Amendment on 27 June 2024
Resolved by Technical Committee on 30 January 2024

Propellors

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part K
Guidance for the Survey and Construction of Steel Ships Part K

Reason for Amendment

IACS Unified Requirements (UR) W24 and W27 respectively specify requirements for the inspection of cast copper alloy propellors and cast stainless steel propellers, and these URs have already been incorporated into the NK Rules and Guidance. Since the requirements originally incorporated into the NK Guidance have established a sufficient record of successful application over the years, it is now considered appropriate to move them to the NK Rules.

In addition, IACS adopted IACS URs W24(Rev.5) and W27(Rev.3) in September 2023 in order to clarify that repair welding of the region carrying the highest operating stresses such as near the propellor bosses is, in principle, to be avoided as much as possible, except in special cases approved by the Society.

Accordingly, relevant requirements are amended based on URs W24(Rev.5) and W27(Rev.3).

Outline of Amendment

The main contents of this amendment are as follows:

(1) In Zone A (the region carrying the highest operating stresses such as near the propellor bosses), repair welding is not permitted except in special cases.
(2) Move requirements related to the inspection of propellers specified based on URs W24 and W27 from Part K of the Guidance to Part K of the Rules.
(3) Amend the treatment of specimen dimensions and criteria for the acceptance of defects.

Effective Date and Application

This amendment applies to propeller castings that fall under the following:

(1) propeller castings being used on ships for which the date of contract for construction is on or after 1 January 2025.
(2) propeller castings for which the application for approval is submitted to the Society on or after 1 January 2025.
(3) propeller castings for which the application for survey is submitted to the Society on or after 1 January 2025.

ID: DD23-21

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part K MATERIALS** **Chapter 5 CASTINGS** **5.7 Stainless Steel Propeller Castings**	**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part K MATERIALS** **Chapter 5 CASTINGS** **5.7 Stainless Steel Propeller Castings**	
5.7.9 Non-destructive Inspection* **1** The steel propeller castings are to be subjected to the penetrant test according to **7.2.10**. Magnetic particle tests in accordance with *ISO* 9934-1 or an equivalent standard deemed appropriate by the Society may be used in lieu of liquid penetrant tests for examinations of *KSCP*1, *KSCP*2 and *KSCP*3. In such cases, the magnetic particle test procedure is to be submitted to the Society. The aforementioned standards, in principle, refer to the most recent version published.	**5.7.9 Non-destructive Inspection*** **1** The steel propeller castings are to be subjected to the penetrant test deemed appropriate by the Society. Magnetic particle tests deemed appropriate by the Society may be used in lieu of liquid penetrant tests for examinations of *KSCP*1, *KSCP*2 and *KSCP*3. In such cases, the magnetic particle test procedure is to be submitted to the Society.	Relocated from current K5.7.9-2, Part K of the Guidance
2 The ultrasonic or radiographic test is to be required, if deemed necessary by the Society. The ultrasonic test procedure is to be approved by the Society. The acceptance criteria or applied quality levels for ultrasonic or radiographic tests are to be agreed upon between the manufacturer and the Society in accordance with a recognised standard.	**2** The ultrasonic or radiographic test is to be required, if deemed necessary by the Society. The ultrasonic test procedure is to be approved by the Society.	Relocated from current K5.7.9-3., Part K of the Guidance

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
5.7.10 Repair of Defects*	**5.7.10 Repair of Defects***	
2 Weld repairs for the parts where defects were removed are to comply with the following requirements according to the zones for the non-destructive inspection shown in **Fig.K7.3**:	**2** Weld repairs for the parts where defects were removed are to comply with the following requirements according to the zones for the non-destructive inspection shown in **Fig.K7.1**:	
(1) The zones where weld repairs are allowed are to be as follows:	(1) The zones where weld repairs are allowed are to be as follows:	Relocated from current Note (5) of Fig.K7.1, Part K of the Rule
Zone A: Weld repairs are not allowed. (Except when otherwise specially approved by the Society)	Zone A: Weld repairs are not allowed.	
Zone B: Weld repairs are subject to the approval. (If the thickness of the part where the defect occurred is "t", then defects not deeper than t/40 *mm* or 2 *mm* (whichever is the greatest) are to be removed by grinding.)	Zone B: Weld repairs are subject to the approval.	IACS UR W27(Rev.3) 11.6
Zone C: Weld repairs are allowed.	Zone C: Weld repairs are allowed.	
(2) Prior to the weld repair on Zone B or C mentioned in **(1)** above, the extent of the repair, a repair plan including welding procedures, welding consumables, edge preparations for weld repair after removing defects and heat treatment is to be submitted and approved by the Society.	(2) Prior to the weld repair on zone B or C mentioned in **(1)** above, the extent of the repair, a repair plan including welding procedures, welding consumables, edge preparations for weld repair after removing defects and heat treatment is to be submitted and approved by the Society.	
(3) Liquid penetrant tests on welded areas are to be carried out in the presence of a Surveyor to ensure that no defect exists.	(3) Liquid penetrant tests on welded areas are to be carried out in the presence of a surveyor to ensure that no defect exists.	
3 The welding procedures are to be in accordance with **(1)** and **(7)**. The welding procedures and related specifications approved by the Society are valid for welding work in all shops and sites belonging to the yard under the same facility and control system.	**3** The welding procedures are to be as deemed appropriate by the Society. The welding procedures and related specifications approved by the Society are valid for welding work in all shops and sites belonging to the yard under the same facility and control system.	Relocated from current K5.7.10, Part K of the Guidance
(1) Welding grooves are to be prepared in a manner that allows good fusion of the groove bottom.	(Newly added)	
(2) The position of welding is, in principle, to be flat.		
(3) Welders are to be qualified as deemed appropriate by the		

