual welding seam		≤1.5	≤2.5	
	Dimension of groove 坡口面尺寸	坡口面角度 $\theta$ Angle of groove $\theta$		±2°	±4°	
		过渡段长度 $l$ Length of taper, $l$		±0.5d	±1.0d	
		坡口深度 $d$ Depth of groove, $d$		±1.0	±1.5	
	Dimension of members 构件尺寸	主要构件 Primary members		±2.0	±4.0	例：双层底肋板、桁材等要求较高的构件 For example: For members with high accuracy demand such as floors and grinder, etc. In double bottom
		次要构件 Secondary members		±3.5	±5.0	

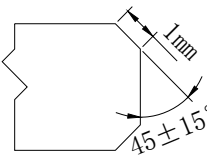
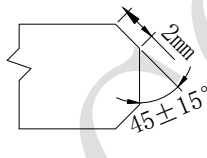

		面板宽度 Breadth of face bar	$\pm 2.0$	$+4.0$ $-3.0$	
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1.2.5 气割边缘打磨要求按表 1-1-6。

1.2.5 Gas cutting edge grinding standard as in table 1-1-6.

Table 1-1-6

mm

项 目 Items	要 求 Requirement	备 注 Remarks
在经以下部位气割边缘打磨到“1G”，压载水舱、艏艉尖舱、货舱（油舱）露天甲板、海水箱 Gas cutting edge grinding up to “1G”, in the area as follow: water ballast, fore/peak tank, cargo (oil hold) hold exposed deck and sea chest	1G) $1\text{mm} \pm 0.5\text{mm}$ 	高应力区域：如：强力甲板开孔和弦顶列板的自由边势按图纸上注明的要求作业。 High stress area such as strength deck. Opening and sheer strake should be done according to the drawing.
在以下部位气割边缘打磨到“2G”，淡水舱、饮水舱、游泳池、蒸馏水舱 Gas cutting edge grinding up to “2G”, in the area as follow: Fresh water tank, portable water tank, swim pool and distilled water tank	2G) $2\text{mm} \pm 0.5\text{mm}$ 	
上述以外区域（无设计要求） Other areas excluding the above (no design requirement)		锐角保留 Remaining acute angle

1.2.6 剪切偏差按表 1-1-7。

1.2.6 Deviation of sheering dimension is to be kept within the limits as defined in table 1-1-7.

Table 1-1-7

mm

项 目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks
构件长度 Length of member	$\pm 3.0$	$\pm 4.0$	
构件宽度 Breadth of member	$\pm 2.0$	$\pm 3.0$	
面板宽度、肋板高度 Breadth of face bar, height of floor	$\pm 2.0$	$\pm 3.0$	
边缘直线度 Straightness of the edge	$\leq 1.0$	$\leq 1.5$	
曲线边缘 Carved edge	$\leq 1.5$	$\leq 2.0$	

1.2.7 刨铣边偏差按表 1-1-8。

1.2.7 Deviation of planed and milled edges is to be kept within the limits as defined in table 1-1-8.

Table 1-1-8

mm

项 目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks
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边缘直线度 Straightness of the edge	$\leq 0.5$	$\leq 1.0$	以 10m 长计 Per 10m in length
坡口面角度 Angle of groove	$\pm 2^\circ$	$\pm 3^\circ$	

### 1.2.8 加工

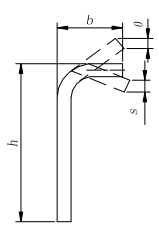
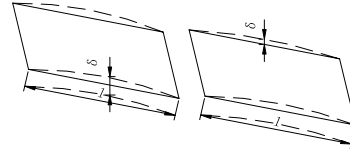
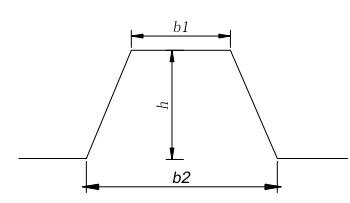
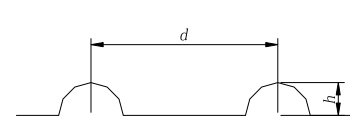
### 1.2.8 Forming

加工偏差按表 1-1-9。

Deviation of forming is to be kept within the limits as defined in table 1-1-9.

Table 1-1-9

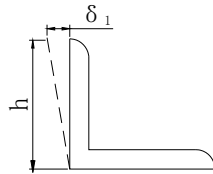
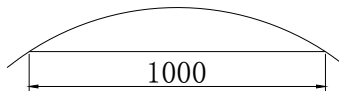
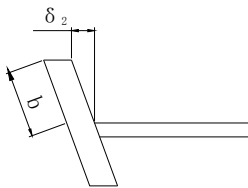
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分类 Classify	加 工 Forming				备 注 Remarks
	项目 Items	标准范围 Standard	允许极限 limits		
折 边 Flange	折边宽度 $b$ Breadth of flange $b$	$\pm 3.0$	$\pm 5.0$		 <p>S is deviation of breadth basic point</p> 
	腹板高度 Depth of web $h$	主要构件 Primary members	$\pm 2.0$	$\pm 3.0$	
		次要构件 Secondary members	$\pm 3.0$	$\pm 5.0$	
	折边角度 $\theta$ Angle of flange, $\theta$	$\pm \frac{2.5}{100} b$ and $\geq 3.0$	$\pm \frac{4.5}{100} b$ and $\geq 5.0$		
	折边方向的直线度 (以每 10m 计) Straightness in the plane of flange (per 10m)	$\leq 10$	$\leq 25$		
	腹板方向的直线度 (以每 10m 计) Straightness in the plate of web (per 10m)	$\leq 10$	$\leq 25$		
Forming plate	Channel plate 槽型板	槽的深度 $h$ Depth of slot, $h$	$\pm 3.0$	$\pm 5.0$	
		槽的宽度 $b1$ 、 $b2$ Breadth of slot, $b1$ 、 $b2$	$\pm 3.0$	$\pm 5.0$	
	Corrugate plate 波型板	波高 $h$ Depth of corrugation $h$	$\pm 3.5$	$\pm 5.0$	
		波型间距 $d$ Pitch of corrugation $d$	有配合时 Connected $\pm 2.0$ 无配合时 Not connected $\pm 6.0$	$\pm 3.0$ $\pm 9.0$	
	Cylinder 圆筒体	直径 Diameter	$\pm \frac{1}{200} D$ but $\pm 5.0$ as max	$\pm \frac{1}{200} D$ but $\pm 7.5$ as max	<p>D——园筒体直径 D——diameter of cylinder</p>
		中心线直线度 Straightness of center line	$\frac{1}{1000}$		
弯 Plate with single	曲面与样板间隙 Gap between curved plated and template	$\leq 2.5$	$\leq 5.0$		每档肋距内 Within each frame spacing

		直线方向三角样板的平面度 Straightness of check line on triangular template	$\leq 2.5$	$\leq 5.0$	每档肋距内 Within each frame spacing
		边缘皱折 Flange of edge	$\leq 2.0$	$\leq 3.0$	
	双弯曲板 Plate with double curvature	与样板上基准线的偏差 Deviation between drawn line and reference line on template	$\pm 2.0$	$\pm 3.0$	
		肋位方向与样箱的空隙 Gap between plate and box template in breadthwise direction	$\leq 4.0$	$\leq 5.0$	
		边缘皱折 Flange of edge	$\pm 2.0$	$\pm 0.4$	
		长度方向与样箱的空隙 Gap between plate and box template in lengthwise direction	$\leq 3.0$	$\leq 5.0$	

Table 1-1-9(end)

mm

分类 Classify		加 工 Forming			备 注 Remarks
		项目 Items	标准范围 Standard	允许极限 limits	
Shape steel and members	Angles 型材	角度偏差 $\delta_1$ ( $h$ 以 100 计) Deviation of angle $\delta$ ( $h$ per100)	$\pm 1.5$	$\pm 2.0$	
		局部弯曲偏差 (以 1m 长计, 相对样板) Deviation of local bending (per 1min length, compared with template)	$\pm 1.0$	$\pm 1.5$	
	Built-up profiles 桁材	弯曲偏差 Deviation of bending	$\pm 2.0$	$\pm 3.0$	以 10m 长计, 相对样板 Per10min length, compared with template
		面板倾斜度 $\delta_2$ ( $b$ 以 100 计) Inclination of face plate $\delta_2$ ( $b$ per100)	$\pm 1.5$	$\pm 3.0$	
机 加工 Machining	刨边 Planed	刨边缘直线度 Straightness of planed	$\leq 0.5$	$\leq 1.0$	
		坡口角度 Angle of groove	$\pm 2^\circ$	$\pm 3^\circ$	
	剪切 Shearing	构件长度 Length of members	$\pm 3.0$	$\pm 4.0$	
		构件宽度 Breadth of members	$\pm 2.0$	$\pm 3.0$	
		面板宽度、肋板高度 Breadth of face plate and height of	$\pm 2.0$	$\pm 3.0$	

		直线边缘 Edge of straight	≤1.0	≤1.5	
		曲线边缘 Edge of curve	≤1.5	≤2.0	

1.2.9 外板弯曲偏差按表 1-1-10。

1.2.9 Bending deviation of shell plates is to be kept within the limits as defined in table 1-1-10.

Table 1-1-10

mm

项目 Items		标准范围 Standard	允许极限 limits	备 注 Remarks
单曲度板 Plate with single curvature	曲面与样板空隙 Gap between curved face and template	≤2.5	≤5.0	每档肋距内 Within each frame space
	三角样板检验线的直线度 Straightness of check line on triangular template			
双曲度板 Plate with double curvature	拉线与样板上基准线的偏差 Deviation between drawn line and reference line on template	±2.0	±3.0	
	肋位方向与样箱的空隙 Gap between plate and box template in breadthwise direction	≤4.0	≤5.0	
	长度方向与样箱的空隙 Gap between plate and box template in lengthwise direction	≤3.0		

1.2.10 加热要求限定按表 1-1-11。

1.2.10 Heating is to be proceeded according to the requirement as defined in table 1-1-11.

Table 1-1-11

mm

项目 Items		标准范围 Standard	允许极限 limits	备 注 Remarks
Maximum heating temperature on surface 表面最高加热温度	高强度钢 Ceq>0.38% High tensile steel Ceq>0.38%	加热后立即水冷时 Water cooling immediately after heating	650℃以下 Under 650℃	碳当量计算公式 $Ceq = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$ Calculation equation for carbon equivalent $Ceq = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5}$
		加热后空气冷却时 Air cooling immediately after heating	900℃以下 Under 900℃	
		加热后空气冷却后再水冷时 Air cooling and subsequent cooling and water after heating	900℃以下空冷下降到 500℃以下水冷 Air cooling under 900℃, water cooling started when below 500℃ 900℃空冷 500℃水冷 900℃(aie-cooled) 500℃(water-cooled)	



高强度钢 Ceq≤0.38% AH、DH 级 High tensile steel Ceq≤0.38% AH、DH	加热后立即水冷却 或空气冷却时 Water or air cooling immediately after heating	1000℃以下 Under 1000℃	1000℃	$+ \frac{Ni + Cu}{15}$
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### 1. 2. 11 装配

#### 1. 2.11 Fixing and assembling

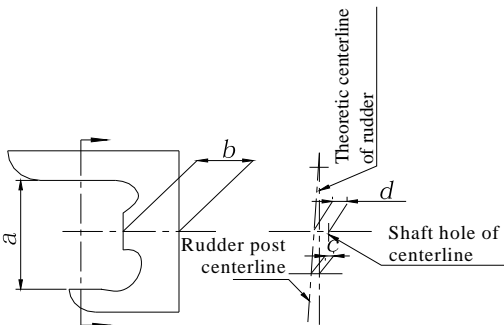
装配偏差按表 1-1-12。

Deviation of fixing and assembling to be in compliance with table 1-1-12

分类 Classify		分段装配 Fixing and assembling				
		项目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks	
制造尺寸 Dimension accuracy of block construction	面与曲面分 Flat block (including flat block and curved block)	1 分段宽度 breadth of sub-assembly	Flat	±4	±6	
			Curved		±8	
		2.分段长度 Length of sub-assembly-	Flat	±4	±6	
			Curved		±8	
		3. 分段正方度 Squareness of sub-assembly	Flat	4	8	指最终划线的对角线 Diagonals of final marking
			Curved	10	15	
	4. 分段扭曲度 Distortion of sub-assembly		10	15	在横梁或桁材面板上测量 Measured on face plates of beam or girder	
	5. 构件安装位置偏差 Position deviation of members installation		±2	±5	超差者拆装 Those exceeding limit are to be refixed.	
	6. 腹板上缘横倾位置偏差 Transverse incline position deviation of upper edge of web plate		±2	±4	超差者拆装 Those exceeding limit are to be refixed.	
	双层底分段 (包括半立体分段) Double bottom block (including cubic block)	上、下平面中心线偏差 Centerline of upper and lower planes		±2	±5	超差者拆装 Those exceeding limit are to be refixed.
		上、下平面肋位线偏差 Frame line of upper and lower planes		±2	±5	超差者拆装 Those exceeding limit are to be refixed.
双层底高度偏差 Height deviation of double bottom			±3	±5	超差者修正内部结构 Internal structure of those exceeding limit are to be modified.	
胎架四角水平度 Levelness of shipway four corners			±4	±6	超差者修正胎架 Shipway of those exceeding limit are to be modified.	
其余项目同平面分段 1、2、3、5 项 Others, same as for those in item 1.2.3.5			—	—	按平面分段偏差标准 According to deviation standard of flat block	

Table 1-1-12(continued)

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分类 Classify		分段装配 Fixing and assembling				
		项目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks	
分段制造尺寸精度 Dimension accuracy of block construction	Block	上、下中心线差 Centerline of upper and lower	Flat block	≤5	≤10	超差者修正 Those exceeding limit are to be modified.
			Curved block	≤7	≤15	
		上、下肋位线差 Frame line of upper and lower	Flat block	≤5	≤10	超差者修正 Those exceeding limit are to be modified.
			Curved block	≤7	≤15	
		分段扭曲度（指大型刚性立体分段） Twist assembly (For large block assembly)	Flat block	10	20	超差者修正 Those exceeding limit are to be modified.
			Curved block	15	25	
		同一水平面结构基准偏差 Height of members at same level	±4	±6	超差者修正 Those exceeding limit are to be modified.	
	两个水平面结构间高度偏差 Height of members at two different levels	±5	±10	超差者修正 Those exceeding limit are to be modified.		
	其它项目同平面分段 5、6 项 Others, same as in item 5.6	—	—	按平面分段偏差标准 According to deviation standard of flat block		
	Block, including stern frame 包括艉柱的立体分段	舵承之间尺寸 <i>a</i> Distance between upper and lower carrier, <i>a</i>	±5	±10		
		轴壳后端与尖舱舱壁距离 <i>b</i> Distance between aft edge of boss and aft peak bulkhead, <i>b</i>				
		分段歪斜 <i>c</i> Inclination of sub-assembly, <i>c</i>	5	10		
		舵柱中心线与轴中心线偏差 <i>d</i> Deviation of rudder post centerline from shaft centerline, <i>d</i>	≤4	≤8		
		其它尺寸 Other dimensions, same as blocks	同立体分段 Compared with block			
	M/E foundation 主机座	基座面板平面度 Flatness of face plate of M/E foundation	≤5	≤10		
		基座面板长度及宽度 Length and breadth of face plate of M/E foundation	±4	±8		
		高度偏差 Deviation of height	±5	±10		
		机座纵桁与中心线的偏差 Deviation between M/E foundation girder and centerline	±4	±6		
		其它尺寸 Others	同立体分段 Compared with block			



# 舟山中远船务工程有限公司

## ZHOU SHAN (COSCO) SHIPYARD CO.,LTD.

Position accuracy of block at erection on shipway 船台合拢时分段定位精度	Double bottom 双层底	分段两端中心线与船台中心线的偏差 Deviation between centerline of both side of block and shipway centerline	$\leq 3$	$\leq 5$	按船底部基准中心线为准 According to bilge reference centerline
		分段两端高度偏差 Height deviation of both sides of block			按标准船台坡度标尺为准 According to standard shipway gradient dimension
		分段两端水平偏差 Levelness deviation of both sides of block	$\pm 6$	$\pm 12$	指包括分段的扭曲 Including twist of block
		大接头肋距 Frame spacing of great joints			

Table 1-1-12(end)

mm

分类 Classify		分段装配 Fixing and assembling			
		项目 Items	标准范围 Standard	允许极限 limits	备 注 Remarks
Position accuracy of block at erection on shipway 船台合拢时分段定位精度	Bow block 艏立体分段	分段中心线与船台中心线的偏差 Deviation between block centerline and shipway centerline	$\leq 2$	3	指底部中心线 Bottom centerline
		艏柱中心线与船台中心线的偏差 Deviation between bow post centerline and shipway centerline	$\leq 10$		指顶部中心线 Top centerline
		分段末端标高偏差 Levelness deviation of block end	$\leq 5$	10	指两端点基线挠度的差值 Deviation of baseline deflection from two end points
		大接头肋距 Frame spacing of great joints	$\pm 10$	$\pm 20$	
	Aft block 艉立体分段	分段末端中心线与船台中心线的偏差 Deviation between centerline of block end and shipway centerline	$\leq 3$	—	指船底末端 End of bilge
		艉轴孔中心线与船台中心线的偏差 Deviation between aft shaft centerline and shipway centerline	$\leq 5$	$\leq 8$	复核尺寸 Check dimension
		舵杆中心线与船台中心的偏差 Deviation between rudder stock and shipway center	$\leq 10$	—	控制尺寸 Control dimension
		分段前后端标高偏差 Levelness deviation of block both ends	$\leq 5$	$\leq 10$	指两端点基线挠度的差值 Deviation of baseline deflection from two end points
		大接头肋距 Frame spacing of great joints	$\pm 10$	$\pm 20$	
	Bulkhead 壁 舱	舱壁高度（纵、横） Height of bulkhead (longitudinal, transverse)	$\pm 4$	$\pm 6$	按中心线处的理论线标高 Leveled according to theoretic line of centerline