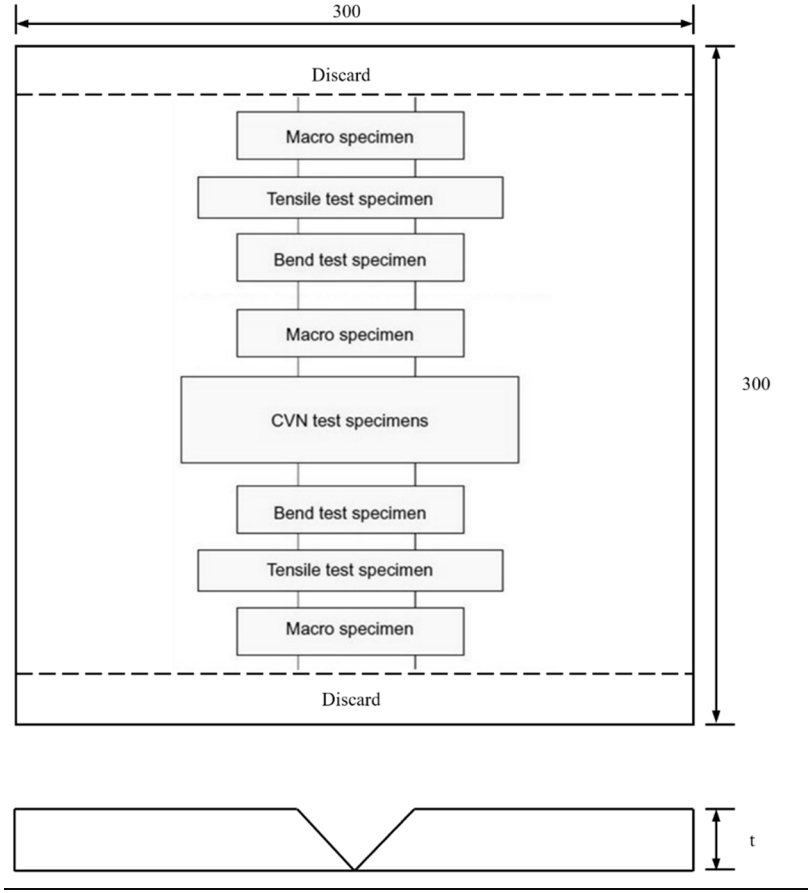
Amended	Original	Remarks
Society. (4) The recommended temperature of the preheating and stress relieving heat treatment after welding is to be as deemed appropriate by the Society. The martensitic steel propeller castings are to be furnace re-tempered after welding repairs except for the case of local stress relieving for minor repairs subject to the prior approval. And on completion of heat treatment of martensitic steels the weld repairs and adjacent material are to be ground smooth. (5) The welding procedure qualification tests are to be carried out in the presence of a Surveyor as follows: (a) Tests for butt welding i) Test sample The minimum dimensions of the test sample are to be as shown in **Fig.K5.2**. ii) Non-destructive inspection Test assemblies are to be examined by visual and liquid penetrant tests prior to the cutting of test specimens. Magnetic particle tests may be used in lieu of liquid penetrant tests for examinations of *KSCP*1, *KSCP*2 and *KSCP*3. The welded surface is to be regular and uniform, and free from prejudicial defects such as cracks and undercuts. In cases where post-weld heat treatment is carried out, non-destructive inspections are to be performed after the heat treatment. Imperfections detected by liquid penetrant tests and magnetic particle tests are to be assessed in accordance with **7.2.10-1**. iii) Macro-etching test Three test specimens are to be prepared and etched on one side of each specimen at the centre		IACS UR W27(Rev.3) 12.7 IACS UR W27(Rev.3) APPENDIX A 3.2

Amended	Original	Remarks
of the test sample and at the welding end parts to clearly reveal the weld metal, the fusion line and the *HAZ*. No pores greater than 3 *mm* and cracks in welded sections are permitted. iv) Tensile test The shapes and dimensions of tensile test specimens are to be of kind *U*2*A* or *U*2*B* given in **Table M3.1, Part M**, the number of tensile test specimens is to be two. The tensile strength is to meet the required values of the base metal. The location of fracture (i.e. the weld metal, *HAZ* or base material) is to be reported. v) Bend test The shapes and dimensions of the bend test specimens are to be of kind *UB*-1 given in **Table M 3.2, Part M**. Two root and two face bend specimens are to be tested. For thicknesses of 12 *mm* and over, four side bend specimens may alternatively be tested. In such cases, the shapes and dimensions of the side bend test specimens are to be of kind *UB*-2 given in **Table M 3.2, Part M**. There is to be no cracks or other defects greater than 3 *mm* in length in any direction on the surface of bent specimen. The diameter of the former is to be 4 *times* the thickness for martensitic stainless steel propeller castings and 3 *times* the thickness for austenitic stainless steel propeller castings. The bending angle is to be 180 *degrees*. vi) Impact test Impact test is required, where the base metal is impact tested. The shapes and dimensions of the impact test specimens are to be of kind *U*4 given		

Amended	Original	Remarks
in **Table K2.5**. Two sets (i.e. a total of six specimens) are to be tested. One set (i.e. three specimens) is to have the notch positioned in the centre of the weld and the other set is to have the notch positioned in the *HAZ*(*FL*+1 *mm*), respectively. The test temperature and impact energy are to comply with the requirements specified for the base material. vii) Hardness test The macro-sections of welding start parts are to be used for hardness test. The hardness of the weld metal, the heat-affected zones (both sides) and the base material (both sides) are to be reported for information. Test force is to be 98.07 *N*. (b) Test of mold cavity welding i) Test piece The dimensions of the test piece are to be as shown in **Fig. K7.11**. ii) Macrostructure test The cross section of the welded part is to be free from defects such as cracks. iii) Microstructure test The microstructures of the welded metal, base metal and heat-affected zones are to be in satisfactory condition. iv) Hardness test The deviation among the hardness of the welded metal, base metal and heat-affected zones is not to be significant. (6) Where the tests specified in the preceding **(5)** are failed, retests are to be in accordance with **4.2.12, Part M**.		IACS UR W27(Rev.3) APPENDIX A 3.7

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
(7) The scopes of approval of the welding procedures and related specifications of steel propeller castings are to be in accordance with the following **(a)** through **(h)**, on the condition that the other welding conditions are same. (a) Base metal Range of approval for steel cast propeller is limited to steel grade tested. (b) Thickness Range of thickness is to be in accordance with **Table K5.16**. (c) Welding position Approval for a test made in any position is restricted to that position. (d) Welding process Approval is only valid for the welding process used in the welding procedure test. Single run is not qualified by a multi-run butt weld test. (e) Filler metal Approval is only valid for the filler metal used in the welding procedure test. (f) Heat input The upper limit of heat input approved is 15 % greater than that used in welding the test piece. The lower limit of heat input approved is 15 % lower than that used in welding the test piece. (g) Preheating and interpass temperature The minimum preheating temperature is not to be less than that used in the qualification test. The maximum interpass temperature is not to be higher than that used in the qualification test.		