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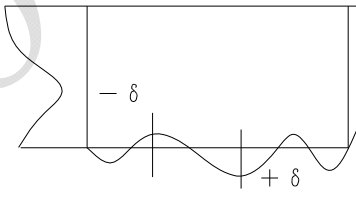
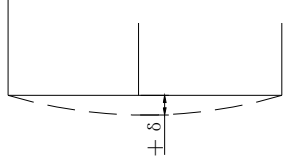
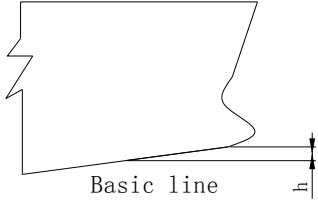
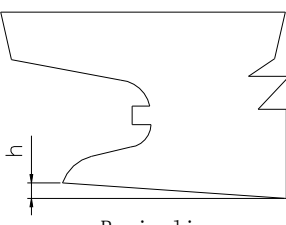
Position accuracy of block at erection on shipway		左右水平偏差 Levelness deviation right/left	$\pm 6$	$\pm 8$	
		垂直度（纵舱壁） Perpendicularity (longitudinal bulkhead)	$<0.1\% h$ and $<10$	$<0.12\% h$ and $<12$	$h$ -舱壁高度 $h$ is the height of bulkhead.
	Side sub-assembly 舷侧分段	高度 Height	$\pm 5$	$\pm 8$	
		肋位重合度 Frame superposition	$\pm 5$	—	指舷侧外的肋位，按双层底上找正的肋位线为准 Frame of the over shell should be based on centering frame line of double bottom
		型宽尺寸（甲板处） Dimension of molded breadth (at deck)	$\pm 3$	—	
		弯曲度 Camber	$\pm 8$	—	
	甲板（包括平台） Deck (including platform)	中心线重合度 Centerline superposition	$\leq 5$	$\leq 8$	
		水平度 Levelness	$\pm 8$	$\pm 12$	
		高度 Height	$\pm 4$	$\pm 6$	
	上层建筑 Superstructure	中心线重合度（与上甲板找正的中线） Centerline superposition (centering with upper deck)	$\leq 4$	$\leq 8$	包括艏楼、艮楼、桅室 Including forecastle, poop, mast room
		四角水平偏差 Levelness deviation of four corners	$\pm 10$	$\pm 15$	包括艏楼、艮楼、桅室 Including forecastle, poop, mast room
		高度 Height	$\pm 10$	$\pm 15$	指甲板间高度 Height of deck room
		合拢肋距 Erection frame distance	$\pm 5$	—	按甲板肋位线为准 According to deck frame lines
	起重柱、雷达架、主桅 Deck crane post, radar frame, main mast	垂直度（中心线上下重合度） Perpendicularity (centerline superposition upper and lower)	$\pm 10$	—	
		垂直线（肋位线上下重合度） Vertical line (frame lines superposition upper and lower)	$\pm 15$	—	
		定位高度 Height of position	$\pm 10$	—	

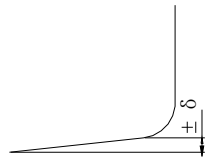
### 1.2.12 Principal dimension

Deviation of principal dimension to be kept within limits as defined in table 1-1-13

Table1-1-13

mm

Table1-1-13 mm Classify		主 尺 度 Principal dimension			
		项目 Items	标准 范围 Standard d	允许 极限 limits	备 注 Remarks
Deviation of principal dimension after finishing hull 船体完工后主尺度偏差	主尺度 Principal dimension	两柱间长 Length between perpendiculars	$\pm 0.1\%$ L	—	L·····设计两柱间长 L·····designed length between perpendiculars
		型宽 Moulded breadth	$\pm 0.1\%$ B	—	B·····设计型宽 B ··· ··· designed moulded breadth
		型深 Moulded length	$\pm 0.1\%$ D	—	D·····设计型深 D ··· ··· designed moulded breadth
	Deformation of hull 船体变形	首尾尖舱之间的全长范围内 Within whole length between fore and aft peak tanks	$\pm 25$	$\pm 35$	
		相邻横舱壁之间 Distance between adjacent transverse bulkhead	$\pm 15$	$\pm 20$	
		艏艉上翘 Warping-up	$\pm 30$	$\pm 40$	
	Deformation of hull 船体变形	艏艉上翘 Warping-up	$\pm 20$	$\pm 30$	

			横 向 上 翘 或 下 垂 Transversely warping-up or sagging-down	±15 (以每 10m 宽 计)(per 10m of breadth )	±25 (以每 10m 宽 计)(per 10m of breadth)	
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### 1.2.13 吃水和干舷

#### 1.2.13 Draft and freeboard marks

吃水和干舷的偏差按表 1-1-14。

Deviation of draft and freeboard mark is to be kept within the limits as defined in table 1-1-14

Table 1-1-14

mm

分类 Classify	项目 Items	标准范围 Standard	允许极限 limits	备注 Remarks
吃水标尺 Draft mark	相对于直尺或样板的 偏差 Deviation regard to the straight ruler and shaping plate	±1.0	±2.0	从龙骨板的下边缘向上 Up from keel plate lower edge
干舷标志 Freeboard mark	相对于直尺或样板的 偏差 Deviation regard to the straight ruler and shaping plate	±1.0	±1.0	从龙骨板的下边缘向上 Up from keel plate lower edge

### 1.2.14 焊接

#### 1.2.14 Welding

1.2.14.1 预热温度限定按表 1-1-15。

1.2.14.1 Preheating temperature is to be kept within the limits as defined in table 1-1-15

Table 1-1-15

mm

项目 Items	允许极限 limits	备注 Remarks
预热温度 1. 高强度钢 2. 低碳钢 Pre-heating temperature 2. High strength steel 3. Mild steel	空气温度 $\leq 0^{\circ}\text{C}$ 空气温度 $\leq -5^{\circ}\text{C}$ Air temperature $\leq 0^{\circ}\text{C}$ Air temperature $\leq -5^{\circ}\text{C}$	按认可的焊接工艺标准进行预热 Preheating according to the approved welding procedure standard.

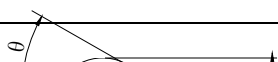
1.2.14.2 焊缝尺寸偏差限定按表 1-1-16。

1.2.14.2 Deviation of seam dimension is to be kept within the limits as defined in table 1-1-16.

Table 1-1-16

mm

项目 Items	标准 Standard	允许极限 Limits	备注 Remarks
焊缝余高 h Height of bead h	H $\leq 3$	H $\leq 4$	




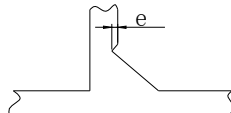


侧面角 $\theta$ Flank angle $\theta$		$0 \leq 40^\circ$	$0 \leq 90^\circ$	
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1.2.14.3 焊缝咬边限定按表 1-1-17。

1.2.14.3 Weld under-cuts are to be kept within the limits as defined in table 1-1-17.

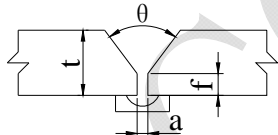
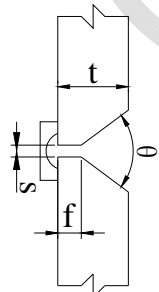
Table 1-1-17

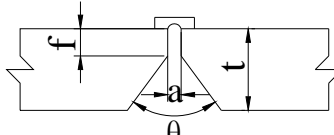
项目 Items		标准 Standard	允许极限 Limits	备注 Remarks
对接焊 Butt weld 	主要构件 Primary members	—	$E \leq 0.5$	1. $e$ 为 0.5~0.8, 如有尖锐咬边, 即使咬边角度大于 $90^\circ$ 也要修整; 2. 角焊缝包头如有尖锐形状要修整。
	次要构件 Second members			
角焊 Fillet weld 		—	$E \leq 0.8$	1. $E$ is between 0.5 to 0.8, the sharp cutting edge is to be repaired even if angle of undercut is larger than $90^\circ$ 2. The sharp configuration of fillet weld is to be repaired.

1.2.14.4 焊缝咬边限定按表 1-1-18。

1.2.14.4 Weld under-cuts are to be kept within the limits as defined in table 1-1-18.

Table 1-1-18

项目 Items	标准 Standard	允许极限 Limits	备注 Remarks
CO <sub>2</sub> 衬垫焊坡口根部间隙 Bevel end gap of CO <sub>2</sub> Back welding  	$\Theta = 30^\circ \sim 45^\circ$ $F = 0 \sim 2$ $A = 8 \pm 4$ $T = \text{plate thickness}$	$\leq 60^\circ$ $\leq 3$ $\leq 20$	1. 当 $20 < a \leq 25$ (最大 1.5t) 时加背垫, 正面单侧成型, 到 $< 20$ 修整后, 再衬垫焊。 2. 当 $a > 25$ 或 $> 1.5t$ 时, 重新装配或换部份材料重新装配。 2. If $20 < a \leq 25$ (max. 1.5t) putting backing the bevel to be welding to gap $< 20$ , then backing welding. 3. If $a > 25$ or $> 1.5t$ , Reassembling or replacing part material.

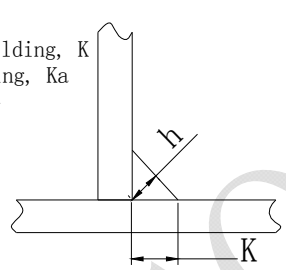
SG <sub>2</sub> 垂直气垫焊 SG <sub>2</sub> Vertical gas welding		$\Theta = 30^{\circ} \sim 45^{\circ}$ $F = 0 \sim 2$ $A = 8 \pm 4$	$\leq 60^{\circ}$ $\leq 3$ $\leq 20$	<p>1. 当 <math>20 &lt; a \leq 25</math> 时, 加钢垫衬, 堆到要求间隙后, 拆除扁钢进行垂直气电焊。</p> <p>2. 当 <math>a &gt; 25</math> 或 <math>&gt; 1.5t</math> 时, 重新装配或割补材料重新装配。</p> <p>1. If <math>20 &lt; a \leq 25</math>, putting steel backing and build-up welding to allowable gap taking off the back, SG2 vertical or replacing part material</p> <p>2. If <math>a &gt; 25</math> or <math>a &gt; 1.5t</math>, reassuming or replacing part material.</p>
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1.2.14.5 角焊缝尺寸偏差限定按表 1-1-19。

1.2.14.5 Deviation of dimension of fillet welds is to be kept within the limits as defined in table 1-1-19.

Table 1-1-19

mm

项目 Items	标准 Standard	允许极限 Limits	备注 Remarks
规定焊角尺寸 K 实际焊角尺寸 Ka 规定焊喉尺寸 H 实际焊喉尺寸 Ha  Specified dimension of welding, K Actual dimension of welding, Ka Specified throat depth, h Actual throat depth, ha  	—	$Ka \geq 0.9K$ $Ha \geq 0.9h$	当焊脚尺寸未达到允许值时, 应用细焊条进行修补。 In case it is not within allowable limits, weld-up over it with fine electrodes is required.

1.2.14.6 短焊缝、定位焊缝、修补焊缝的焊缝长度要求限定按表 1-1-20。

1.2.14.6 Requirement of short bead, tack welding bead and repairing bead are as defined in table 1-1-20.

Table 1-1-20

mm

项 目 Items	标准范围 Standard	允许极限 Limits	备 注 Remarks
500Mpa 级高强度钢 E 级低碳钢 500Mpa high tensile steel Grade E mild steel	—	$\geq 50$	当焊缝长度小于极限值时, 应进行 $100 \pm 25^{\circ}\text{C}$ 预热 In case bead length is less than allowable limits, preheating at $100 \pm 25^{\circ}\text{C}$ is necessary.
低碳钢 Mild steel		$\geq 30$	

1.2.14.7 引弧规定按表 1-1-21。

1.2.14.7 Arc-strike is to be kept within the limits as defined in table 1-1-21.

Table 1-1-21

mm

项 目 Items	标准范围 Standard	允许极限 Allowable limits	备 注 Remarks
500Mpa 级高强度钢、E 级低碳钢、铸钢 500Mpa high strength steel, grade E mild steel and cast steel		不允许 No allowable	若已引弧必须用下述方法修补: a. 在引弧线上面焊补一条 50mm 以上的焊缝; b. 用砂轮磨平硬化部。

			<p>In case arc-strike was made, do repairing as below:</p> <ol style="list-style-type: none"> <li>Weld on a short bead over 5mm on the arc strike.</li> <li>Remove the hardened zone by grinding.</li> </ol>
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1.2.14.8 焊接变形限定按表 1-1-22。

1.2.14.8 Welding joint distortion is to be kept within the limits as defined in table 1-1-22

Table 1-1-22

mm

项 目 Items	标准范围 Standard	允许极限 Allowable limits	备 注 Remarks
舳 0.6L 区域内的 外板 e Shell plate between 0.6 L amidship, e	—	$\leq 6.0$	当超过极限范围时， 可以矫正或割断后再 重新装配焊接
艏艉部的外板 e Shell plate at fore and aft ends, e		$\leq 7.0$	In case it exceeds allowable limits, it is to be repaired or rewelded
其他部位 e Others, e		$\leq 8.0$	after correcting and cutting.

### 1.2.15 修整

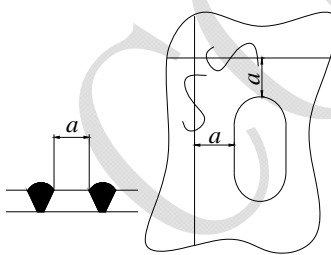
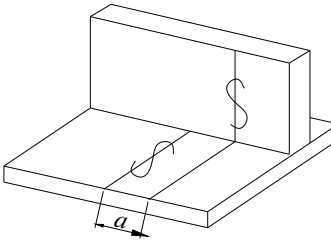
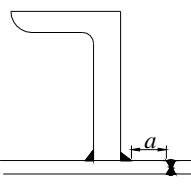
### 1.2.15 Finishing

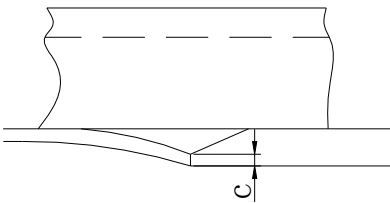
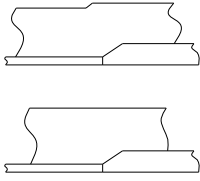
#### 1.2.15.1 焊缝间最小间距限定按表 1-1-23

1.1.15.1 Finishing is to be in compliance with the requirement as defined in table 1-1-23

Table 1-1-23

mm

分类 Classify		修 整 Finishing			
		项 目 Items	标准范围 Standard range	允许极限 Allowable limits	备 注 Remarks
焊 缝 间 距 Between weld seams	对接焊缝之间 Between butt welding		—	$a \geq 100$	
			—	$a \geq 50$	
		主要构件 Important members	—	$a \geq 10$	
		次要构件 Others	—	$a \geq 0$	
		主要构件 Important members	—	$a \geq 5.0$	

			次要构件 Others	—	$a \geq 0$	
构件间隙 Gap between members	板与骨材间隙 Gap between plate and keel material			—	$c \leq 3.0$	当 $c > 3$ 时, 可用下列方法之一进行修整: When $c > 3$ , choosing one of the following methods to adjust: 

### 1.2.15.2 各类焊接接头的装配精度

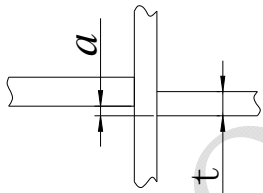
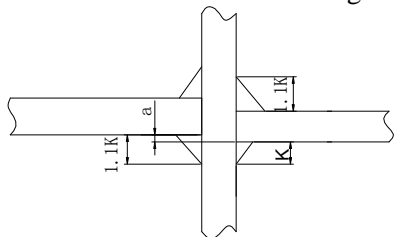
各类焊接接头的装配精度按表 1-1-24。

### 1.2.15.2 Fixing and assembling accuracy of various welding joints

Fixing and assembling accuracy of various welding joints is to be in compliance with the requirement as defined in table 1-1-24

Table 1-1-24

mm

分类 Classify		各类焊接接头的装配精度 Fixing and assembling accuracy of various welding joints			备注 Remarks
		项目 Items	标准范围 Standard range	允许极限 Allowable limits	
角焊接头 Joints of butt welding	十字接头 对中 Alignment of cross joint	 重要结构 (纵总强度受力构件) Primary structure (longitudinal stressed members) $a$ 为错位量; $t$ 为较小的板厚 $a$ is misalignment $t$ is thickness of thinner plate	$a \leq \frac{1}{4} t$	$a \leq \frac{1}{3} t$	当 $t/3 < a \leq t/2$ 时, 应增加焊角, 如下图 1. when $t/3 < a \leq t/2$ , leg length is to be increased as shown on the figure.  2. when $a > t/2$ , joint shall be refixed 当 $a > t/2$ 时, 重新安装
		其他 (受力构件) Others (stressed members)	$a \leq \frac{1}{3} t$	$a \leq \frac{1}{2} t$	超差者修正 Deviation exceeding allowable values is to be modified accordingly.

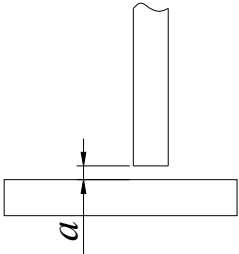
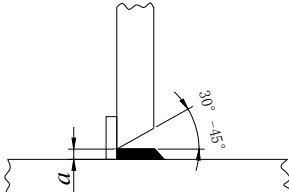
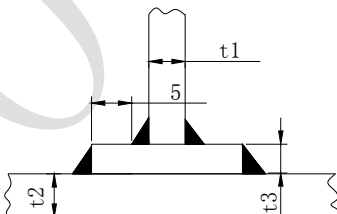
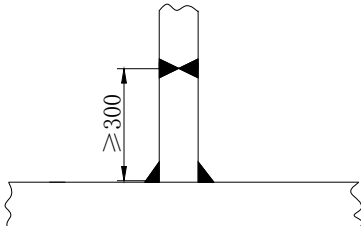
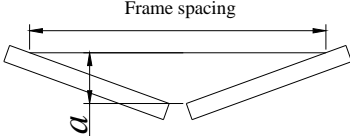
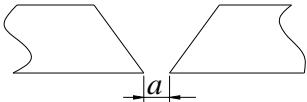
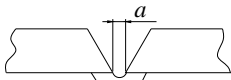
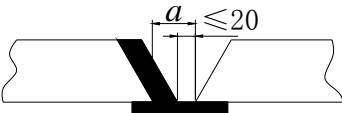
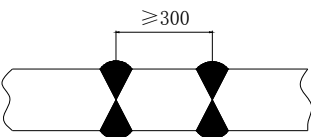
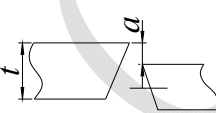
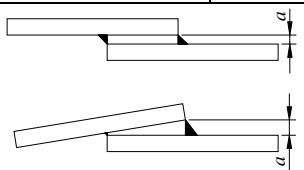
	角焊接头的焊接 Gap between joints of butt welding		$a \leq 2$	$a \leq 3$	<p>超差的修理 Treatment for exceeding allowable limits:</p> <p>1. 当 <math>3 &lt; a \leq 5</math> 时, 加大焊脚尺寸 (<math>a - 2</math>); 1. when <math>3 &lt; a \leq 5</math>, leg length shall be increased by (<math>a - 2</math>);</p> <p>2. 当 <math>5 &lt; a \leq 16</math> 时: 增设衬垫、堆焊。若衬垫拆除, 必须进行封底焊。 when <math>5 &lt; a \leq 16</math>: ① Add liner or do built-up welding. If liner is removed, back-up welding must be adopted.</p>  <p>增设垫板焊接。垫板厚度 <math>t_3</math> 取 <math>t_1 \leq t_3 \leq t_2</math></p> <p>② add pad plate and do welding. The pad thickness <math>t_3</math> shall be <math>t_1 \leq t_3 \leq t_2</math></p>  <p>当 <math>a &gt; 16</math> 时, 换新。割换高度大于等于 300 3. when <math>a &gt; 16</math>, renew the plate, with cutting height <math>\geq 300</math></p> 
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Table 1-1-24(end)

mm

分类 Classify		各类焊接接头的装配精度 Fixing and assembling accuracy of various welding joints			
		项目 Items	标准范围 Standard range	允许极限 Allowable limits	备注 Remarks
对焊接头 Joints of butt welding	对焊接头的平面度 Joints flatness of butt welding	 <p>骨架间距</p>	$a \leq 2$	$a \leq 3$	超差者加工工艺板拉平 Those exceeding allowable limit are to be flattened by adding technological plates.