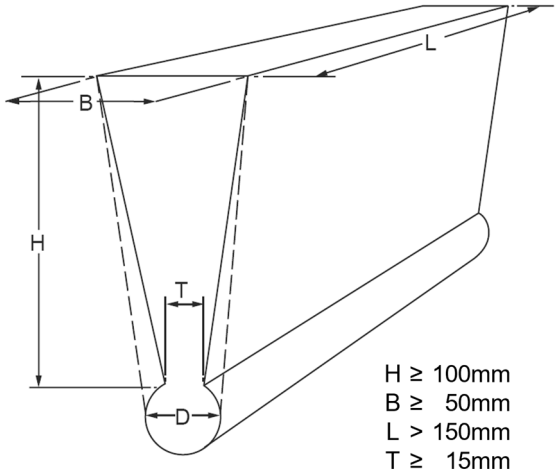
Amended	Original	Remarks
(h) Post-weld heat treatment Heat treatment used in the qualification test is to be maintained during actual work. Holding time may be adjusted as a function of thickness.		
Fig.K5.2 Test Sample for Butt Welding Test (*mm*)  Note: Joint preparation and fit-up as detailed in the preliminary welding procedure specification		Relocated from current Fig.K5.7.10-1., Part K of the Guidance IACS UR W27(Rev.3) APPENDIX A Fig.A

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">Table K5.16 Approval range of thickness
<table><tr><th>Thickness of the test sample, t (mm)</th><th>Approval range</th></tr><tr><td>15 < t ≤ 30</td><td>3 mm to 2 t</td></tr><tr><td>30 < t</td><td>0.5 t to 2 t or 200 mm, whichever is the greater</td></tr></table></td><td>Relocated from current Table K5.7.10-2., Part K of the Guidance</td></tr>
<tr><td>Chapter 7 COPPER AND COPPER ALLOYS

7.2 Copper Alloy Castings

7.2.8 Selection of Test Specimens*
2 The test samples are to be cast in moulds made of the same material as the mould for the propeller castings and they are to be cast under the same condition as the propeller castings. The shapes and dimensions of the test samples are to comply with Fig.K7.1. The shape given by the dotted lines shown in the figure, however, may be acceptable.</td><td>Chapter 7 COPPER AND COPPER ALLOYS

7.2 Copper Alloy Castings

7.2.8 Selection of Test Specimens*
2 The test samples are to be cast in moulds made of the same material as the mould for the propeller castings and they are to be cast under the same condition as the propeller castings. The shapes and dimensions of the test samples are to be deemed appropriate by the Society.</td><td>Relocated from current K7.2.8, Part K of the Guidance</td></tr>
<tr><td colspan="2">Fig.K7.1 Shapes and Dimensions of the Test Samples
 
</td><td>Relocated from current Fig.K7.2.8-1., Part K of the Guidance

IACS UR W24(Rev.5) Fig.1</td></tr>
</table>

Amended-Original Requirements Comparison Table (Propellors)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>

7.2.9 Surface and Dimensional Inspection*

3 The dimensional inspections of propeller castings are to be conducted by the manufacturer. Where straightening of a bent blade is carried out, the procedure for the straightening is to comply with the following requirements.

(1) Loading used for straightening purposes is to be static.

(2) In the case of hot straightening, uniform heating is to be conducted to a sufficient area, and the temperature is to be measured by a suitable instrument. The temperature is to be maintained within the range given in **Table K7.6** during the straightening operation. Weld repaired areas may be subject to hot straightening, provided it can be demonstrated that the weld properties are not impaired by the hot straightening operations, and it is approved by the Society.

(3) Cold straightening is to be restricted to the case of minor repairs of tips and edges. Cold straightening is to be followed by a stress relieving heat treatment other than *KAlBC*3. The heat treatment is to be conducted in accordance with **7.2.11-3(4).**

</td><td>

7.2.9 Surface and Dimensional Inspection*

3 The dimensional inspections of propeller castings are to be conducted by the manufacturer. Where straightening of a bent blade is carried out, the procedure for the straightening is to be deemed appropriate by the Society.

(Newly added)

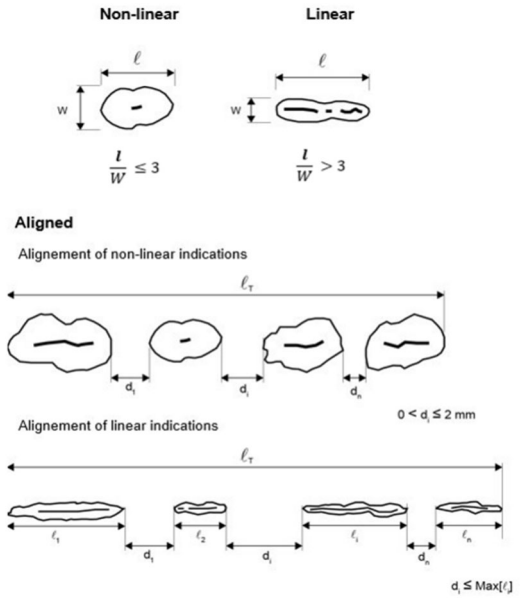
</td><td>Relocated from current K7.2.9-2., Part K of the Guidance</td></tr>
<tr><td>

Table K7.6 Temperature for Hot Straightening

Grade	Temperature(℃)
KHBsC1	500–800
KHBsC2	500–800
KAlBC3	700–900
KAlBC4	700–850

</td><td></td><td>Relocated from current Table K7.2.9-1., Part K of the Guidance</td></tr>
</table>

Amended	Original	Remarks
7.2.10 Non-destructive Inspections*	**7.2.10 Non-destructive Inspections***	
1 The propeller castings are to be subjected to the penetrant test according to (1) to (4) below.	**1** The propeller castings are to be subjected to the penetrant test deemed appropriate by the Society.	Relocated from current ANNEX K7.2.10, Part K of the Guidance
(1) The methods of the testing are to conform to *ISO* 3452-1 or an equivalent standard thereto. The aforementioned standards, in principle, refer to the most recent version published. Where indications of defects appear, the type of the defects and the size of the indications are to be recorded in detail. These records are to be presented to the Surveyor. For reference, the true sizes of the defects are also to be confirmed.	(Newly added)	
(2) Test areas are classified as Zones A, B and C as specified in **Fig.K7.3**. Tests on Zone A are to be carried out in the presence of Surveyor, while tests on Zones B and C are to be performed by the manufacturer and may be witnessed by the Surveyor upon his request.		
(3) Defects detected by penetrant tests are divided into the following (a) to (d) types (see **Fig.K7.2**).		IACS UR W24(Rev.5) IACS UR W27(Rev.3) Amends the definition of term
(a) Cracks: defects regarded as a crack.		
(b) Circular defects: defects other than cracks in which the length (l) is equal to or less than 3 *times* the width (w)		
(c) Linear defects: defects other than cracks in which the length (l) is greater than 3 *times* the width (w).		
(d) Aligned defects: defects consisting of three or more circular defects which are almost aligned and for which the spacing (d) in between does not exceed 2 *mm*. In addition, defects consisting of two or more linear defects which are almost aligned and for which the spacing (d) in between does not exceed the longest indications of the defects. The length of an aligned		

Amended	Original	Remarks
defect is to be as the sum of the lengths of all individual defects and all spacing in between. (4) The defects to be evaluated are to be indications of defects for which the length exceeds 1.5 *mm*. Where cracks or other defects which do not meet the acceptance criteria given in **Table K7.7** are detected by penetrant tests, they are to be repaired in accordance with **7.2.11**. Areas which are prepared for welding are always to be assessed according to Zone A regardless of their location. **2** The ultrasonic or radiographic test is to be required if deemed necessary by the Society. The ultrasonic test procedure is to be approved by the Society. The acceptance criteria or applied quality levels are to be agreed upon between the manufacturer and the Society in accordance with a recognised standard.	**2** The ultrasonic or radiographic test is to be required if deemed necessary by the Society. The ultrasonic test procedure is to be approved by the Society.	Relocated from current K7.2.10-2., Part K of the Guidance
Fig. K7.2 Shapes of Indications of Defects  		Relocated from current Fig.1 of ANNEX K7.2.10, Part K of the Guidance IACS UR W24(Rev.5) Fig.7 IACS UR W27(Rev.3) Fig.1

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

Table K7.7 Acceptance Criteria

<table>
<tr><th rowspan="3">Area of Test</th><th rowspan="3">Type of Defect (excluding cracks)</th><th colspan="3">Acceptance Criteria</th></tr>
<tr><th rowspan="2">Max. total number of defects (I)</th><th colspan="2">Defects of same type</th></tr>
<tr><th>Number of each type (II)</th><th>Max. size for each indication (III)(mm)</th></tr>
<tr><td rowspan="3">Zone A</td><td>Circular</td><td rowspan="3">7</td><td>5</td><td>4</td></tr>
<tr><td>Linear</td><td>2</td><td>3</td></tr>
<tr><td>Aligned</td><td>2</td><td>3</td></tr>
<tr><td rowspan="3">Zone B</td><td>Circular</td><td rowspan="3">14</td><td>10</td><td>6</td></tr>
<tr><td>Linear</td><td>4</td><td>6</td></tr>
<tr><td>Aligned</td><td>4</td><td>6</td></tr>
<tr><td rowspan="3">Zone C</td><td>Circular</td><td rowspan="3">20</td><td>14</td><td>8</td></tr>
<tr><td>Linear</td><td>6</td><td>6</td></tr>
<tr><td>Aligned</td><td>6</td><td>6</td></tr>
</table>

Notes:

(1) Defects are to be repaired when they do not meet the one or more criteria of (I) through (III) in this table.

(2) The counting of the number of defects is to be conducted to the most unfavourable location relative to the indication being evaluated. The area of a reference zone is to be 100 cm^2. Each reference area may be square or rectangular with the major dimension not exceeding 250 *mm*.

(3) Singular circular indications less than 2 *mm* for Zone A and less than 3 *mm* for other zones may be disregarded.

(4) The total number of non-linear indications may be increased to the max. total number, or part thereof, represented by the absence of linear or aligned indications.

</td><td></td><td>Relocated from current Table 1 of ANNEX K7.2.10, Part K of the Guidance

IACS UR W24(Rev.5) Note 2 of Table 3

IACS UR W27(Rev.3) Note 2 of Table 3</td></tr>
<tr><td>

7.2.11 Repair of Defects*

2 Repair weldings for the parts where defects were removed are to comply with the following requirements according to the zones for non-destructive inspection shown in **Fig.K7.3**. Notwithstanding the zones, welds having areas less than 5 cm^2 are to be avoided.

(1) The areas according to **Fig.K7.3** where repair weldings are acceptable are to be as follows:

Zone A: Repair weldings are not allowed (Except when

</td><td>

7.2.11 Repair of Defects*

2 Repair weldings for the parts where defects were removed are to comply with the following requirements according to the zones for non-destructive inspection shown in **Fig.K7.1**. Notwithstanding the zones, welds having areas less than 5 cm^2 are to be avoided.

(1) The areas according to **Fig.K7.1** where repair weldings are acceptable are to be as follows:

Zone A: Repair weldings are not allowed

</td><td>Relocated from current Note (5) of Fig.K7.1, Part K of the Guidance</td></tr>
</table>