<p>手工焊接的 跟部间隙 Gap between roots by manual welding</p>		<p>2~3.5</p>	<p><math>a \leq 5.0</math></p>	<p>1.当 <math>5 &lt; a \leq 20</math> 时, 使用 CO<sub>2</sub> 衬垫焊 1.when <math>5 &lt; a \leq 20</math>, CO<sub>2</sub> back welding to be used.</p>  <p>2.当 <math>20 &lt; a \leq 25</math> (最大 1.5t) 2.when <math>20 &lt; a \leq 25</math> (1.5t max) (1) 背面加钢衬垫, 正面单侧成型后再焊主焊缝。 (1) Steel back at backside, welding main seam after forming or front single side. (2) 去除背面钢衬垫后封底焊接 (2) Finish welding after taking off the steel back.</p>  <p>3.当 <math>a &gt; 25</math> 时, 换新部分材料或重新装配 3.when <math>a &gt; 25</math>, renew the plate partially and refit</p> 
<p>对接焊缝的 偏差 Deviation of butt welding*-</p>		<p>主要结构 Primary members</p>	<p><math>a \leq 0.1t</math> (and <math>\leq 3</math>)</p>	<p>超差应重新装配。 <math>a</math> 为错开量; <math>t</math> 为较薄板厚 Deviation exceeding allowable values is to be refixed. “<math>a</math>” is misalignment “<math>t</math>” is thickness of thinner plate</p>
<p>搭接焊接的 尺寸偏差 Gap dimension between lap welding</p>		<p>其他 Others</p>	<p><math>a \leq 0.15t</math> (and <math>\leq 3</math>)</p>	<p><math>a \leq 0.2t</math> (and <math>\leq 3</math>)</p>
				<p>1.当 <math>3 &lt; a \leq 5</math> 时, 增加焊脚尺寸 (<math>a-3</math>); 1.when <math>3 &lt; a \leq 5</math>, leg length is to be increased (<math>a-3</math>); 2.当 <math>a &gt; 5</math> 时, 重新装配。 2.when <math>a &gt; 5</math>, should be refixed.</p>



### 1.2.16 马攀的切割

马攀的切割按表 1-1-25 和表 1-1-26。

### 1.2.16 Finishing of staging sockets and lifting eye pieces

Staging sockets and lifting eyepieces are to be finished according to the requirement as defined in table 1-1-25 and 1-1-26

Table 1-1-25

分类 Classify	脚手架眼板和吊装眼板的修整 Finishing of staging sockets and lifting eye pieces		
	项目 Items	要求 Requirement	备注 Remarks
脚手架眼板 Staging sockets	油水舱里 In water and oil tanks	允许全部留下 May be retained totally	1. 影响外观和通行的吊攀；切除后应修补到与母材表面一样平。 1. After cutting off those lifting eyepieces affecting appearance and passage, the surface is to be finished as flush as the base plate. 2. 其它处可以用气割，允许留有根部，但对强度特别重要的部位，切除后应焊补光顺。 2. Such pieces may be removed by gas cutting at other places, root may be retained, but for parts especially important to strength, built-up welding is to be made to smooth and flushing after cutting.
	机舱里 In engine room	只切除影响外观和通行的耳板 Only those affecting appearance and passage is to be removed	
	货舱里 In cargo hold	只切除下部和舱口围板上的耳板 Only those at lower level and on hatch coaming is to be removed.	
	主甲板和外板上 On exposed part of shell and upper deck, etc	全部切除 To be removed totally	
吊装眼板 Lifting eye pieces	油水舱里 In water and oil tanks	不影响通行的留下 May be retained provide not effecting passage	
	货舱里 In cargo hold	在甲板里侧的允许留 10mm 的根 10mm of root may be retained on backside of deck plate.	
	主甲板和外板上 On exposed part of shell and upper deck, etc	全部切除 To be removed totally	除了固定眼板 Except fixed eyepieces

Table 1-1-26

mm

项目 Items	要求 Requirement	备注 Remarks
需要良好外观的 Where good appearance is required	船壳板、甲板和上层建筑需要批平和光顺，工艺板咬边深度不大于 0.5mm。超出的需焊补打磨光顺。 Outside surface of shell plate, deck and superstructure are to be chipped flush and smooth. Under-cut of technologic pieces may have a depth of 0.5mm. Above this limit, the cut is to be welded over and grinded flush.	舷顶列板、强力甲板的角隅板，工艺板应少设或不设，其咬边应全部焊补磨光 Technologic pieces are not to be fixed or to be kept as less as possible on sheer strakes and on corner plate of strength deck with under-cuts welded over and grinded flush completely.
不需良好外观要求的 Where good appearance is not	舱内部等只批掉特别显眼部位的工艺板。工艺板咬边允许深度 0.5~1, 长度不大于 30，超过者应焊补和修整，但可不批磨 Temporary pieces inside holds and similar places are to be chipped off if they are at particularly conspicuous places. Under-cut may have a depth of	

required	0.5-1.0mm and a length not more than 30mm. Over these limits they are to be welded over and finished, but may be not chipped off and grinded.	
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### 1.2.17 变形

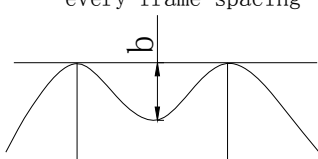
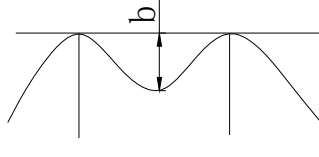
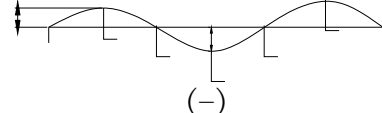
变形偏差按表 1-1-27 和表 1-1-28。

### 1.2.17 Deformation

Deviation of deformation is to be kept within the limits as defined in table 1-1-27 and 1-1-28.

Table 1-1-27

mm

分类 Classify		变形 Deformation			Remarks
		项目 Items	Standard range	Allowable limits	
Local fairness 局部平整	外板 Shell plate	平行舭体 (舷侧板、底板) Parallel midbody (side plate, bottom plate)	$\leq 4$	$\leq 6$	 <p>every frame spacing</p> <p>b is fairness.</p> <p>每档肋位间距, b 平整度</p>
		首尾曲率部分 Fore and aft curved parts	$\leq 5$	$\leq 7$	
	双层底 Double bottom	内底板 Tank top plate	$\leq 4$	$\leq 6$	
Local fairness 局部平整	舱壁 Bulkhead	舱壁 Bulkhead	$\leq 6$	$\leq 8$	 <p>every frame spacing</p> <p>b is fairness.</p> <p>每档肋位间距, b 平整度</p>
	上甲板 Upper deck	平行舭体 (包括纵桁和横结构) Parallel midbody (including longitudinal and transverse structure)	$\leq 4$	$\leq 6$	
		前后部分 Fore and aft parts	$\leq 6$	$\leq 8$	
		非暴露部分 Non-exposed part	$\leq 7$	$\leq 9$	
	二层甲板 Second deck	暴露部分 Exposed part	$\leq 6$	$\leq 8$	
		非暴露部分 Non-exposed part	$\leq 7$	$\leq 9$	
	上建甲板 Superstructure deck	暴露部分 Exposed part	$\leq 4$	$\leq 6$	
		非暴露部分 Non-exposed part	$\leq 7$	$\leq 9$	
	围壁 House walls	暴露部分 Exposed part	$\leq 4$	$\leq 6$	
		两面非暴露部分 Both side of non-exposed part	$\leq 7$	$\leq 9$	
Whole fairness 整体平整度	外板 Shell plate	平行舭体 Parallel midbody	$\pm 2l/1000$	$\pm 3l/1000$	 <p>(+)</p> <p>(-)</p> <p>measuring method : Minimum measuring length <math>l=3m</math> but about 5m for bulkhead and outside wall.</p>
		前后部分 Fore and aft part	$\pm 3l/1000$	$\pm 4l/1000$	
	筒办、平台和内底板 Deck, platform, tank top		$\pm 3l/1000$	$\pm 4l/1000$	
	舱壁板 Bulkhead		$\pm 4l/1000$	$\pm 5l/1000$	
	上建 Superstruc	甲板 Deck	$\pm 3l/1000$	$\pm 4l/1000$	

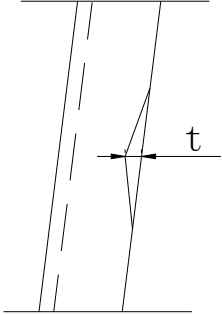
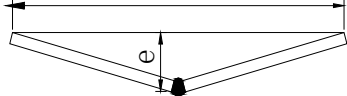
	ture	外围壁板 Outside wall	$\pm 2l/1000$	$\pm 3l/1000$	
	其他 Others		$\pm 5l/1000$	$\pm 6l/1000$	
直线度 Straightness	内部支撑 Internal supports	强横梁、肋板、强肋骨及甲板纵桁等主要构件 Main members, such as strength beam, web frame, floor and deep deck girder.	$\leq 5$	$\leq 8$	 t — flatness. T — 平直度
		纵骨、肋骨、横梁及扶强材等次要构件: 长度 $\geq 1000$ 长度 $< 1000$ Other members, such as longitudinal, frame, beam and stiffener, with length L L $\geq 1000$ L $< 1000$	$\leq 10$ $\leq 5$	$\leq 13$ $\leq 8$	
		甲板间 H 型支柱 H type pillar between decks	$\leq 4$	$\leq 8$	
		其他支撑 Other supports	$\leq 6$	$\leq 10$	

Table 1-1-28

mm

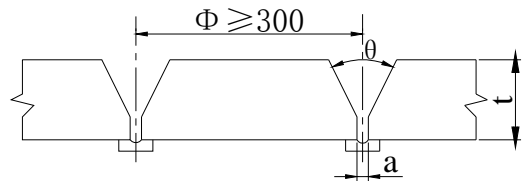
分类 Classify	变形 Deformation			
	项目 Items	标准范围 Standard range	允许极限 Allowable limits	备注 Remarks
焊接接头的 扭曲变形 Distortion of welding joints	船中 0.6L 区域内的 外板 $e$ Shell plate between 0.6L amidship $e$	—	$e \leq 6$	<div></div> <div>1.e is distortion of shell plate in frame span 2. In case it exceeds allowable limits, it is to be repaired or rewelded after correcting and cutting.</div>
	艏艉部外板 $e$ Shell plate $e$ at fore and aft shell plate $e$	—	$e \leq 7$	
	其他 $e$ Other $e$	—	$e \leq 8$	

1.2.18 误开孔处理限定按表 1-1-29。

1.2.18 Holes made erroneously are to be treated according to the requirements as defined in table 1-1-29.

Table 1-1-29

mm

项目 Items		要求 Requirement	备注 Remarks
$\Phi \geq 300$	甲板和外板上的强力构件 Strength members on shell plate and upper deck		<p>A.挖补 A: Repair and weld by insert plate</p> 
	其他 Others		
三角形孔 扇形孔 长方形孔 Triangular opening, scallop, rectangular opening			<p> <math>a=4 \sim 8</math>  <math>\theta = 40^\circ \pm 5^\circ</math>            反面使用陶质衬垫            B: 从结构上切到 <math>\Phi 200</math> 以上孔有困难时, 应采取预热等措施, 用低氢焊条进行焊接, 焊接后应进行 X 射线或超声波探伤检查。            预热温度 <math>\geq 80^\circ\text{C}</math>  <math>A=4 \sim 8</math>  <math>\theta = 40^\circ \pm 5^\circ</math>            Ceramic backing to be used on backside            B: It is difficult from structure point of view to cut an opening over 200 in diameter; it may be processed by low hydrogen electrode after preheating and followed by radiographic examination on ultrasonic inspection.            Preheating temperature <math>\geq 80^\circ\text{C}</math> </p>

1.2.19 嵌补处理限定按表 1-1-30。

1.2.19 Repairing by insert piece is to be done according to the requirements as defined in table 1-1-30.

Table 1-1-30

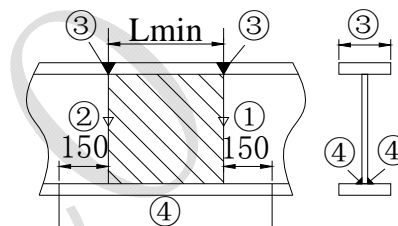
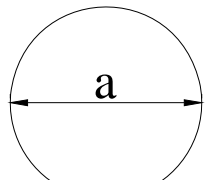
mm

项目 Items		允许极限 Allowable limits	处理方法 Method treatment
挖补修理 Repairing by insert piece	挖补的最小长度 L Minimum length of insert piece, L min	300	
	挖补的最小宽度 B Minimum breadth of insert piece, B min	300	

	挖补最小圆角 R Minimum roundness of insert piece, R min	5 倍的板厚, 但不得小于 100 5times of plate thickness, but $\geq 100$	
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Table 1-1-30(end)

mm

项目 Items	允许极限 Allowable limits	处理方法 Method treatment
组合件的挖补修理 Repairing welding by insert piece for composite unit	挖补的最小长度 L Minimum length of insert piece, L min	焊接顺序 Welding procedure: ①→②→③→④ 
	挖补最小直径 Min diameter round type insert plate	

## 2 涂装

### 2.1 钢材表面预处理

#### 2.1.1 表面处要求按表 1-2-1。

## 2. Painting

### 2.1 Pretreatment of steel surface

2.1.1 Pretreatment of steel surface is to be performed in according with the requirement as defined in table 1-2-1

Table 1-2-1

项目 Items	标准范围 Standard range	备注 Remarks
抛丸处理 Shot blasting	板厚大于 6mm Steel plate of $t \geq 6\text{mm}$	除锈等级 Cleanness Sa2.5 级 Sa2.5class ISO8501-1
	粗糙度 Roughness 中级 Medium class GB/T13288	
	型材大于 4mm Profile of $t \geq 4\text{mm}$	除锈等级 Cleanness Sa2.5 级 Sa2.5class ISO8501-1
	粗糙度 Roughness 中级 Medium class GB/T13288	
喷射处理 Abrasive blasting	钢板 任意规格 Steel plate of any size	除锈等级 Cleanness Sa2.5 级 Sa2.5class ISO8501-1
		粗糙度 Roughness 中级 Medium class GB/T13288

	型材 任意规格 Profile of any size	除锈等级 Cleanness	S <sub>a</sub> 2.5 级 Sa2.5class	ISO8501-1
		粗糙度 Roughness	中级 Medium class	GB/T13288

2.1.2 间底漆涂装要求按表 1-2-2。

2.1.2 Application of shop primer is to be in accordance with the requirement as defined in table 1-2-2

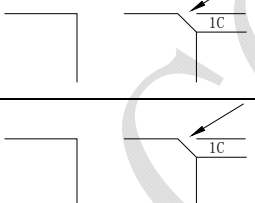

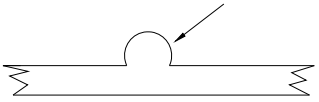
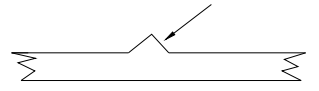
Table 1-2-2

项目 Items		标准范围 Standard range		备注 Remarks
		流水线处理 Assembly line treatment	喷射处理 Abrasive blasting	
涂装种类 Type of paint	含锌底漆 Zinc paint	—	—	船厂按船级社认可，符合船东认可的涂装说明书要求选择 Approved by classification society in accordance with painting scheme approved by shipowner.
	无锌底漆 Zincless paint			
膜厚 Thickness of film	含锌底漆 Zinc paint	根据合同规格书 According to contract specifications	15 μ m~25 μ m	手工流水线操作 Assembly line operation manual

2.2 边缘准备和焊溅物处理按表 1-2-3。

2.2 The preparation of edge and treatment of weld spatter to be in accordance with table 1-2-3.

Table 1-2-3

项目 Items		标准范围 Standard range	备注 Remarks
锐边 Sharpening	(0.5~1.0m inclined plane) 	压载水舱 Ballast water tank	在船体车间进行 1 度打磨 First coat grinding hull workshop.
		淡水舱 Fresh water tank	
		其他 Other areas	同上 Same above
滚边 Rolling	滚边不用机械工具光顺 Rolling to be faired not by power tool.		
焊接飞溅 Weld spatter		用机械设备去除 Spatter to be removed by machine.	
		打磨锐角飞溅 Grinding a sharp angle spatter	

2.3 二次除锈质量要求按表 1-2-4。

2.3 Qualities after secondary derusting are to be in compliance with the requirements as defined in table 1-2-4

Table 1-2-4

工艺阶段 Technological stage	项目 Items			标准范围 Standard range	备注 Remarks
	处理位置 Treatment Position	油漆种类 Paint type	表面处理 Surface treatment		



分段阶段 Block stage	船体各部位车间底漆损伤处如：焊缝区、火工区、自然锈蚀区（除燃油舱外） Shop primer damaged area, such as weld area, line and spot heating area and naturally exposed area (except fuel oil tank)	任何涂料 Any paint	喷射处理 Abrasive blasting	Sa 级按合同说明书规定的各部位的除锈标准 For Sa Class, rusting standard for every position to be in accordance with the contract specification	ISO8501-1
			动力工具处理 Power tool	St 级按合同说明书规定的各部位的除锈标准 For St Class, rusting standard for every position to be in accordance with the contract specification	ISO8501-1
	船体各部位车间底漆完好表 Surface with intact shop primer of hull	任何涂料 Any paint	车间底漆保留，轻度表面清洁 Shop primer retained Slight cleanness on surface	无水份 无盐类 无粉化层 无尘埃 无浮锈 无油脂 No water No salt No scale No dust No rust No grease	
	各类舾装件 Various outfitings	任何涂料 Any paint	喷射处理 Abrasive blasting	Sa <sub>2</sub> class	
			动力工具处理 Power tool	St <sub>2</sub> class	
总装阶段 船坞阶段 系泊阶段 交船阶段 Erection, mooring, docking and delivery	密性焊缝烧损区、碰伤处、燃油舱 Watertightness seam, burning area, collision area, fuel oil tank	任何涂料 Any paint	动力工具处理（除特殊部位按合同说明书规定处理） Power tool (special position to be treated according to contract specification)	St 级按合同说明书规定的部位除锈标准 For St Class, rusting standard for every position to be in accordance with the contract specification	ISO8501-1

注：1）根据所用涂料的要求，规定相应的除锈等级，二次除锈一般不作规定粗糙度的要求，因预处理后的钢板表面已具有相当的粗糙度，并足够达到质量要求。

2）凡属于环氧系列类的涂层在进行除锈处理同时对除锈部位的边缘涂层必须进行拉毛处理。

Note:

- Derusting grade shall be determined according to the requirements of applied paint. Roughness will not be specified for secondary derusting, since the surface of pretreated steel plate has enough roughness to meet the quality requirement.
- For any coating belongs to epoxy series, during the edge of coating in way of derusted position should be roughened.