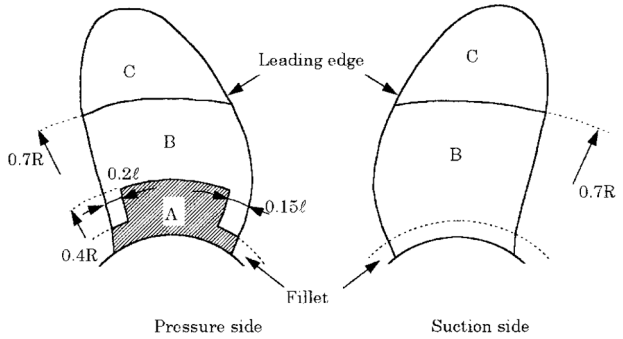
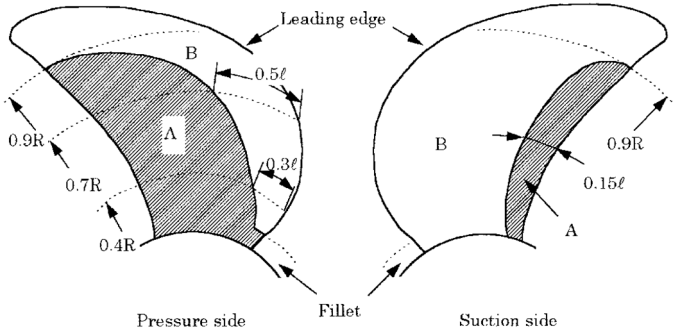
Amended	Original	Remarks
otherwise specially approved by the Society) Zone B: Repair weldings are allowed provided that prior approval was given by the Society (If the thickness of the part where the defect occurred is "t", then defects not deeper than t/40 *mm* or 2 *mm* (whichever is the greatest) are to be removed by grinding.) Zone C: Repair weldings are allowed. (2) Prior to the weld repair on Zone B or C mentioned in **(1)** above, the extent of the repair, a repair plan including welding procedures, welding consumables, edge preparations for weld repair after removing defects and heat treatment is to be submitted and approved by the Society. (3) Liquid penetrant tests on welded areas are to be carried out in the presence of a Surveyor to ensure that no defect exists. **3** The welding procedures are to be as in accordance with **(1)** and **(7)**. The welding procedures and related specifications approved by the Society are valid for welding work in all shops and sites belonging to the yard under the same facility and control system. (1) Welding grooves are to be prepared in a manner that allows good fusion of the groove bottom. (2) The kind of welding is to be either *MIG* or *TIG* welding, and the position of welding is, in principle, to be flat. In addition, welding consumables are, in principle, to be aluminium bronze or common metals. (3) Welders are to have qualifications deemed appropriate by the Society. (4) The preheating and stress relieving heat treatment following the repair weldings are to be in accordance with	Zone B: Repair weldings are allowed provided that prior approval was given by the Society Zone C: Repair weldings are allowed. (2) Prior to the weld repair on zone B or C mentioned in **(1)** above, the extent of the repair, a repair plan including welding procedures, welding consumables, edge preparations for weld repair after removing defects and heat treatment is to be submitted and approved by the Society. (3) Liquid penetrant tests on welded areas are to be carried out in the presence of a surveyor to ensure that no defect exists. **3** The welding procedures are to be as deemed appropriate by the Society. The welding procedures and related specifications approved by the Society are valid for welding work in all shops and sites belonging to the yard under the same facility and control system. (Newly added)	IACS UR W24(Rev.5) 11.4 Relocated from current K7.2.11, Part K of the Guidance

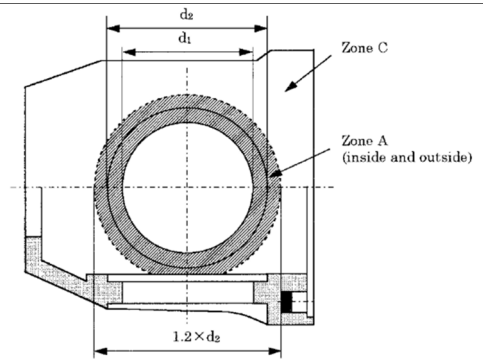
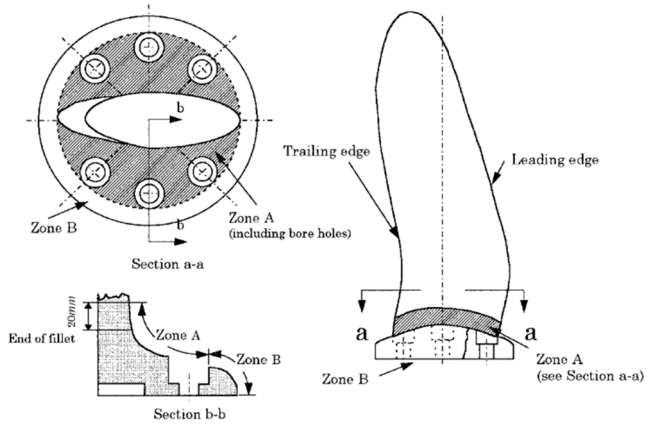
Amended	Original	Remarks
Tables K7.8 and **K7.9**, and the area to be heat treated is to be as large as possible. (5) Welding procedure qualification tests are to be carried out in the presence of a Surveyor as follows: (a) Tests for butt welding i) Test sample The minimum dimensions of the test sample are to be as shown in **Fig.K7.4**. ii) Non-destructive inspection Test assemblies are to be examined by visual and liquid penetrant tests prior to the cutting of test specimens. The welded surface is to be regular and uniform and free from prejudicial defects such as cracks and undercuts. In cases where post-weld heat treatment is carried out, non-destructive inspections are to be performed after the heat treatment. Imperfections detected by liquid penetrant tests are to be assessed in accordance with **7.2.10-1**. iii) Macro-etching test Three test specimens are to be prepared and etched on one side to clearly reveal the weld metal, the fusion line and the *HAZ*. No pores greater than 3 *mm* and cracks in welded sections are permitted. iv) Tensile test The shapes and dimensions of the tensile test specimens are to be of kind *U2A* or *U2B* given in **Table 3.1, Part M**, the number of tensile test specimens is to be two, and tensile strength is to be in compliance with **Table K7.10**. (b) Test of mold cavity welding		IACS UR W24(Rev.5) APPENDIX A 3.2

Amended	Original	Remarks
i) Test piece The dimensions of the test piece are to be as shown in **Fig.K7.5**. ii) Macrostructure test The cross section of the welded part is to be free from defects such as cracks. iii) Microstructure test The microstructures of the deposit metal, base metal and heat-affected zones are to be in satisfactory condition. iv) Hardness test The deviation among the hardness of the deposit metal, base metal and heat-affected zones is not to be unacceptable. (6) Where the tests specified in the preceding **(5)** are failed, retests are to be in accordance with **4.2.12, Part M**. (7) The scopes of approval of the welding procedures and related specifications of propeller castings are to be in accordance with the following **(a)** through **(h)**, on the condition that the other welding conditions are same. (a) Base metal Range of approval for propeller castings is limited to be in accordance with **Table K7.11**. (b) Thickness Range of thickness is to be in accordance with **Table K7.12**. (c) Welding position Approval for a test made in any position is restricted to that position. (d) Welding process Approval is only valid for the welding process used in		

Amended	Original	Remarks
the welding procedure test. Single run is not qualified by a multi-run butt weld test. (e) Filler metal Approval is only valid for the filler metal used in the welding procedure test. (f) Heat input The upper limit of heat input approved is 25 % greater than that used in welding the test piece. The lower limit of heat input approved is 25 % lower than that used in welding the test piece. (g) Preheating and interpass temperature The minimum preheating temperature is not to be less than that used in the qualification test. The maximum interpass temperature is not to be higher than that used in the qualification test. (h) Post-weld heat treatment Heat treatment used in the qualification test is to be maintained during actual work. Holding time may be adjusted as a function of thickness.		

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
Fig.K7.~~1~~3 Zones for Non-destructive Inspection  (a) Propeller other than highly skewed propeller  (b) Highly skewed propeller		Change the figure number

Amended	Original	Remarks
 (a) Zones for Non-destructive Inspection for Controllable Pitch Propeller Boss  (b) The zones for non-destructive inspection on the root areas of the of controllable pitch or build up propeller blades (for remaining surface of the propeller blades, see **Fig. K7.1, Part K**)		Relocated from current Fig.K7.2.9-1., Part K of the Guidance

Notes:

(1) R is the radius of the propeller, l is the chord length at any radius.

(2) Highly skewed propeller is a propeller with a skew angle exceeding 25°.

(3) The boss area of a integrally cast propeller is regarded as ~~a~~Zone C.

~~(4) The zones for non-destructive inspection in the root areas of controllable pitch or build up propeller blades and controllable pitch propeller bosses are to be deemed appropriate by the Society.~~

~~(5) Where stress distribution on propeller blade surfaces is estimated in detail, the non-destructive inspection zones different from those shown in this figure may be applied provided the Society's approval.~~

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks

Table K7.8 Temperature for Heat Treatment

Grade	Preheat temperature (°C)	Interpass temperature (°C)	Stress relief temperature (°C)
KHBsC1	150 min.	300 max.	350–500
KHBsC2	150 min.	300 max.	350–550
KAlBC3	50 min.	250 max.	450–550
KAlBC4	100 min.	300 max.	450–600

Notes:

(1) The cooling rate after any stress relieving heat treatment is , in principle, not to exceed 50 °C/h until the temperature reaches 200 °C.

(2) Stress relieving for *KAlBC3* may be dispensed with.

Relocated from current Table K7.2.11-1., Part K of the Guidance

Table K7.9 Soaking Times for Stress Relief Heat Treatment

Stress relief temperature (°C)	*KHBsC1* and *KHBsC2*		*KAlBC3* and *KAlBC4*	
	Hours per 25 *mm* thickness	Maximum soaking times (*h*)	Hours per 25 *mm* thickness	Maximum soaking times (*h*)
350	5	15	—	—
400	1	5	—	—
450	1/2	2	5	15
500	1/4	1	1	5
550	1/4(1)	1/2(1)	1/2(2)	2(2)
600	—	—	1/4(2)	1(2)

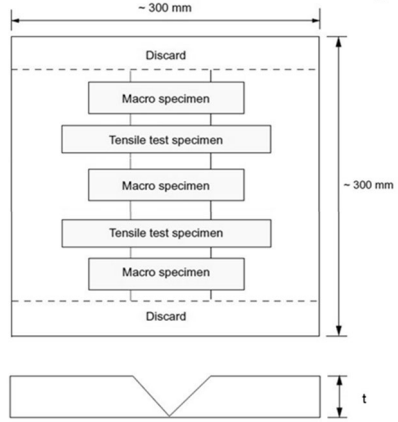
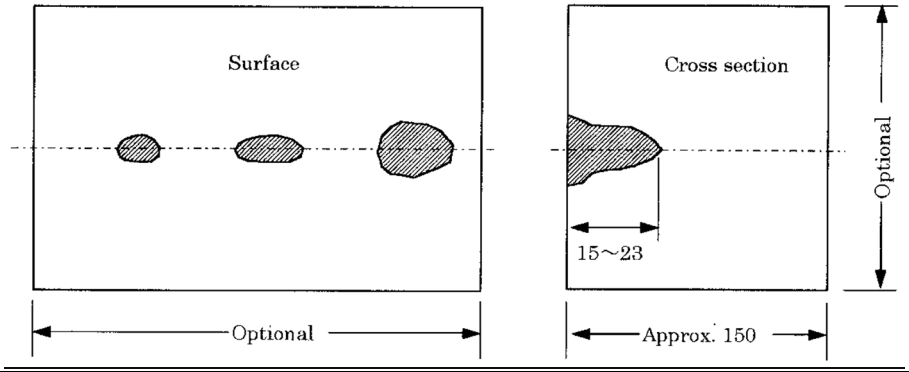
Note:

(1) 550°C only applicable for *KHBsC2*.

(2) 550°C and 600°C only applicable for *KAlBC4*.

Relocated from current Table K7.2.11-2., Part K of the Guidance

IACS UR W24(Rev.5) Table 5

Amended	Original	Remarks
Fig.K7.4 Test Sample for Butt Welding Test (*mm*)  Note: Joint preparation and fit-up as detailed in the preliminary welding procedure specification		Relocated from current Fig.K7.2.11-1., Part K of the Guidance
Table K7.10 Tensile Strength for Butt Welding Test Grade | Tensile strength (N/mm^2) KHBsC1 | 370 min. *KHBsC*2 | 410 min. *KAlBC*3 | 500 min. *KAlBC*4 | 550 min.		Relocated from current Table K7.2.11-3., Part K of the Guidance IACS UR W24(Rev.5) Table A.2
Fig.K7.5 Test Piece for Mold Cavity Welding (*mm*)  		Relocated from current Fig.K7.2.11-1., Part K of the Guidance

Amended-Original Requirements Comparison Table (Propellors)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>

Table K7.11 Approval Range of Base Metal

Grade of the test sample	Approval range
*KHBsC*1	*KHBsC*1
*KHBsC*2	*KHBsC*1, *KHBsC*2
*KAlBC*3	*KAlBC*3
*KAlBC*4	*KAlBC*4

</td><td></td><td>Relocated from current Table K7.2.11-4., Part K of the Guidance</td></tr>
<tr><td>

Table K7.12 Approval Range of Thickness

Thickness of the test sample, *t* (*mm*)	Approval range
$30 \leq t$	≥ 3 *mm*

</td><td></td><td>Relocated from current Table K7.2.11-5., Part K of the Guidance</td></tr>
<tr><td>

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2025.