# 舟山中远船务工程有限公司

## ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.

2.4 涂装前表面清理要求按表 1-2-5。

2.4 Surface cleanliness before painting is to be in appliance with the requirement as defined in table 1-2-5

Table 1-2-5

项目 Items		标准范围 Standard range	允许极限 Allowable limits	备注 Remarks
水分 Moisture	涂装任何油漆 Before applying any paint	肉眼看不 见痕迹 Invisible to naked eye	—	
盐份 Salt	涂装任何油漆 before applying any paint			
油脂 Grease	涂装无机锌油漆 Before applying inorganic zinc paint			
	涂装无机锌油漆以外的油漆 Before applying paints other than inorganic zinc paint	去除 Remove	有痕迹 With trace remained	
尘 Dust	涂装任何油漆 Before applying any paint			
锌盐 Zinc sale	涂装无机锌油漆 Before applying inorganic paint		有轻微痕迹 With slight trace remained	
	涂装无机锌油漆以外的油漆 Before applying paint other than inorganic zinc paint		有痕迹 With trace remained	
气割电焊烟尘 Dust of gas cutting and welding	涂装无机锌油漆 Before applying inorganic zinc paint		有轻微痕迹 With slight trace remained	
	涂装无机锌油漆以外的油漆 Before applying paint other than inorganic zinc paint		有痕迹 With trace remained	
粉笔记号 Chalk marking	涂装无机锌油漆 Before applying inorganic zinc paint		有轻微痕迹 With slight trace remained	
	涂装氯化橡胶、环氧树脂、乙烯树脂、聚氨脂等涂料 Before applying chloridize rubber, paint, epoxy resin paint, vinly resin paint and polyurethane resin paint		有痕迹 With trace remained	
	涂装常规涂料 Before applying conventional paint	基本清除 Remove basically	—	
油漆记号 painting Mark	涂装无机锌涂料 Before applying inorganic zinc paint	清除 Remove	有轻微痕迹 With slight trace remained	
	涂装氯化橡胶、环氧树脂、乙烯树脂、聚氨脂等涂料 Before applying	标记漆与所有涂装的涂料相容 In case the marking paint is compatible	不必除去 Not need to remove	

	chlorinated rubber paint, epoxy resin paint, vinly resin paint and polyurethane resin paint	标记漆与所有涂装的涂料不相容 In case the marking paint is not compatible	清除 Remove		
	涂装常规涂料 Before applying conventional paint		不必除去 Not need to remove		

### 2.5 涂层质量要求

2.5.1 任何部位均不允许存在的缺陷，如开裂、咬底、不干、剥离、露底。

2.5.2 允许存在的涂层缺陷见表 1-2-6

### 2.5 Coating quanlity requirement

2.5.1 No defects such as cracks, pulling up, flaking and holiday could be found on any part of coating.

2.5.2 Defects for any parts allowed in table 1-2-6

Table 1-2-6

Items			Standard arange	Allowed limits	Note
装饰要求高的表面（上层建筑外表面、驾驶室、居住舱室、舱室内通道的外露表面） Surface painting with high decoration requirement (exterior surface of superstructure, exposed sueface of wheelhouse, accommodation cabins and internal passage)	缺陷 Defect	漏涂、气孔、裂纹、干喷雾颗粒 Miss-out painting, bubble cavity, dry particies of paint	无 None	—	
		流挂、刷痕、起皱 Flowtrace, brush mark, ripple	不明显 Not obvious	轻微 Slight	
	颜色 Colour		与规定一致 In comformity with requirement	—	
有一般装饰要求的表面（船体外板、露天甲板、机舱、储舱） Surface painting with certain deccration requirement (shell plating, exposed deck,E/R,stores)	缺陷 Defect	漏涂、气孔、裂纹 Miss-out painting, bubble cavity, crack	无 None	—	
		流挂、起皱 Flowtrace, ripple	不明显 Not obvious	轻微 Slight	
	颜色 Colour		与规定无明显差异 No obviously difference from requiuremnent	—	

无装饰要求的表面(如货舱、液舱、空舱、隔离舱等) Surface without decoration demand (such as cargo hold, liquid tank,void space,compartment and so on)	缺陷 Defects	漏涂、气孔、裂纹 Miss-out painting, bubble cavity, crack	无 None	—	
		流挂、起皱 Flowtrace, ripple	不明显 Not obvious	不严重 Not serious	

2.6 涂装膜厚度偏差按表 1-2-7。

2.6 Film deflection(see table1-2-7)

Table 1-2-7

Items		Standard area	Note
膜厚分布 Distribution of film thickness	85% 以上测点的膜厚 Film thickness of above 85% measurement points	达到规定膜厚 Up to required thickness	成品油轮货油舱涂层应为 90% 以上测点的膜厚达到规定膜厚, 其余测点的膜厚达到规定膜厚的 90% For cargo tank of product tanker, the film thickness at over 90% measured points is to be up to the required film thickness, with thickness at measured points to be up to 90% required thickness.
	其作测点的厚度 Thickness of remaining measurement points	达到规定膜厚的 85% Up ot 85% required thickness	

注：1) 涂装的膜厚按合同说明书。

2) 居住舱室、工作舱、贮物舱、大型舾装件的膜厚由船厂自测记录，船东应予以认可（必要时抽查）。

Note:1)The film thickness of painting is to be according to Specifications.

2) The film thickness of accommadations,working cabins,stores,large scaled outfitings to be recored by shipyard.Owner should give approval (spot-check when necessary).

### 3. 舾装

#### 3.1 舵

3.1.1 舵叶与舵杆制造要求按表 1-3-1。

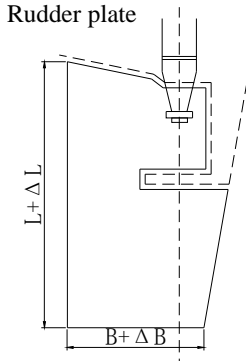
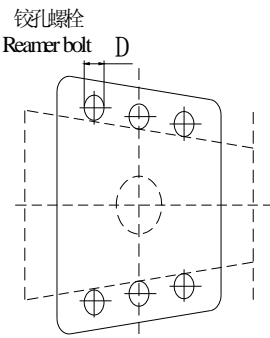
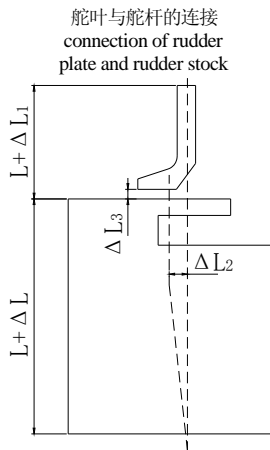
### 3. Outfitting

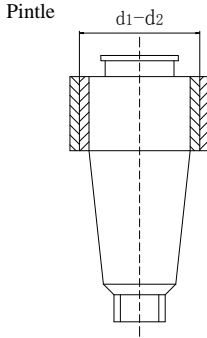
#### 3.1 Rudder

3.1.1 The rudder plate and rudder stock are to be manufactured in accordance with the requirements as defined in table 1-3-1

Table 1-3-1

mm

Items	Standard range	Allowable limits	Remarks
 <p>舵叶</p>	舵叶高度的偏差 $\Delta L$ Deviation of rudder plate height $\Delta L$	$\pm 4.0$	
	舵叶宽度的偏差 $\Delta B$ Deviation of rudder plate width $\Delta B$	+4.0 0	
 <p>铰孔螺栓 Reamer bolt D</p>	螺栓孔的圆度 Roundness of bolt hole	$\leq 0.01$	
	螺栓孔的圆柱度 Cylindricity of bolt hole	$\leq 0.02$	
	螺栓圆度 Roundness of bolt	$\leq 0.01$	
	螺栓的圆柱度 Cylindricity of bolt	$\leq 0.02$	
	螺栓的过盈量 d-D Oversize of bolt d-D	0.005~0.015	>0 “d”是螺栓直径 “d” is bolt diameter D 是孔的直径 D is hole diameter
 <p>舵叶与舵杆的连接 connection of rudder plate and rudder stock</p>	舵杆长度偏差 d-D Deviation of stock length $\Delta L_1$	$\pm 3.0$	
	总长偏差 $\Delta L + \Delta L_1$ Deviation of total length $\Delta L + \Delta L_1$	$\pm 5.0$	
	舵叶与舵杆安装后的中心偏移量 $\Delta L_2$ Offset of centerlines of rudder plate and rudder stock after installation $\Delta L_2$	$\leq 0.25$	$\leq 0.50$
	舵杆与舵叶法兰安装后的间隙 $\Delta L_3$ Clearance between stock and rudder plate flange after installation $\Delta L_3$	$\leq 0.05$	— 0.05mm 塞尺不允许插入 15mm The allowable inserting depth of 0.05 feeler shall not exceed 15mm
	法兰接触面 Contact area of flange	$\geq 70\%$	—

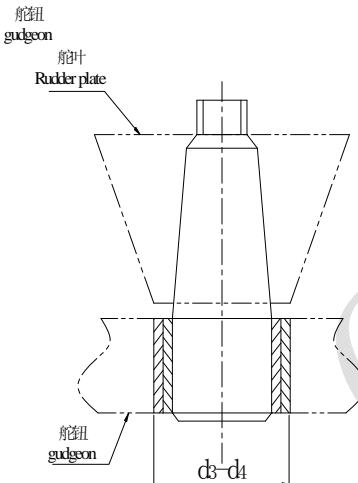
	锥体部分与舵叶的接触面 Contact area between taper part and rudder plate	$\geq 70\%$	无键连接按各国的规范要求 Keyless joint according to all countries' rule requirements
	与不锈钢衬套的过盈量 Oversize of pintle when fitted with stainless steel sleeve, D1-d2	$\frac{(5 \sim 10)d1}{10000}$	d1 是销的直径 d1 is outside diameter of pintle
	与青铜套的过盈量 Oversize of pintle when fitted with bronze sleeve, D1-d2	$\frac{(10 \sim 20)d1}{10000}$	d2 是销孔内径 d2 is inside diameter of pintle hole

3.1.2 舵安装要求按表 1-3-2。

3.1.2 The rudder is to be installed according to the requirements as defined in table 1-3-2

Table1-3-2

mm

Items		Standard range	Allowable limits	Remarks
	与不锈钢衬套过盈量 d3-d4 Oversize when fitted with stainless steel bush d3-d4	0~0.05		d3 为衬套外径 d4 为舵钮内径 d3 is outside diameter of bush d4 is inside diameter of gudgeon
	与青铜衬套过盈量 d3-d4 Oversize when fitted with bronze bush, d3-d4			
	与酚醛树脂衬套过盈量 Oversize when fitted with phenol resin bush, d3-d4			按厂商要求 According to factory
舵柄 Tiller	与舵杆圆柱部分的过盈量 Oversize with cylindric part of rudder stock	$>0$		
	与键的过盈量 Oversize with key	0.005~0.015	$>0$	

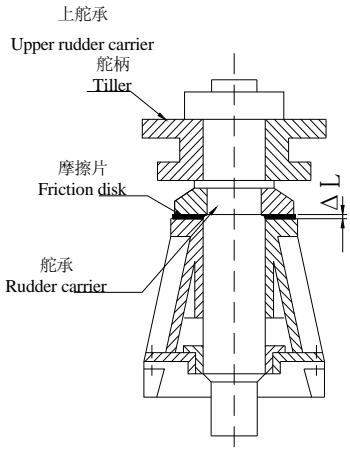
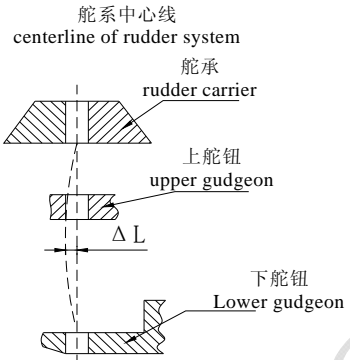
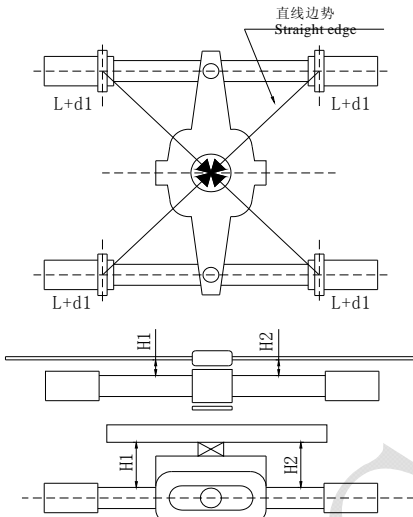
	与舵杆锥体部分接触面 Contact area with rudder stock taper	$\geq 70\%$	无键连接按各国规范要求 Keyless joint according to all countries rule requirements
 <p>上舵承 Upper rudder carrier 舵柄 Tiller 摩擦片 Friction disk 舵承 Rudder carrier</p>	舵承与摩擦片接触面 Contact area between rudder carrier and friction disk	$\geq 50\%$	
	舵承与摩擦片间隙 $\Delta L$ Clearance between rudder carrier and friction disk $\Delta L$	0.05	
 <p>舵系中心线 centerline of rudder system 舵承 rudder carrier 上舵钮 upper gudgeon <math>\Delta L</math> 下舵钮 Lower gudgeon</p>	舵承、上舵钮、下舵钮镗孔后中心线偏差(包括首尾方向及左右方向) $\Delta L$ Deviation of centerline for rudder carriers upper and lower gudgeons after boring(in both fore and aft direction and athwartship) $\Delta L$	$\leq 0.5$	$\leq 0.6$

Table1-3-2(end)

mm

项目 Item		标准范围 Standrad arange	允许极限 Allowed Limit	备注 Remak
柱塞式 Plunger type	铰制螺栓过盈量 Interference of reamer bolt	0.01	0	
	柱塞液压缸同轴度和位置度 Coaxial and position errors of plunger hydraulic cylinder	$\leq 10/100$	气缸间隙 75% 以内 Cylinder clearance within 75%	
	安装的刚性联轴节校中 Alignment of assembled rigid coupling	径向 Radial	不做规定 Not specified	
		轴向 Axial		
转翼式 Rotating vane type	舵杆与舵机轴套的锥形区域的表面接触比 Surface contact ratio of rudder stock with the shaft liner cone area of steering gear	$\geq 60\%$		



	舵杆顶端螺母过盈量压痕长度 Length of interference press trace of top end nut of rudder stock		0.6~1.0	不做规定 Not specified	压痕长度按制造厂技术文件规定 Length of press trace is to be in accordance with technical document of manufacturer
	液压泵联轴节校中 Alignment of couplings of hydraulic pump	径向 Radial	≤0.07		
		轴向 Axial	≤0.05		
垫片 Liner	接触比 Contact ratio		≥60%	≥50%	
	基座间隙 Bed frame clearance		≤0.05	Not specified	0.05 塞尺插入深度不大于 10mm Inserting depth of 0.05 feeler is to be not more than 10mm
Alignment 对中					
			$ d1  \leq 2$  $ H1-H2  \leq 0.15$		

### 3.2 甲板机械

#### 3.2 Deck machinery

##### 3.2.1 分类

##### 3.2.1 Category

###### (1) A 级: 锚机

在拧紧底脚螺丝之后, 要用榔头敲击检查垫块的坚固, 确认 0.05mm 厚塞尺插入深度不大于 10mm。

###### (1) A: Windlass

Tightness of chock liner shall be checked by hammering after tightening the holding down bolts and confirming that a feeler gauge of 0.05mm thickness should not insert more than 10mm.

###### (2) B 级: 尾绞盘和货物绞盘

在安装完工之后, 要用榔头敲击检查底脚螺丝的坚固。

###### (2) B class: Stern winch and cargo winch

Tightness of holding down bolts shall be checked by hammering after installation is completed.

###### (3) C 级: 不在 A 级或 B 级内的其它机器

在安装完工之后, 要用榔头敲击检查底脚螺丝的坚固。

###### (3) Class: Other machineries not in group A or B.

Tightness of holding down bolts shall be checked by hammering after installation is completed.