2. Notwithstanding the amendments to the Rules, the current requirements apply to propeller castings other than propeller castings that fall under any of the following:

(1) propeller castings being used on ships for which the date of contract for construction* is on or after the effective date; or

(2) propeller castings for which the application for approval is submitted to the Society on or after effective date.

(3) propeller castings for which the application for survey is submitted to the Society on or after effective date; or

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

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

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
IACS PR No.29 (Rev.0, July 2009) **1.** The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding. **2.** The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided: (1) such alterations do not affect matters related to classification, or (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed. **3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply. **4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Note: This Procedural Requirement applies from 1 July 2009.		

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part K MATERIALS** **K5 CASTINGS** **K5.7 Stainless Steel Propeller Castings**	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part K MATERIALS** **K5 CASTINGS** **K5.7 Stainless Steel Propeller Castings**	
K5.7.8 Surface and Dimensional Inspection The wording "to be deemed appropriate by the Society" in **5.7.8-3, Part K** of the Rules means the followings: (1) The straightening load is to be static. (2) In case of hot straightening, the uniform heating is to be conducted to a sufficient area, and the temperature is to be measured by a suitable instrument. The recommended temperature range during the straightening operation is given in **Table K5.7.8-1**. (3) Cold straightening is to be restricted to the case of minor repairs of tips and edges. Cold straightening is to be followed by a stress relieving heat treatment. The heat treatment is to be conducted in accordance with the requirement of **K5.7.10(3)**.	**K5.7.8 Surface and Dimensional Inspection** The wording "to be deemed appropriate by the Society" in **5.7.8-2, Part K** of the Rules means the followings: (1) The straightening load is to be static. (2) In case of hot straightening, the uniform heating is to be conducted to a sufficient area, and the temperature is to be measured by a suitable instrument. The recommended temperature range during the straightening operation is given in **Table K5.7.8-1**. (3) Cold straightening is to be restricted to the case of minor repairs of tips and edges. Cold straightening is to be followed by a stress relieving heat treatment. The heat treatment is to be conducted in accordance with the requirement of **K5.7.10(3)**.	
K5.7.9 Non-destructive Inspection (Deleted)	**K5.7.9 Non-destructive Inspection** **1** The wording "the penetrant test deemed appropriate by the Society" in **5.7.9-1, Part K** of the Rules means those specified in **Annex K7.2.10** "GUIDANCE FOR THE PENETRANT TEST OF	

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
	PROPELLER CASTINGS".	
1 The wording "an equivalent standard deemed appropriate by the Society" means, for example, *JIS Z* 2320-1.	**2** The wording "magnetic particle test deemed appropriate by the Society" means to be in accordance with *ISO* 9934-1, *JIS Z* 2320-1 or an equivalent standard approved by the Society. The aforementioned standards, in principle, refer to the most recent version published.	
(Deleted)	**3** The acceptance criteria or applied quality levels for ultrasonic or radiographic tests are to be agreed upon between the manufacturer and the Society in accordance with a recognized standard.	
2 Due to the attenuating effect of ultrasound within austenitic steel castings, ultrasonic testing may not be practical in some cases, depending on the shape/type/thickness, and grain-growth direction of the casting.	(Newly added)	IACS UR W27(Rev.3) 9.5 Note
K5.7.10 Repair of Defects (Deleted)	**K5.7.10 Repair of Defects** The wording "to be as deemed appropriate by the Society" in **5.7.10-3, Part K of the Rules** means the followings: (1) The position of welding is, in principle, to be flat. (2) The welders are to be qualified as deemed appropriate by the Society. (3) The recommended temperature of the preheating and stress relieving heat treatment after welding is given in **Table K5.7.10-1**. The martensitic steel propeller castings are to be furnace re-tempered after welding repairs except for the case of local stress relieving for minor repairs subject to the prior approval (4) Welding grooves are to be prepared in a manner that allows good fusion of the groove bottom. (5) The welding procedure qualification tests are to be carried out in the presence of a Surveyor as follows:	

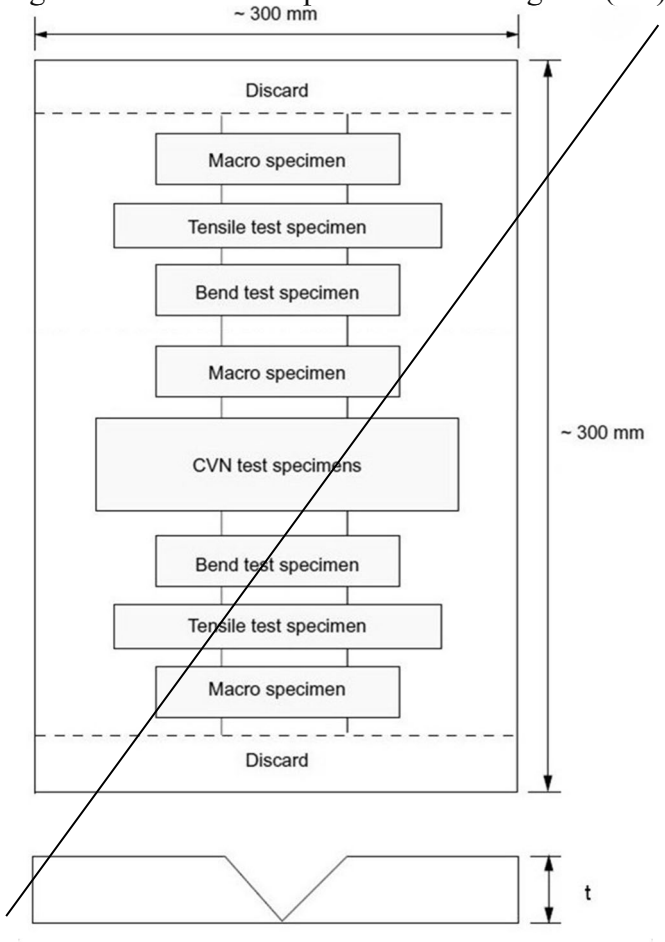
Amended	Original	Remarks
	(a) Tests for butt welding i) Test sample The minimum dimensions of the test sample are to be as shown in **Fig.K5.7.10-1**. ii) Non-destructive inspection Test assemblies are to be examined by visual and liquid penetrant tests prior to the cutting of test specimens. Magnetic particle tests may be used in lieu of liquid penetrant tests for examinations of *KSCP*1, *KSCP*2 and *KSCP*3. The welded surface is to be regular and uniform and free from prejudicial defects such as cracks and undercuts. In cases where post-weld heat treatment is carried out, non-destructive inspections are to be performed after the heat treatment. iii) Macro-etching test Three test specimens are to be prepared and etched on one side to clearly reveal the weld metal, the fusion line and the *HAZ*. No pores greater than 3 *mm* and cracks in welded sections is permitted. iv) Tensile test The shapes and dimensions of the tensile test specimens are to be of kind *U*2*A* or *U*2*B* given in **Table M3.1, Part M of the Rules**. The tensile test is to be carried out with two test specimens. The tensile strength is to meet the required values of the base metal. The location of fracture (i.e. the weld metal, *HAZ* or base material) is to be reported. v) Bend test The shapes and dimensions of the bend test specimens are to be of kind *UB*-1 given in **Table**	