3.2.2 安装按表 1-3-3。

3.2.2 Installation of deck machinery is to be in accordance with the requirement as defined in table 1-3-3.

Table 1-3-3

mm

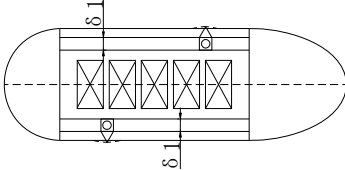
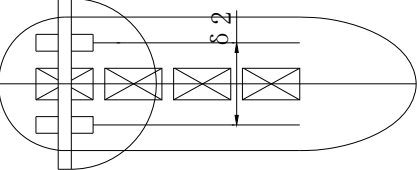
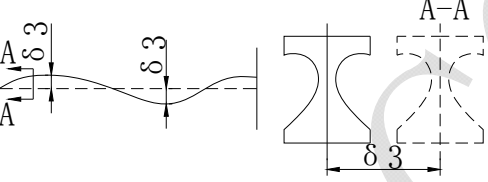
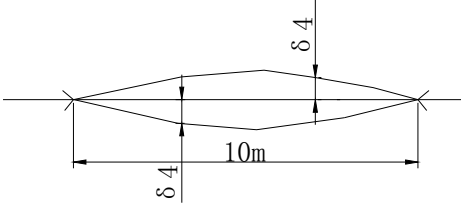
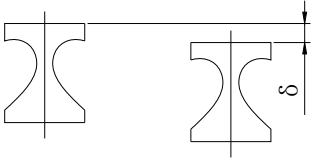
Items			Standard range	Allowable limits	Remarks
甲板机械 分类 Category of deck machinery	A	绞缆机、起锚机、起锚绞盘 Winch, windlass, anchor captain	—	—	
	B	系泊绞车、起货绞车 Mooring winch, cargo winch			
	C	未列入 A 类、B 类的其他机械 Machinery other than those of class A and class B			
垫片 Liner	外倾斜度 Outward taper		1: 100	1: 50	
	表面粗糙度 Ra 值 Surface roughness Ra		0.0036	0.0125	
	厚度 Thickness	A、B 类 Class A, B	≥12	—	
		表面粗糙度 Ra 值 Surface roughness Ra	2 片 2 pieces	3 片 3 pieces	不允许半片补垫 Half liner is not allowed
安装 Installation	垫片与基座 间间隙 Clearance between liner and bed frame	Class A	≤0.06	≤0.10	塞尺允许插入深度不大于 10 Allowable insert depth of feeler is not more than 10
		Class B	≤0.10	—	
		Class C	不作规定 Not specified	—	
	垫片间接触比 Contact ratio between liners	Class A	≥60%	≥50%	
		Class B	≥50%	≥40%	
		Class C	不作规定 Not specified	不作规定 Not specified	
	紧固和锁紧螺母数 Number of fastening and locking nuts	Class A	2	—	
		Class B	2	—	
		Class C	不作规定 Not specified	—	

### 3.2.3 甲板行车安装按表 1-3-4

3.2.3 The installation of deck travelling cranes should be in compliance with the requirement as defined in table 1-3-4

Table 1-3-4

mm

Items	Standard range	Remarks
导轨中心间距离（普通型） Difference between centers of rails (common type) 	$\delta 1 \pm 5$	
导轨中心间距离（普通型） Difference between centers of rails ( Gantray type) 	$\delta 1 \pm 5$	
导轨直线性（纵向） Straightness (longitudinal) of rail 	$\delta 3 \pm 5$	
直线性（导轨顶端面水平） Straightness (level of rail top surface) of rail 	$\delta 4 \pm 5$	
左、右舷之间高度偏差 Difference of height between port and stb'd 	$\delta \leq 8$	

### 3.3 货舱舱口盖

#### 3.3 Cargo holds hatchcover

##### 3.3.1 舱口盖制造要求按表 1-3-5。

3.3.1 The manufacturing of hatchcover is to be in accordance with the requirements as defined in table1-3-5

Table1-3-5 mm

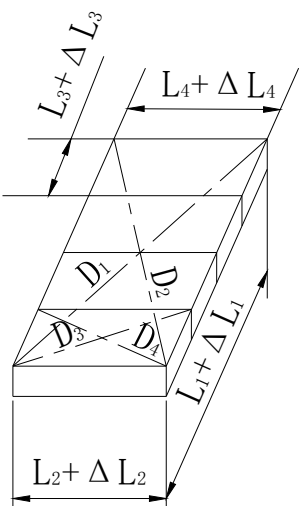
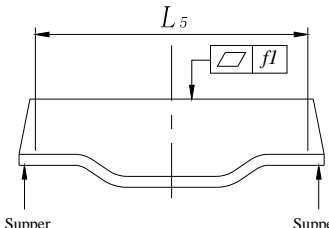
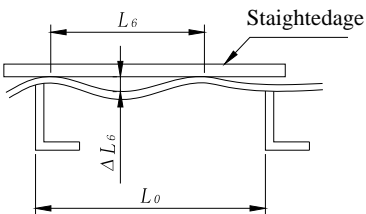
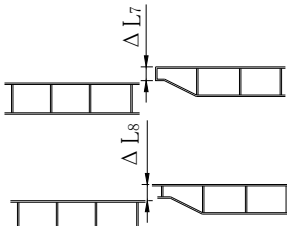
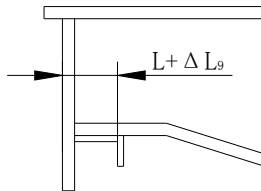
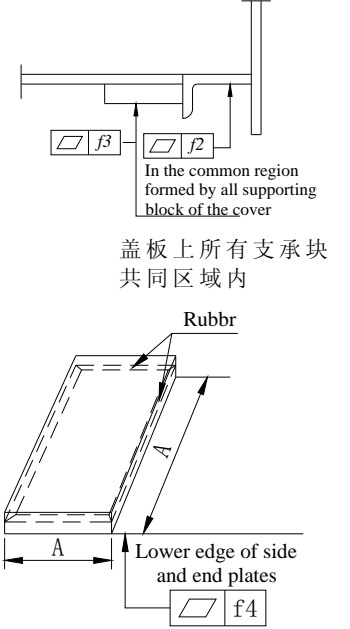
Items				Standard range	Allowable limits	Remarks	
	$L_1$ or $L_3$ or $L_4$	$>1000\sim2000$	$\Delta L_1$ or $\Delta L_3$ or $\Delta L_4$	$\pm 3$	$\pm 4$	整 舱 长 度 为 $L_1$ , 整 舱 宽 度 为 $L_2$ , 单 块 长 度 为 $L_3$ , 单 块 宽 度 为 $L_4$ Length of whole cover $L_1$ , breadth of whole cover $L_2$ , length of single panel $L_3$ , breadth of single panel $L_4$	
		$>2000\sim4000$		$\pm 4$	$\pm 5$		
		$>4000\sim8000$		$\pm 5$	$\pm 6$		
		$>8000\sim12000$		$\pm 6$	$\pm 7$		
		$>12000\sim16000$		$\pm 7$	$\pm 8$		
		$>16000\sim20000$		$\pm 8$	$\pm 9$		
		$>20000\sim24000$		$\pm 9$	$\pm 10$		
		$>24000\sim28000$					
		$>28000$					
	$L_2$	$\Delta L_2$	$>1000\sim2000$	$\pm 3$	$\pm 4$		
			$>2000\sim4000$	$\pm 5$	$\pm 6$		
			$>4000\sim8000$	$\pm 7$	$\pm 8$		
			$>8000\sim12000$	$\pm 9$	$\pm 10$		
			$>12000\sim16000$	$\pm 11$	$\pm 12$		
			$>16000\sim20000$	$\pm 13$	$\pm 14$		
			$>20000\sim24000$	$\pm 15$	$\pm 16$		
			$>24000\sim28000$	$\pm 16$	$\pm 17$		
			$>28000$				
	$L_1$ or $L_2$ or $L_3$ or $L_4$	$D_1-D_2$ or $D_3-D_4$	$>1000\sim2000$	$\pm 6$	$\pm 8$	$L_1, L_3$ 或 $L_2, L_4$ 取 小 者 $L_1, L_3$ or $L_2, L_4$ whichever smaller	
			$>2000\sim4000$	$\pm 7$	$\pm 9$		
			$>4000\sim8000$	$\pm 8$	$\pm 10$		
			$>8000\sim12000$	$\pm 10$	$\pm 12$		
			$>12000\sim16000$	$\pm 11$	$\pm 13$		
			$>16000\sim20000$	$\pm 12$	$\pm 14$		
			$>20000\sim24000$	$\pm 13$	$\pm 15$		
			$>24000\sim28000$	$\pm 14$	$\pm 16$		
			$>28000$				
单块盖板平面度 (即诸梁共同区域的变形) Planeness of single cover panel (i.e. deformation of the region formed by girders within the panel) 	Max length of the girders of the panel $L_5$ 盖板诸梁最大长度	$\leq 5000$	$f_1$	$\leq 3$	$\leq 5$	测量必须象在实船上一样的支承状态 The measuring shall be done at the supported condition as that on board the ship	
		$> 5000\sim15000$		$\leq 6$	$\leq 8$		
		$> 15000\sim25000$		$\leq 10$	$\leq 12$		

Table1-3-5(end)

mm

Items				Standard range	Allowable limits	Remarks
顶板局部变形 Local deformation of top plate 	$L_6$  ( $t=7\sim9$ )	$\leq 400$	$\Delta L_6$	$\leq 3$	$\leq 4$	两接触点之间的测量间距 $L_6$ 大于扶强材间距 $L_0$ 时, 应取 $L_0$ 值 In case the measuring distance $L_6$ between two Contact points is larger than the distance $L_0$ between the stiffeners the $L_0$ value shall be adopted.
		$> 400\sim 600$		$\leq 4$	$\leq 5$	
		$> 600\sim 800$		$\leq 5$	$\leq 6$	
		$> 800\sim 1000$		$\leq 6$	$\leq 7$	
		$> 1000\sim 1200$		$\leq 7$	$\leq 8$	
	$L_6$  ( $t=10\sim 12$ )	$\leq 400$	$\Delta L_6$	$\leq 3$	$\leq 3$	
		$> 400\sim 600$		$\leq 3$	$\leq 4$	
		$> 600\sim 800$		$\leq 4$	$\leq 5$	
		$> 800\sim 1000$		$\leq 5$	$\leq 6$	
		$> 1000\sim 1200$		$\leq 6$	$\leq 7$	
顶板高低尺寸偏差 Elevations of adjacent plates  $\Delta L_7$ —有桁材支承处顶板高低 $\Delta L_7$ —elevation of top plates at place supported by girder $\Delta L_8$ —无支承边缘处顶板高低 $\Delta L_8$ —elevation of top plates at place without girder supporting	普通货船舱口盖 Conventional hatchcover		$\Delta L_7$	$\leq 6$	$\leq 7$	
			$\Delta L_8$	$\leq 3$	$\leq 4$	
	Hatchcover for carrying evenly loaded container and hatchcover for tweendeck of reefer with wooden gratings		$\Delta L_7$	$\leq 4$	$\leq 5$	
			$\Delta L_8$	$\leq 2$	$\leq 3$	
	装载作为均布负荷的集装箱舱口盖以及冷藏船铺木格栅的中间甲板舱口盖 Hatchcover for tweendeck in paper product cargo hold		$\Delta L_7$	$\leq 1$	$\leq 2$	
			$\Delta L_8$	$\leq 1$	$\leq 2$	
四周橡皮槽尺寸偏差及平面度 Size deviation of rubber packing slot at perirhery 	$\Delta L_9$			—	$\pm 1$	
	开式结构 A Open type structure A	$\leq 3000$	$f_2$	$\leq 2$	$\leq 3$	
			$f_3$	$\leq 2$	$\leq 2$	
		$> 3000\sim 7000$	$f_2$	$\leq 3$	$\leq 4$	
			$f_3$	$\leq 2$	$\leq 3$	
		$> 7000\sim 25000$	$f_2$	$\leq 5$	$\leq 6$	
			$f_3$	$\leq 4$	$\leq 5$	

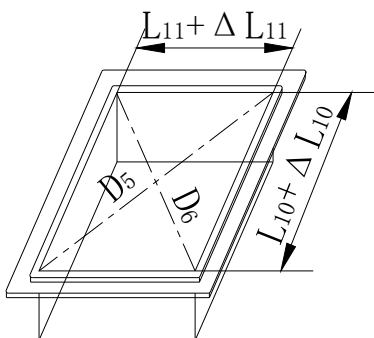
 <p>盖板上所有支承块 共同区域内</p> <p>Rubbr</p> <p>Lower edge of side and end plates</p> <p>侧板, 端板下缘</p> <p>A-侧部或端部橡皮槽 长度</p> <p>A-length of slot at side or end</p>	Close type structure	$f_4$	$\leq 3$	$\leq 4$	
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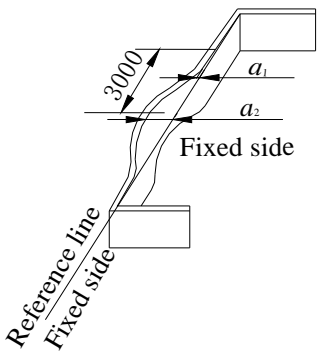
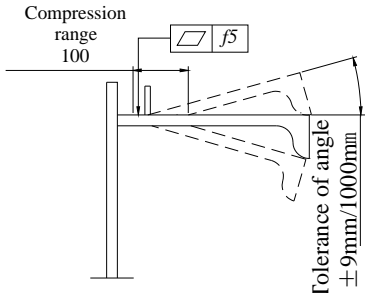
3.3.2 舱口围制造要求按表 1-3-6。

3.3.2 the manufacturing of hatchcover coaming is to be in accordance with the requirements as defined in table 1-3-6

Table1-3-6

mm

Items				Standard range	Allowable limits	Remarks
	长度 或 宽度 L <sub>10</sub> 或 L <sub>11</sub> Lengt h or width L <sub>10</sub> or L <sub>11</sub>	>1000~2000	$\Delta L_{10}$ or $\Delta L_{11}$	$\pm 3$	$\pm 4$	
		>2000~4000		$\pm 5$	$\pm 6$	
		>4000~8000		$\pm 7$	$\pm 8$	
		>8000~12000		$\pm 9$	$\pm 10$	
		>12000~16000		$\pm 11$	$\pm 12$	
		>16000~20000		$\pm 13$	$\pm 14$	
		>20000~24000		$\pm 15$	$\pm 16$	
		>24000~28000		$\pm 16$	$\pm 17$	
		>28000		$\pm 17$	$\pm 18$	
	长度 或 宽度 L <sub>10</sub> 或 L <sub>11</sub> Lengt h or width L <sub>10</sub> or L <sub>11</sub>	>1000~2000	D <sub>5</sub> —D <sub>6</sub>	$\pm 6$	$\pm 8$	
		>2000~4000		$\pm 8$	$\pm 10$	
		>4000~8000		$\pm 11$	$\pm 13$	
		>8000~12000		$\pm 14$	$\pm 16$	
		>12000~16000		$\pm 17$	$\pm 19$	
		>16000~28000		$\pm 20$	$\pm 22$	

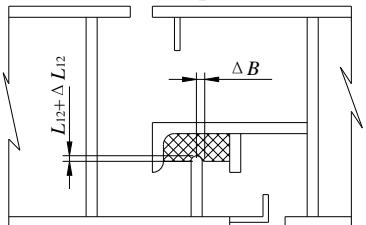
<div>舱口围板直线度</div> <div>Straightness of side coaming</div> <div></div>	$ a_2 - a_1 $			$\leq 4$	$\leq 5$	
<div>舱口围水平面板平面度</div> <div>Levelness of face plate of coaming</div> <div></div> <div>A<sub>1</sub>—压紧条长度</div> <div>A<sub>1</sub>—length of compression bar</div>	后装压紧条(可 调)	$\leq 3000$	$f_5$	$\leq 2$	$\leq 3$	For local measuring, The deviation of levelness shall be kept within 2mm for every length
	Compression bar to be fixed late (adjustable)	$> 3000 \sim 13000$		$\leq 3$	$\leq 4$	
		$> 13000 \sim 28000$		$\leq 4$	$\leq 5$	
	先装压紧条(焊 牢)	$\leq 7000$		$\leq 2$	$\leq 2$	
	Compression bar to be fixed before hand (welded) A <sub>1</sub>	$\leq 28000$		$\leq 2$	$\leq 3$	
	无压紧条(滑移 橡皮)	$\leq 14000$		$\leq 2$	$\leq 3$	
	Without compression bar (sliding rubber)	$\leq 28000$		$\leq 3$	$\leq 4$	

3.3.3 密封橡皮条安装要求按表 1-3-7。

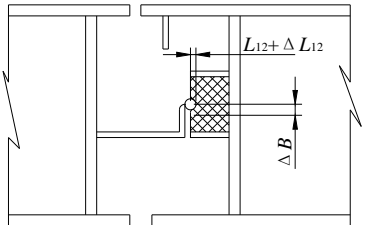
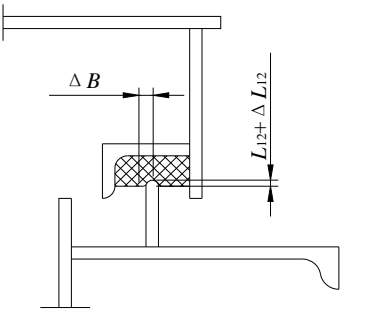
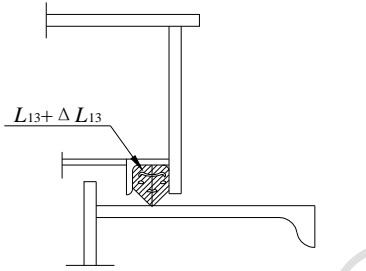
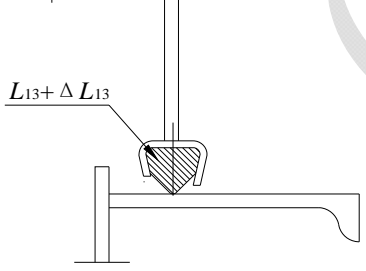
3.3.3 The installation of sealing rubber is to be accordance with the requirement as defined in table 1-3-7

Table 1-3-7

mm

Items				Standard range	Allowable limits	Remarks
压紧条中心及橡皮压缩量偏差 Deviation of compression of rubber and center of compression bar 	矩形泡沫芯橡皮 Rectangular rubber with foamed core	Size 32×71 L <sub>12</sub> =8	$\Delta B$	$\leq 6$	$\leq 7$	橡皮压缩量通常为四分之一的橡皮厚度 The normal rubber compression is one-fourth of rubber thickness.
			$\Delta L_{12}$	$\pm 1$	$\pm 2$	
		Size 40×71 L <sub>12</sub> =10	$\Delta B$	$\leq 6$	$\leq 7$	
			$\Delta L_{12}$	$\pm 2$	$\pm 3$	
		Size 50×93	$\Delta B$	$\leq 8$	$\leq 9$	

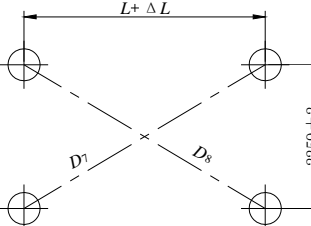
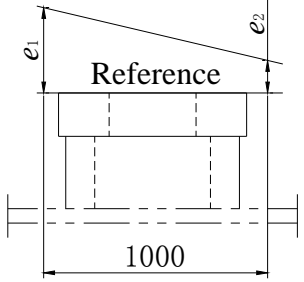
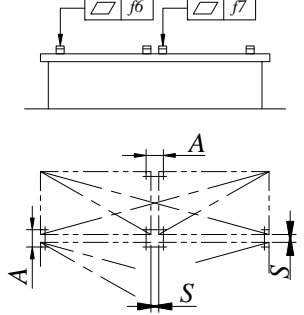


  <p> <math>\Delta B</math>—压紧条与橡皮条中心偏差  <math>\Delta B</math>—center deviation of rubber as against compression bar  <math>L_{12}</math>—橡皮压缩量  <math>L_{12}</math>—compression of rubber  <math>\Delta L_{12}</math>—压缩量偏差  <math>\Delta L_{12}</math>—deviation of compression         </p>		$L_{12}=13$	$\Delta L_{12}$	$\pm 2$	$\pm 3$	
			$\Delta B$	$\leq 11$	$\leq 12$	
		Size 50×120 $L_{12}=13$	$\Delta L_{12}$	$\pm 2$	$\pm 3$	
  <p> <math>L_{13}</math>—橡皮压缩量  <math>L_{13}</math>—compression of rubber  <math>\Delta L_{13}</math>—压缩量偏差  <math>\Delta L_{13}</math>—deviation of compression         </p>	滑梯橡皮 Sliding rubber	空心 Hollow 67×72 $L_{13}=12$	$\Delta L_{13}$	$\pm 6$	$\pm 8$	
		空心 Hollow 60×98 $L_{13}=11$	$\Delta L_{13}$	$\pm 5$	$\pm 7$	
		实心 Solid 57×72 $L_{13}=7$	$\Delta L_{13}$	$\pm 2$	$\pm 3$	

3.3.4 舱盖上集装箱底座安装要求按表 1-3-8。

3.3.4 the installation of container sockets on hatchcover is to be in accordance with the requirements as defined in table 1-3-8

Table 1-3-8

Items				Standard arrange	mm		Remark
					Allowable limits		s
舱盖上集装箱底座偏差 Position deviation of container 	标准箱 Standard container	40ft $L=11985$	$\Delta L$	$\pm 3.0$	$\pm 4.5$		
			$D_7-D_8$	$\pm 5.0$	$\pm 7.0$		
		30ft $L=8918$	$\Delta L$	$\pm 3.0$	$\pm 4.5$		
			$D_7-D_8$	$\pm 6.0$			
	非标箱 Non-standard container	20ft $L=5853$	$\Delta L$	$\pm 4.0$	$\pm 6.0$		
			$D_7-D_8$	$\pm 7.0$			
		49ft $L=14731$	$\Delta L$	$\pm 3.0$	$\pm 4.5$		
			$D_7-D_8$	$\pm 5.0$	$\pm 7.0$		
		45ft $L=13513$	$\Delta L$	$\pm 3.0$	$\pm 4.5$		
			$D_7-D_8$	$\pm 5.0$	$\pm 7.0$		
		24½ft $L=7225$	$\Delta L$	$\pm 3.0$	$\pm 4.5$		
			$D_7-D_8$	$\pm 6.0$			
集装箱底座上表面允许角度偏差 Allowable angular deviation of top surface of container socket 				$e_1-e_2$	—	$\leq \frac{5}{1000}$	
集装箱底座共同区域平面度 Planeness of common region formed by container sockets 	单个集装箱 4 个底座共同区域 Common region formed by 4sockets of a single container				$f_6$	$\leq 4$	$\leq 7$
	20ft 与 40ft 集装箱 8 个底座共同区域 Common region formed by 8sockets of 20ft and 40ft container	中心距 A Center spacing A	203	25	$f_7$	$\leq 4$	$\leq 7$
			216	38		$\leq 4$	$\leq 7$
			258	80		$\leq 6$	$\leq 10$
			279	76		$\leq 6$	$\leq 10$

### 3.4 风雨密关闭设备

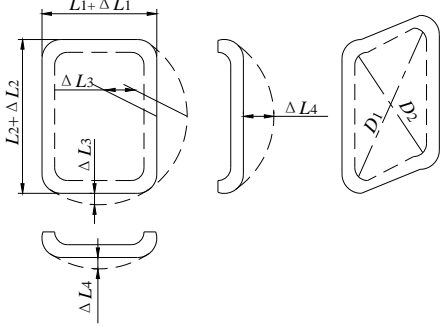
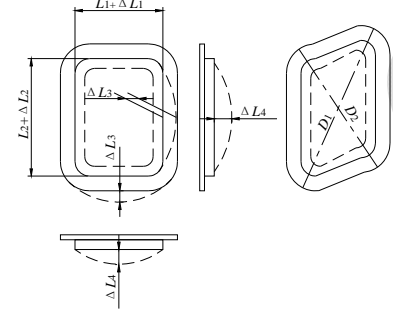
#### 3.4.1 风雨密门制造和安装要求按表 1-3-9

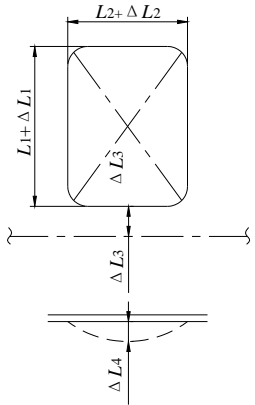
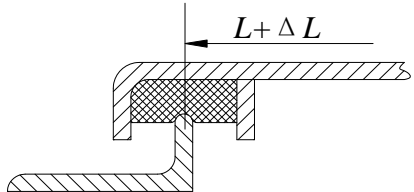
#### 3.4 Weathertight closing devices

3.4.1 the manufacture and installation of Weathertight door is to be in accordance with the requirements as defined in table 1-3-9

Table 1-3-9

mm

Items		Standard range	Allowable limits	Remarks
<b>Door</b> 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 2$	$\pm 4$	
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 5$	$\pm 4$	
	对角线长度 $D_1-D_2$ Difference between lengths of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	扭曲度 Degree of distortion	$\leq 2$	$\leq 3$	扭曲度：两对角线中点之间距离 Degree of distortion is distance between middle points of two diagonals
	直线度 $\Delta L_3$ Straightness $\Delta L_3$	$\leq 1$	$\leq 3$	
	平面度 $\Delta L_4$ planeness $\Delta L_4$	$\leq 1$	$\leq 3$	
<b>门框</b> Door frame 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 2$	$\pm 4$	
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 2$	$\pm 4$	
	对角线长度 $D_1-D_2$ Difference between lengths of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	扭曲度 Degree of distortion	$\leq 2$	$\leq 4$	扭曲度：两对角线中点之间距离 Degree of distortions distortion between middle points of two diagonals
	直线度 $\Delta L_3$ Straightness $\Delta L_3$	$\leq 1$	$\leq 3$	
	平面度 $\Delta L_4$ planeness $\Delta L_4$	$\leq 1$	$\leq 3$	
<b>围壁开孔</b> Wall opening	高度偏差 $\Delta L_1$ Deviation of height $\Delta L_1$	$\pm 4$	$\pm 6$	

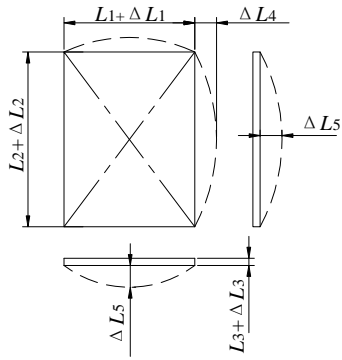
	宽度偏差 $\Delta L_2$ Deviation of breadth $\Delta L_2$	$\pm 4$	$\pm 6$	
	对角线长度 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	门槛高度 (高低点) 偏差 $\Delta L_3$ Deviation of sill height (lowest point) $\Delta L_3$	$+15$ $0$	$+15$ $-10$	
	开孔处围壁平面度 $\Delta L_4$ Planeness of wall at opening $\Delta L_4$	$\leq 2$	$\leq 3$	
门的安装 Installation of door 	门槛高度偏差 Deviation of sill height	$+15$ $0$	$+30$ $0$	
	门中心垂直度 Verticality of door center	$\leq \frac{2L}{1000}$	$\leq \frac{2L}{1000}$	$L$ 为密封垫距门中心的距离 $L$ is distance of seal to centre of door
	密封垫距门中心偏差 $\Delta L$ Deviation of distance of seat to door centre $\Delta L$	$\pm 2$	$\pm 2$	

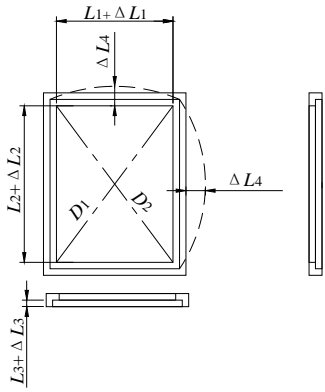
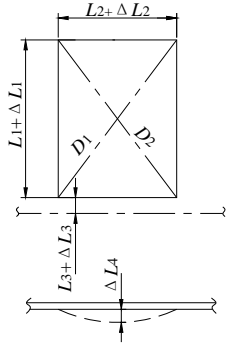
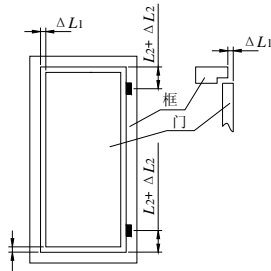
3.4.2 防火门制造和安装要求按表 1-3-10。

3.4.2 the manufacture and installation of fireproof door is to be in accordance with the requirements as defined in table 1-3-10

Table 1-3-10

mm

Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
门 Door 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 1.0$	$\pm 1.0$
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 1.0$	$\pm 1.0$
	厚度偏差 $\Delta L_3$ Deviation of thickness $\Delta L_3$	$\pm 1.0$	$\pm 1.0$
	对角线长度差异 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2.0$	$\pm 4.0$
	扭曲度 Degree of distortion	$\leq 2.0$	$\leq 2.0$ 扭曲度: 两对角线 中点之间距离 Degree of distortion is distance between middle points of two diagonals
	直线度 $\Delta L_4$ straightness $\Delta L_4$	$< 1.0$	$< 1.0$
	平面度 $\Delta L_5$ planeness $\Delta L_5$	$\leq 1.0$	$\leq 2.5$

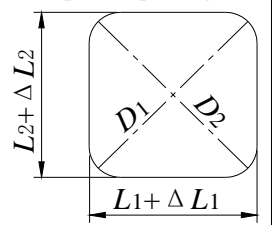
<b>门框</b> Door frame 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 1.0$	$\pm 1.0$	
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 1.0$	$\pm 1.0$	
	厚度偏差 $\Delta L_3$ Deviation of thickness $\Delta L_3$	$\pm 2.0$	$\pm 2.0$	
	对角线长度差异 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2.0$	$\pm 4.0$	
	扭曲度 Degree of distortion	$\leq 2.0$	$\leq 2.0$	Degree of distortions distance between middle points of two diagonals
	直线度 $\Delta L_4$ straightness $\Delta L_4$	$< 1.0$	$< 1.0$	
<b>围壁开孔</b> Wall opening 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 2.0$	$\pm 2.0$	
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 2.0$	$\pm 2.0$	
	对角线长度差异 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	门槛高度（最低点）偏差 $\Delta L_3$ Deviation of sill height (lowest point) $\Delta L_3$	$+5$ $0$	$\pm 10$	
	开孔处围壁平面度 $\Delta L_4$ Deformation of wall at cut $\Delta L_4$	$\leq 2.0$	$\leq 2.0$	
<b>门的安装</b> Installation of door 	门与门框之间间隙 $\Delta L_1$ Clearance between door frame and door $\Delta L_1$	$\pm 1.0$	$\pm 1.0$	
	门与门之平面度 Planeness of door frame and door	$\leq 1.0$	$\leq 1.0$	
	铰链位置偏差 $\Delta L_2$ Deviation of hinge position $\Delta L_2$	$\pm 5.0$	$\pm 5.0$	

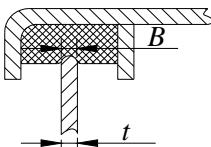
3.4.3 风雨密小舱口盖制造和安装要求按表 1-3-11

3.4.3 the manufacture and installation of Weathertight small hatchcover is to be in accordance with the requirements as defined in table 1-3-11

Table1-3-11

mm

Items 项目		Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
舱盖 Hatchcover 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	$\pm 3$	$\pm 5$	
	高度偏差 $\Delta L_2$ Deviation of height $\Delta L_2$	$\pm 3$	$\pm 5$	
	对角线长度差异 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	扭曲度 Degree of distortion	$\leq 2$	$\leq 3$	扭曲度: 两对角线中点之间距离 Degree of distortion is distance between middle points of two diagonals
	直线度 $\Delta L_3$ Straightness $\Delta L_3$	$\leq 1$	$\leq 2$	
	平面度 $\Delta L_4$ Planeness $\Delta L_4$	$\leq 1$	$\leq 3$	
舱口围 Hatch coaming 	长度偏差 $\Delta L_1$ Deviation of length $\Delta L_1$	$\pm 2$	$\pm 5$	
	宽度偏差 $\Delta L_2$ Deviation of breadth $\Delta L_2$	$\pm 2$	$\pm 5$	
	对角线长度差异 $D_1-D_2$ Difference between length of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
	高度(最低处)偏差 $\Delta L_3$ Deviation of height (lowest point) $\Delta L_3$	+6 0	+10 0	
	扭曲度 Degree of distortion	$\leq 2$	$\leq 3$	
	直线度 $\Delta L_3$ Straightness $\Delta L_3$	$\leq 1$	$\leq 3$	
	平面度 $\Delta L_4$ Planeness $\Delta L_4$	$\leq 1$	$\leq 3$	
甲板开孔 Deck plate opening 	宽度偏差 $\Delta L_1$ Deviation of breadth $\Delta L_1$	贯通型 Penetration type	$\pm 2$	$\pm 3$
		非贯通型 Non-penetration type	+2 -3	+3 -5
	长度偏差 $\Delta L_2$ Deviation of length $\Delta L_2$	贯通型 Penetration type	$\pm 2$	$\pm 3$
		非贯通型 Non-penetration type	+2 -3	+3 -5

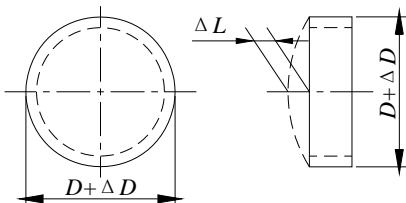
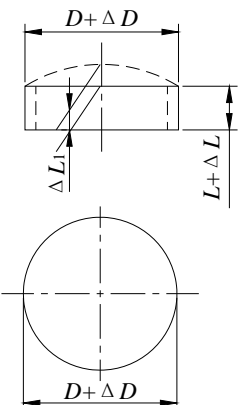
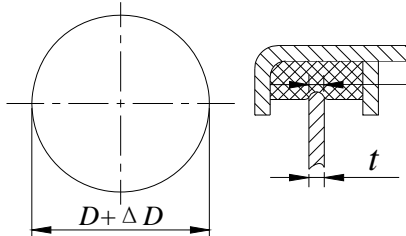
	对角线长度 $D_1-D_2$ Difference between legths of diagonals $D_1-D_2$	$\pm 2$	$\pm 4$	
水密结构 Watertight structure 	密封垫接触 Touch between gasket and coaming	$B \geq t/2$	$B \geq t/2$	$B$ 为压痕宽度 $B$ is breadth of compression print

3.4.4 圆形风雨密舱口盖制造和安装要求按表 1-3-12。

3.4.4 the manufacture and installation of circular Weathertight hatchcover is to be in accordance with the requirements as defined in table 1-3-12

Table1-3-12

mm

Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
盖 Cover 	直径偏差 $\Delta D$ Deviation of diameter $\Delta D$	$\pm 3$	$\pm 5$
	圆度 Roundness	$\leq 2$	$\leq 3$
	平面度 $\Delta L$ Planeness $\Delta L$	$\leq 1$	$\leq 3$
舱口围 Hatch coaming 	直径偏差 $\Delta D$ Deviation of diameter $\Delta D$	$\pm 2$	$\pm 5$
	高度偏差 $\Delta L$ Deviation of height $\Delta L$	$+6$ $0$	$+20$ $0$
	圆度 Roundness	$\leq 2$	$\leq 3$
	平面度 $\Delta L$ Planeness $\Delta L$	$\leq 1$	$\leq 3$
甲板开口和水密结构 Cut in deck plate and water tightness 	直径偏差 $\Delta D$ Deviation of diameter $\Delta D$	$\pm 2$	$\pm 3$
	密封垫接触面 Touch between gasket and coaming	$B \geq t/2$	$B \geq t/2$
			$B$ 为压痕宽度 $B$ is breadth of compression print

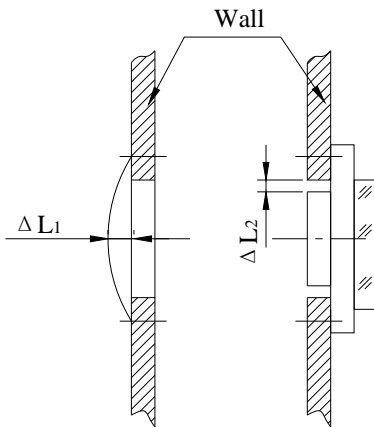


3.4.5 矩形窗安装要求按表 1-3-13。

3.4.5 the installation of rectangular window is to be in accordance with the requirements of table 1-3-13

Table 1-3-13

mm

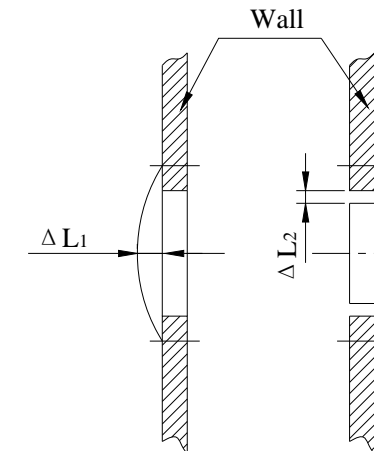
Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
	开孔处围壁平面度 $\Delta L_1$ Planeness of wall at cut $\Delta L_1$	$\leq 2$	$\leq 3$
	窗座与窗开孔间隙 $\Delta L_2$ Clearance between window frame and cut $\Delta L_2$	$\leq 1$	$\leq 2$

3.4.6 舷窗安装要求按表 1-3-14。

3.4.6 the installation of porthole is to be in accordance with the requirements of table 1-3-14

Table 1-3-14

mm

Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
	开孔处围壁平面度 $\Delta L_1$ Planeness of wall at cut $\Delta L_1$	$\leq 1.0$	$\leq 1.5$
	窗座与窗开孔间隙 $\Delta L_2$ Clearance between window frame and cut $\Delta L_2$	$\leq 1$	$\leq 2$

### 3.5 舱室舾装

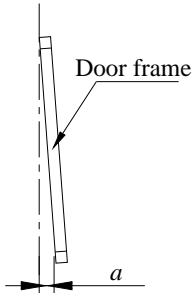
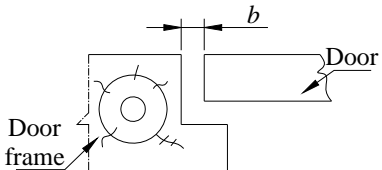
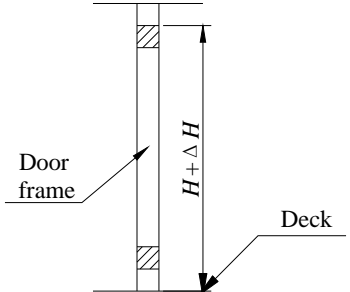
#### 3.5.1 门及门框的安装要求按表 1-3-15

#### 3.5 Cabinet outfitting

#### 3.5.1 The installation of door and doorframe is to be in accordance with the requirements of table 1-3-15

Table 1-3-15

mm

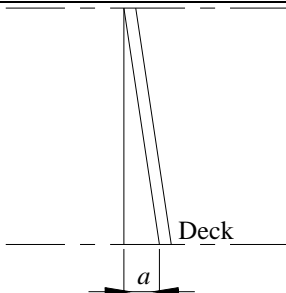
Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
 <p>Door frame</p> <p>门框垂直度 <math>a</math> Verticality of door frame <math>a</math></p>	$\leq 4$	$\leq 6$	
<p>木门与门框间隙 <math>b</math> Clearance between wooden door and door frame, <math>b</math></p>  <p>Door frame</p> <p>Door</p>	门锁边缝 Clearance at lock side	$\leq 2$	$\leq 3$
	铰链边缝 Clearance at hinge side	$\leq 2$	$\leq 3$
	上门缝 Upper crock	$\leq 2$	$\leq 4$
	下门缝 Lower crock	$\leq 4$	$\leq 6$
 <p>Door frame</p> <p>Deck</p> <p>门框安装高度偏差 <math>\Delta H</math> Deviation of installed height of frame <math>\Delta H</math></p>	$-3 \sim 10$	$-5 \sim 12$	

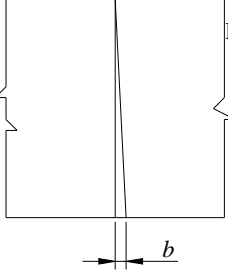
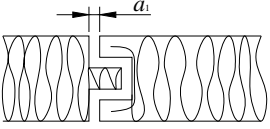
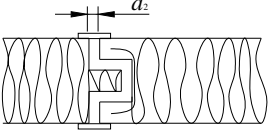
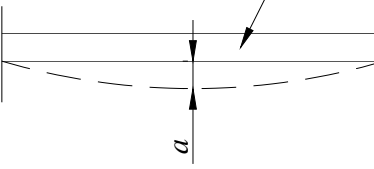
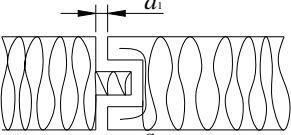
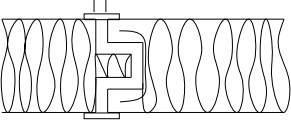
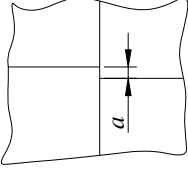
#### 3.5.2 壁板与天花板的安装要求按表 1-3-16。

#### 3.5.2 installation of lining and ceiling is to be in accordance with the requirements as defined in table 1-3-16

Table 1-3-16

mm

Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
 <p>Deck</p> <p>壁板垂直度 <math>a</math> Verticality of lining <math>a</math></p>	$\leq 5$	$\leq 7$	

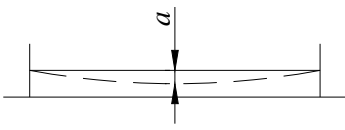
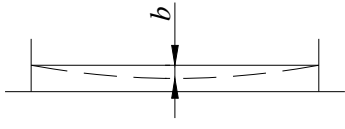
 <p>Plate</p>	<p>壁板板缝垂直度 <math>b</math> Verticality of seam of lining plate <math>b</math></p>	$\leq 3$	$\leq 5$	
<p>壁板板缝间隙 Clearance between lining plates</p>  	<p>无盖条 <math>a_1</math> Without strip <math>a_1</math></p>	$\leq 0.3$	$\leq 0.5$	
	<p>有盖条 <math>a_2</math> With strip <math>a_2</math></p>	$\leq 1.0$	$\leq 2.0$	
 <p>Ceiling</p>	<p>天花板平面下垂度 <math>a</math> Sagging of ceiling plate <math>a</math></p>	$\leq 3$	$\leq 5$	
<p>天花板板缝间隙 Clear between ceiling plate</p>  	<p>无盖条 <math>a_1</math> Without strip <math>a_1</math></p>	$\leq 1.0$	$\leq 1.5$	
	<p>有盖条 <math>a_2</math> With strip <math>a_2</math></p>	$\leq 1.0$	$\leq 2.0$	
	<p>天花板板缝错位 <math>a</math> Misalignment of ceiling plate <math>a</math></p>	$\leq 2.0$	$\leq 2.5$	
<p>天花板净高偏差 Deviation of clear height of ceiling</p>		$-10$	$-$	

3.5.3 甲板覆盖敷设要求按表 1-3-17。

3.5.3 the application of deck covering is to be in accordance with the requirements as defined in table 1-3-17

Table 1-3-17

mm

Items 项目	Standard range 标准范围	Allowable limits 允许极限	Remarks 备注
 甲板敷料平面度 $a$ Planeness of deck covering $a$	$\leq 2.5$	$\leq 3.0$	Per meter
 塑料地板平面度 $b$ Planeness of plastic deck $b$	$\leq 2.5$	$\leq 3.0$	Per meter



# 舟山中远船务工程有限公司

## ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.

### 1. 机装

### 4. Machinery installation

#### 4.1 通则

#### 4.1 general

本章内容包括轴系、主机、柴油发电机组、辅锅炉、空气压缩机、空气瓶和泵等轮机安装的质量要求。

This chapter includes the quality requirements of installation of shafting, M/E, diesel generating set, auxiliary boiler, air compression, air bottle and pump.

#### 4.2 轴系

#### 4.2 shafting

#### 4.2.1 轴系拉线

要求与舵系中心线的偏差量  $S \leq 4$ , 其垂直度不大于 1mm/m。

#### 4.2.1 Shaft drawing lines

S, the deviation between shaft drawing lines and centerline, should be not more than 4mm. The perpendicularity of shaft drawing lines is not more than 1mm/m

#### 4.2.2 艉轴管

#### 4.2.2 Stern shaft pipe

(1) 镗孔后的中心与找正中心的偏差  $< 0.10\text{mm}$ 。

(1) Deflection between aft boring center and centering should be not exceeded 0.10mm.

(2) 镗孔圆的表面粗糙度  $R_a$  的上限值为 0.0063mm。

(2) The max. value of roughness of boring round surface is 0.0063mm.

(3) 镗孔的圆度、圆柱度要求见表 1-4-1。

(3) The roundness and cylindricity of boring should be in accordance with the requirement as defined in table1-4-1

(4) 采用环氧树脂浇注固定的艉轴管，其镗孔要求按制造厂的标准

(4) The boring of stern tube, which is fixed with epoxy resin, should be in accordance with the maker's standard.

Table1-4-1 mm

轴 径 Diameter of shaft	要 求 Requirement	在制造厂没有要求时使用 These can be adopted in case no maker's date.
$> 260 \sim 360$	$\leq 0.030$	
$> 360 \sim 500$	$\leq 0.035$	
$> 500 \sim 700$	$\leq 0.040$	
$> 700 \sim 900$	$\leq 0.050$	

#### 4.2.3 尾管轴承的装配压入力见表 1-4-2。

#### 4.2.3 Assembly pressure of stern shaft bearing (see table 1-4-2)

Table 1-4-2 mm

	轴 承 外 径 mm Bearing outside diameter mm	压 入 力 (kN) Input strength (kN)	
		Forward bearing	After bearing
Pressure lubrication stern tube bearing	$300 < D < 500$	68-294	147-588
	$500 < D < 900$	147-588	343-980
	$900 \geq D$	147-784	343-1176

#### 4.2.4 尾轴

#### 4.2.4 Tail shaft

尾轴锥面与螺旋桨锥孔接触面检查在 75% 的接合面上，每 25mm×25mm 区域内，色油点不少于 3 点。

Tail shaft taper surface tuch inside surface of propeller taper hole more than 75%, tuch point is no less than 3 points per 25mm×25mm area.

#### 4.2.5 轴系校中

#### 4.2.5 Shaft alignment



# 舟山中远船务工程有限公司

## ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.

轴承负荷允许误差不超过理论计算值的±20%。

The allowable deflection of bearing load should be not less or more than 20% of theoretic calculated value.

### 4.3 主机

#### 4.3 Main engine

##### 4.3.1 主机垫片

##### 4.3.1 M/E liner

(1) 色油检查, 接触点分布均匀, 在 70% 的结合面上, 每 25mm×25mm 区域内色油点不少于 3 点。

(1) splash check, tuch poin is well-distributed, tuch point of 25mm×25mm area is no less than 3 points at 70% tuch area.

(2) 底脚螺栓紧固后, 垫片用 0.05mm 塞尺检查, 局部允许插入深度不超过 10mm。环氧树脂垫片浇注按照制造厂的说明书。4.3 M/E

(2) after foundation bolts tightness, use 0.05 plug guage check gasket, depth of part insert is no more than 10mm. Chockfast moulding according to manufacture sepecification.

##### 4.3.2 底脚螺栓装配接触面大于 70%

4.3.2 foundation bolts assembly surface tuch more than 70%

##### 4.3.3 曲轴甩档根据主机制造厂规定的标准

4.3.3 crankshaft deflects should be according to the M/E maker's standard.

##### 4.3.4 主机运转试验方法按系泊试验大纲和航行试验大纲。

4.3.4 The methods of M/E operation test should be in accordance with outline of mooring teat and navigation test.

### 4.4 辅机

#### 4.4 Aux. Engine

##### 4.4.1 垫片

##### 4.4.1 Liner

0.05mm 厚的塞尺插入不超过 10mm, 接触面不用于 60%。

The inserting of 0.05mm feeler can should not be more than 10mm, and contact surface is not less than 60%.

##### 4.4.2 曲轴甩档按制造厂说明书。

4.4.2 Crankshaft deflection to be according to the maker's instruction.

### 4.5 泵

#### 4.5 Pump

撬紧底脚螺栓后用锤敲击, 检查底座的密贴程度, 使 0.05mm 塞尺插入不超过 10mm。

After foundation bolts tightness, check tuch degree of beteen seat and foundation, plug guage insert no more than 10mm.

### 5 管子加工与安装

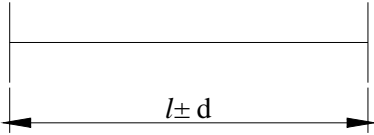
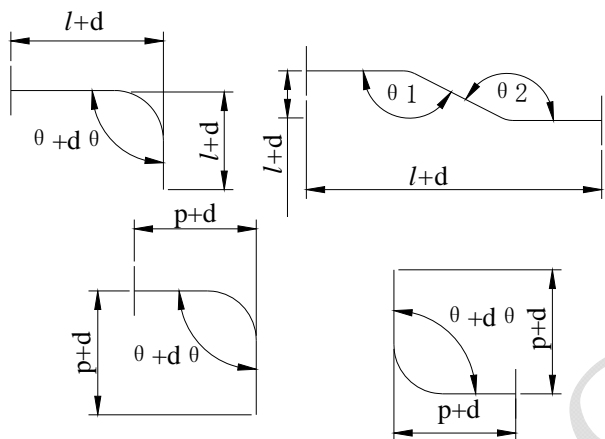
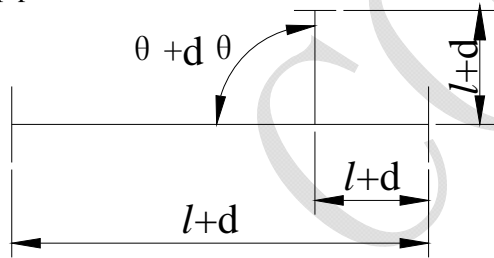
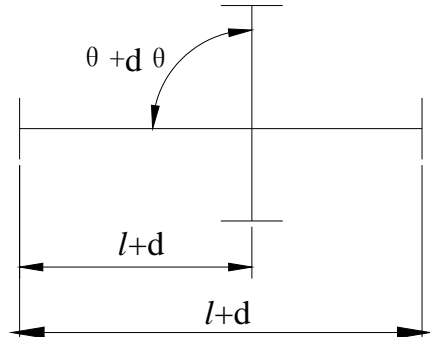
#### 5. Fabrication and installation of piping

##### 5.1 管子加工要求按表

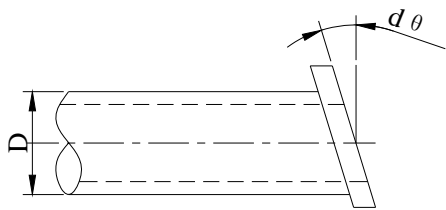
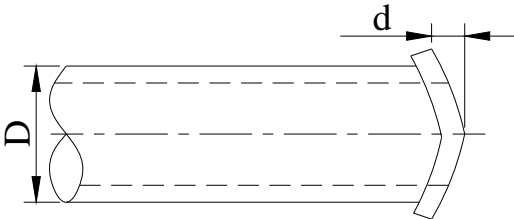
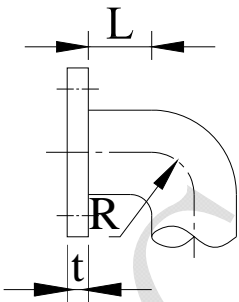
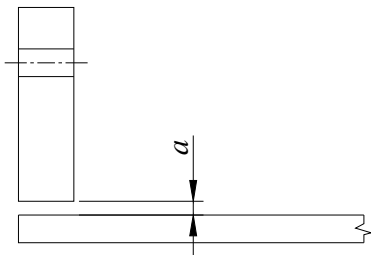
5.1 Fabrication of piping should be in accordance with the requirement as defined in table 1-5-1.

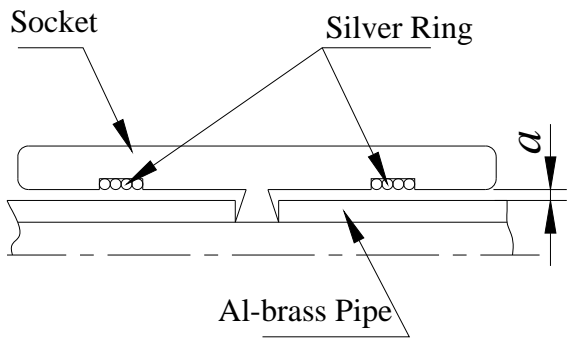
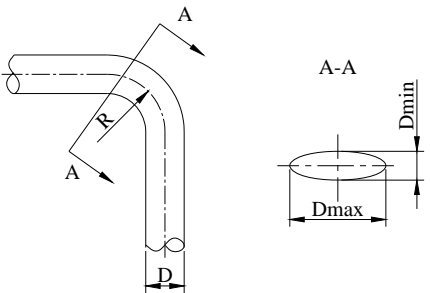
Table 1-5-1

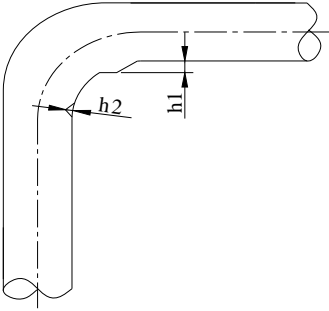
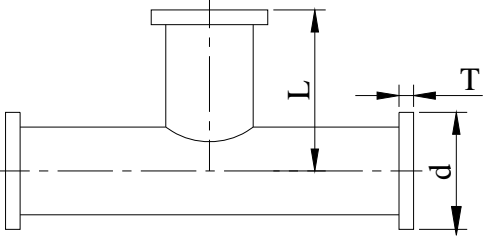
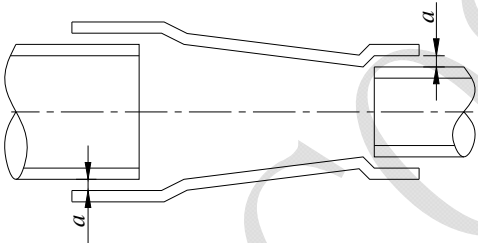
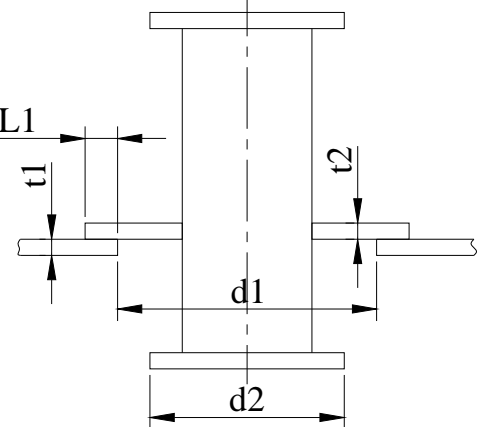
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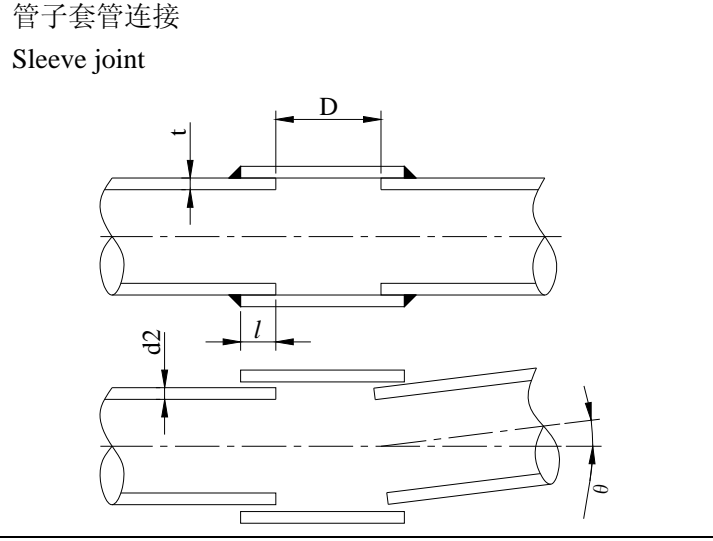
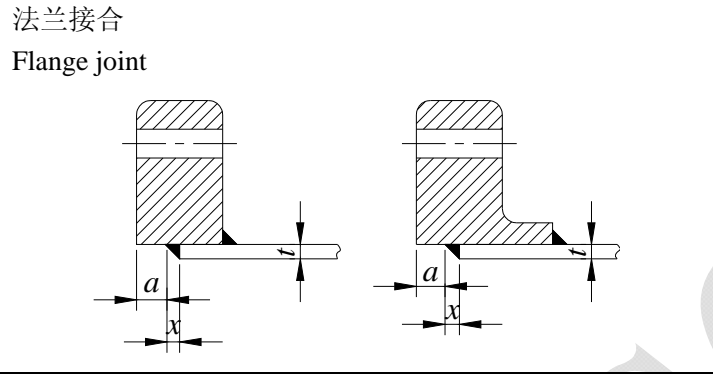
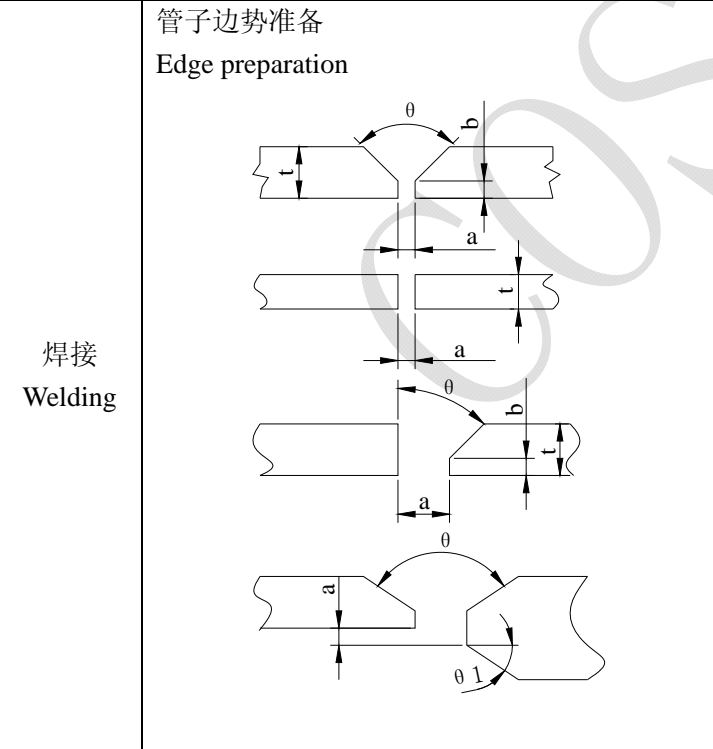
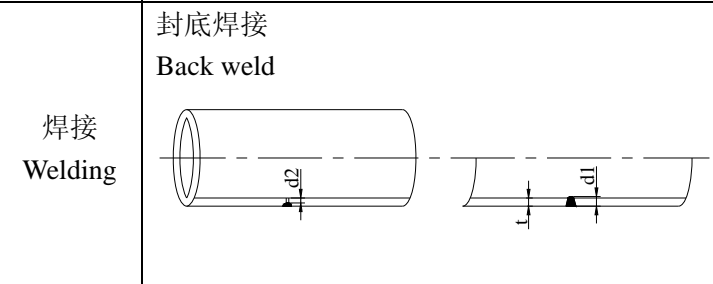
Items	Standard range	Remarks
直管偏差 Length error of straight pipes 	$d \pm 3$	
弯管尺寸和角度 Bent pipe size and angle 	$d = \pm 3$ $d \theta = \pm 1^\circ$ $ \theta 1 - \theta 2  \leq 1^\circ$  $d = \pm 3$ $d \theta = \pm 1^\circ$	
支管 Branch pipe 	$d = \pm 3$ $d \theta = \pm 1^\circ$	
贯通件 Penetration pipe 	$d = \pm 3$ $d \theta = \pm 1^\circ$	

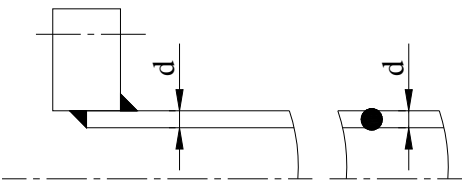
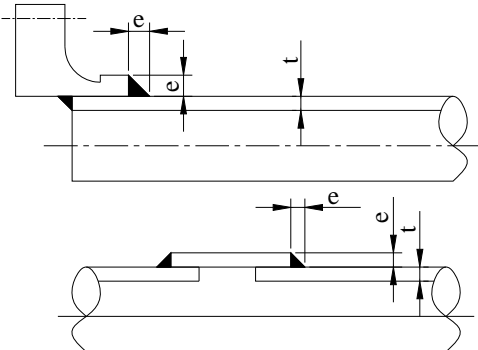


<p>管子法兰平面 Attachment of flange to pipe Angle of flange to pipe</p> 	$d \theta \leq 0.5^\circ$	
<p>管子法兰变形 Distortion of flange face</p> 	$DN < 200$ $d \leq 1.0$ $200 \leq DN \leq 450$ $d \leq 1.0$ $DN \geq 450$ $d \leq 1.5$ <p>DN: pipe nominal diameter</p>	
<p>法兰与弯管间距 Distance between flange and bent pipes</p> 	$L \geq t$ $R \geq 3D$	
<p>法兰与弯管间距 Distance between flange and bent pipe</p> 	$a \leq 0.5$	

<p>管子套管 银钎焊 Sleeve brazing of pipe</p> 	$0.05 \leq a \leq 0.15$																	
<p>管子弯曲 椭圆度 (E) Pipe deformation due to bending (E) ellipseness</p>  $E = \frac{D_{\max} - D_{\min}}{D} \times 100\%$ <p>D: 外径 R: 弯管半径 Where: D=outside diameter R=radius of bent pipe</p>	<p>Class I 、 II Pipe, <math>E \leq 7\%</math>; Class III Pipe, <math>E \leq 10\%</math></p>																	
<p>管子弯曲 壁厚减少率 (T) Pipe deformation due to bending (T) Thickness reduction ratio</p> $T = \frac{t - t_1}{t} \times 100\%$ <p>t: 原管子壁厚 t: Original pipe thickness t1: 弯管之后壁厚 t1: Thickness after bending D: 管子外径 D: Outside dia. of pipe</p>	<table border="1"> <thead> <tr> <th rowspan="3">弯曲半径 Curvature radius</th><th colspan="2">T (%)</th></tr> <tr> <th>钢管 Steel pipe</th><th>铜管 Copper pipe</th></tr> <tr> <th>HC</th><th>HC</th></tr> </thead> <tbody> <tr> <td><math>2D &lt; R \leq 3D</math></td><td>25</td><td>30</td></tr> <tr> <td><math>3D &lt; R \leq 4D</math></td><td>20</td><td>25</td></tr> <tr> <td><math>R &gt; 4D</math></td><td>15</td><td>20</td></tr> </tbody> </table> <p>H: 热弯 C: 冷弯 H: Hot bending C: Cold bending</p>		弯曲半径 Curvature radius	T (%)		钢管 Steel pipe	铜管 Copper pipe	HC	HC	$2D < R \leq 3D$	25	30	$3D < R \leq 4D$	20	25	$R > 4D$	15	20
弯曲半径 Curvature radius	T (%)																	
	钢管 Steel pipe	铜管 Copper pipe																
	HC	HC																
$2D < R \leq 3D$	25	30																
$3D < R \leq 4D$	20	25																
$R > 4D$	15	20																

<p>管子弯曲 起皱和隆起 Pipe deformation due to bending Rumples and swells</p> 	<p> <math>h1 \leq D/100</math>, 且 I、II 级管最大为 2mm。  <math>h1 \leq D/100</math>, and I、II class pipe, the max. value is 2mm.  <math>h2 \leq D/100</math>  <math>h2 \leq D/100</math>  D: 管子外径  D: Outside diameter of pipe </p>	
<p>支管连接长度 Connection length of branch</p> 	<p> <math>L \geq d/2 + T + 2H</math>   d: 主管法兰外径  d: Outside diameter of main flange  T: 主管法兰厚度  T: Thickness of main flange  H: 螺母厚度  H: Thickness of nut </p>	
<p>异径管 (铜管) Reducer (copper pipe)</p> 	<p><math>0.1 \leq a \leq 0.5</math></p>	
<p>贯通件复板连接 Penetration piece</p> 	<p> <math>d1 \geq d2 + 10</math>  when <math>t2 \leq 12</math>, <math>t2 = 12</math>  (上层建筑 <math>t2 = 10</math>)  (superstructure <math>t2 = 10</math>)  when <math>12 &lt; t1 \leq 15</math>, <math>t2 = 15</math>  when <math>t1 &gt; 15</math>, <math>t2 = 20</math>  when <math>DN \leq 100</math>, <math>L1 = 30 \pm 5</math>  when <math>DN 125 \sim 500</math>, <math>L1 = 40 \pm 5</math>  when <math>DN \geq 550</math>, <math>L1 = 50 \pm 5</math>  DN: 管子公称通径  DN: Pipe nominal diameter </p>	<p>防火区域的结构可按照设计惯例 Structure in fireproof area is to be designed according to design practice.</p>

<p>管子套管连接 Sleeve joint</p> 	<p><math>l \geq 15</math> <math>d=0 \sim 20</math></p> <p><math>d2 \leq 5</math> <math>\theta &lt; 3^\circ</math></p>	
<p>法兰接合 Flange joint</p> 	<p><math>a \leq 1.5</math></p> <p><math>DN \leq 25, \quad x \geq 3</math>  <math>32 \leq DN \leq 125, \quad x \geq 4</math>  <math>150 \leq DN \leq 400, \quad x \geq 5</math>  <math>DN=450, 500, \quad x \geq 6</math>  <math>DN=600, 700, \quad x \geq 8</math></p>	
<p>管子边势准备 Edge preparation</p> <p>焊接 Welding</p> 	<p><math>3.0 \leq t \leq 19.0</math></p> <p><math>a=2.0 \sim 4.0</math>  <math>b=1 \sim 2</math>  <math>\theta=50 \sim 55^\circ</math></p> <p><math>a=0 \sim 2</math>  <math>t \leq 4.0</math></p> <p><math>\theta=30^\circ + 5^\circ</math>  <math>a=0 \sim 2</math>  <math>b=0 \sim 2</math>  <math>t &gt; 4.0</math></p> <p><math>\theta=50^\circ + 5^\circ</math>  <math>\theta 1 \leq 14^\circ</math>  <math>a \leq 1.6</math></p>	<p>I 级管焊接坡口要求 welding groove requirement of I class pipe</p> <p>II、III级管焊接坡口要求 welding groove requirement of II、III class pipe</p> <p>具体参照 WPS Detail see WPS of vessel</p>
<p>封底焊接 Back weld</p> <p>焊接 Welding</p> 	<p>I、II class pipe: <math>d1=0 \sim 30</math>  III class pipe: <math>d2 \leq 0.5</math></p>	

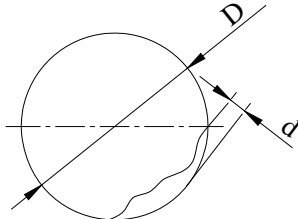
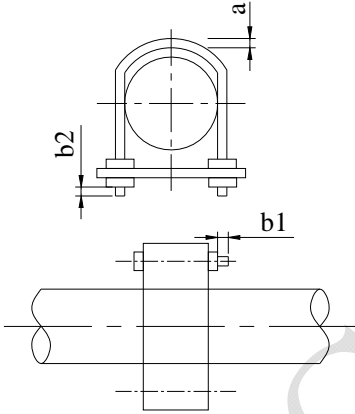
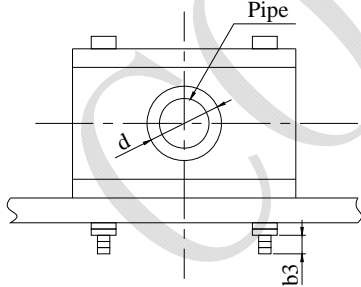
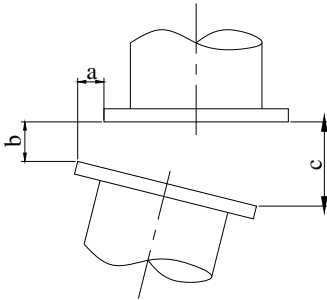
	<p>咬口 Under-cut</p> 	$d \leq 0.8$	
	<p>焊脚长度 Welding Leg length</p> 	$e \geq 1t$	<p>根据设计要求 According to design requirement</p>

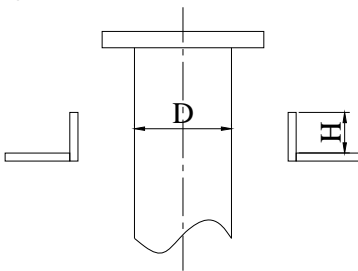
5.2 管系安装要求按表 1-5-2。

5.2 Installation of piping should be in accordance with the requirement as defined in table 1-5-2.

Table 1-5-2(continued)

mm

项目 Items	标准范围 Standard range	备注 Remarks
管子切割 Pipe hole cutting 	$d \leq D/50$	
螺栓 Bolting   塑料夹具 Plastic clamp 	$0.1 \leq a \leq 3.0$ D: Bolt diameter b1: 0~3 threads b2: 0~1D b3: 1.5~3.0 d: Outside diameter of pipe	使用时要考虑管子膨胀参数, 如货油管、压载管、舱内加热盘管(长度超过 3 米)及惰性气体管等。 Apply to the place where expansion is needed; cargo oil pipe, ballast pipe, heating coil in tank (length over 3m), and inert gas pipe, etc.
阀兰找正 Alignment of flange 	$a \leq 3$ $c - b \leq 3$	

管子护圈 Pipe coaming				H=100	除非图纸上另有说明 Unless otherwise indicated in drawing
管子支架间距 Spacing between pipe supports					
DN	Max. distance	DN	Max. distance		
10	1.4m	125	4.1m		
15	1.6m	150	4.5m		
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	3.4m	600	7.0m		
100	3.8m	700	7.0m		
注：将选用以上标准距离作为工作指南，可根据实际情况相应地增加。 Note: above mentioned figures are to be acted as work manual; they could be adjusted according to actual condition.					



### 6. 电装

#### 6. Electric installation

##### 6.1 电缆敷设

##### 6.1 Cable laying

##### 6.1.1 电缆敷设要求按表 1-6-1。

##### 6.1.1 Requirement of cable laying as table 1-6-1.

Table 1-6-1.

Mm

序号 Series	项目 Items	标准范围 Standard range	允许极限 Allowable limits	备注 Remarks
1	每束电缆层数 Layers of each bunch of cable	Normally two layers(or thickness $\leq 50$ )		$\geq 6$ 根成束敷设的电力电缆, 其截面积或载流量修正系数为 0.85 $\geq 6$ pc power cables are in one bunch, 0.85(connection f,) to be calculated for the cross section or the current rating of each cable.
2	每束电缆宽数 Breadth of each bunch of cable	$\leq 150$	$\leq 200$	
3	监控、安全系统信号电缆分束间距 Clearance between monitor cable and safety system signal cable	$\geq 50$	$\geq 30$	
4	电缆束距热源 Distance from heat source	$\geq 500$		除非采用有效隔热措施 Available heat-isolation measure to be adopted otherwise.
5	电缆束距甲板、舱壁及防火隔堵间距 Fire-proof clearance of cable bunch on deck and bulkhead	$\geq 20$		
6	电缆束距双层底及滑油、燃油舱柜 Clearance of cable bunch is DB and LO, FO tanks	$\geq 50$		
7	电缆支承托板间距 Distance of cable bracket	轻型 Light	$\leq 300$	—
		重型 Heavy	$\leq 350$	—
8	电缆紧固间距 Securing distance of cable	一般 Normal	$\leq 300$	—
		水平下托 Cable lay up hanger	$\leq 600$	—
9	电缆穿管系数 Cable penetration coefficient	$\leq 40\%$		
10	电缆最小弯曲内半径 Min. Bend of inner diameter	非铠装 $D \leq 25$ Non-armoring $D \leq 25$	$4D$	$D$ 为电缆外径 $D$ is the external diameter of cable

		其他 Others	6D		
11	露天甲板电缆管道分线箱（膨胀箱） 间距 Distance of distribution box for cable line on open deck		$\leq 30\text{m}$		
12	水密或防水电缆筒（框）的高（长） 度 Height (length) of watertight or fireproof cable trunk		$\geq 250$		
13	安全接地线截面积 Section area of safety earth cable	$S \leq 25\text{mm}^2$	$Q \geq 1.5\text{mm}^2$		
		$S > 25\text{mm}^2$	$Q \geq 4\text{mm}^2$		

### 6.2 电气设备安装

#### 6.2 Installation of electrical equipment

##### 6.2.1 居住舱室电气设备安装高度按表 1-6-2。

##### 6.2.1 Height of installation of electrical equipment in accommodation cabins as in table 1-6-2.

Table 1-6-2

mm

序号 Series	项目 Items	标准范围 Standard range		备注 Remarks	
		安装尺寸 Installation size	设定面 Setting point		
1	开 关 Switch	1400	地面 Floor	设备中心 Center of unit	
2	开关插座 Plug with switch				
3	开关或带开关插座（上下安装） Switch or plug with switch			300	台面 On desk
4	落地插座 Floor plug				
5	台灯插座、台式电话机接线盒 Plug for desk lamp, junction box for table type telephone set	150	设备中心 Center of unit		
6	电视机、收音机天线插座 Antenna plug for TV set and radio				
7	火警按钮盒及其它按钮盒 Fire alarm bottom box and other button box	1400	地板 Floor		
8	床头灯 Bed lamp	750	床 Beth	设备中心 Center of unit	
9	壁灯 Wall lamp	1700	地板 Floor	灯下沿 Lower edge of lamp	
		200	天花板 Ceiling		
10	镜灯	20~100	镜子或镜子箱	灯上沿	

	Mirror lamp		Mirror or mirror box	Top edge of lamp
11	铃或蜂鸣器 Bell or buzzer	1800	地板 Floor	上沿 Top edge
		200 或 300	天花板 Ceiling	
12	扬声器 Speaker	1800	地板 Floor	设备中心 Center of unit
13	壁式电话 Wall telephone set	1400		
14	主机转速表、分罗径、钟或壁装仪表 ME revolution counter, compass repeater, clock or wall instruction	1800		
15	延伸报警板或需操作的监控板 Extension alarm panel or mirror panel to be necessary foe operation	1500~1700		
16	电脑通讯接口 Connection for computer communication	150	台面 On desk	

6.2.2 居住舱室以外（机舱、工作舱和其它区域）的电气设备安装高度按表 1-6-3。

6.2.2 Installation height of electrical equipment beside accommodation (ER, working room and other area) as in table 1-6-3.

Table 1-6-3

mm

序号 Series	项目 Items	标准范围 Standard range		备注 Remarks
		安装尺寸 Installation size	设置位置 Setting point	
1	分电箱、起动器、控制箱 Distribution box, starter box, control box	1800	Floor	大设备上沿 Top edge of big unit
		1200		小设备下沿 Lower edge of small unit
2	开关或带开关插座 Switch or plug with switch	1400		上、下安装中心间距 250 250mm between upper and lower
3	遥控按钮盒 Remote control button box			设备中心 Center of unit
4	应急按钮盒 Emergency button box			
5	外通道灯（包括应急灯） External passage light (including emergency light)	150~200	Under deck	灯下沿
		2300	Floor	



# 舟山中远船务工程有限公司

## ZHOUSHAN (COSCO) SHIPYARD CO.,LTD.

6	舱顶灯（荧光灯或白炽灯） Cabin ceiling light (fluorescent light or incandescent light)	2300 (最小 1980) (Min. 1800)		Low edge of lamp
7	报警铃（灯）、蜂鸣器 Alarm bell (light), buzzer	1800		设备下沿 Low edge of unit
8	壁式电话 Wall telephone set	1400		设备中心 Center of unit
9	指示仪表 Indicator	1800		设备下沿 Low edge of unit

COSCO

COSCO