Amended	Original	Remarks
	M 3.2, Part M of the Rules. Two root and two face bend specimens are to be tested. For thicknesses of 12 *mm* and over, four side bend specimens may alternatively be tested. In such cases, the shapes and dimensions of the side bend test specimens are to be of kind *UB*-2 given in **Table M 3.2, Part M of the Rules**. There is to be no crack nor any other defects greater than 3 *mm* in length in any direction on the surface of bent specimen. The diameter of the former is to be 4 times the thickness for martensitic stainless steel propeller castings and 3 times the thickness for austenitic stainless steel propeller castings. The bending angle is to be 180 degrees. vi) Impact test Impact test is required, except where the test is not required for the base metal. The shapes and dimensions of the tensile test specimens are to be of kind *U*4 given in **Table K2.5, Part K of the Rules**. Two sets (i.e. total six specimens) are to be tested. One set (i.e. three specimens) of them is to have the notch positioned in the center of the weld and the other set is to have the notch positioned in *HAZ*(*FL*+1*mm*), respectively. The test temperature and impact energy are to comply with the requirements specified for the base material. vii) Hardness testing One of the macro-sections is to be used for hardness testing. The hardness of the weld metal, the heat-affected zones (both sides) and the base material (both sides) are to be reported for information. Test force is to be 98.07 *N*.	

Amended	Original	Remarks
	(b) Test of mold cavity welding i) Test piece The dimensions of the test piece are to be as shown in **Fig. K7.2.11-2**. ii) Macrostructure test The cross section of welded part is to be free from defects such as cracks. iii) Microstructure test The microstructures of the welded metal, base metal and heat-affected zones are to be in satisfactory condition. iv) Hardness test The deviation among the hardness of the welded metal, base metal and heat-affected zones is not to be significant. (6) Where the tests specified in the preceding **(5)** fail, retests are to be in accordance with **4.2.12, Part M of the Rules**. (7) The scope of approval of the welding procedures and related specifications of steel propeller castings are to be in accordance with the following **(a)** through **(h)**, on the condition that the other welding conditions are same. (a) Base metal Range of approval for steel cast propeller is limited to steel grade tested. (b) Thickness Range of thickness is to be in accordance with **Table K5.7.10-2**. (c) Welding position Approval for a test made in any position is restricted to that position. (d) Welding process	

Amended	Original	Remarks
	Approval is only valid for the welding process used in the welding procedure test. Single run is not qualified by a multi-run butt weld test. (e) Filler metal Approval is only valid for the filler metal used in the welding procedure test. (f) Heat input The upper limit of heat input approved is 15 % greater than that used in welding the test piece. The lower limit of heat input approved is 15 % lower than that used in welding the test piece. (g) Preheating and interpass temperature The minimum preheating temperature is not to be less than that used in the qualification test. The maximum interpass temperature is not to be higher than that used in the qualification test. (h) Post-weld heat treatment Heat treatment used in the qualification test is to be maintained during actual work. Holding time may be adjusted as a function of thickness.	
The wording "to be as deemed appropriate by the Society" in **5.7.10-3(4), Part K of the Rules** means as given in **Table K5.7.10-1**.	(Newly added)	

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
~~Fig. K5.7.10-1 Test Sample for Butt Welding Test (*mm*)~~  ~~Note: Joint preparation and fit-up as detailed in the preliminary welding procedure specification~~		(Deleted)

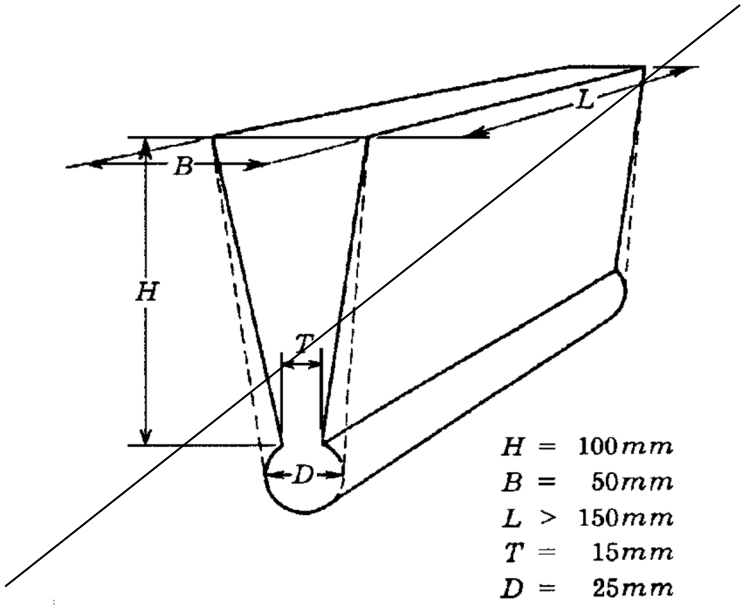
<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>~~Table K5.7.10-2 Approval range of thickness~~
<table><tr><th>~~Thickness of the test sample, t (mm)~~</th><th>~~Approval range~~</th></tr><tr><td>~~$15 < t \leq 30$~~</td><td>~~3 mm to $2t$~~</td></tr><tr><td>~~$30 < t$~~</td><td>~~$0.5t$ to $2t$ or 200 mm, whichever is the greater~~</td></tr></table></td><td></td><td>(Deleted)</td></tr>
<tr><td>K7 COPPER AND COPPER ALLOYS

K7.2 Copper Alloy Castings

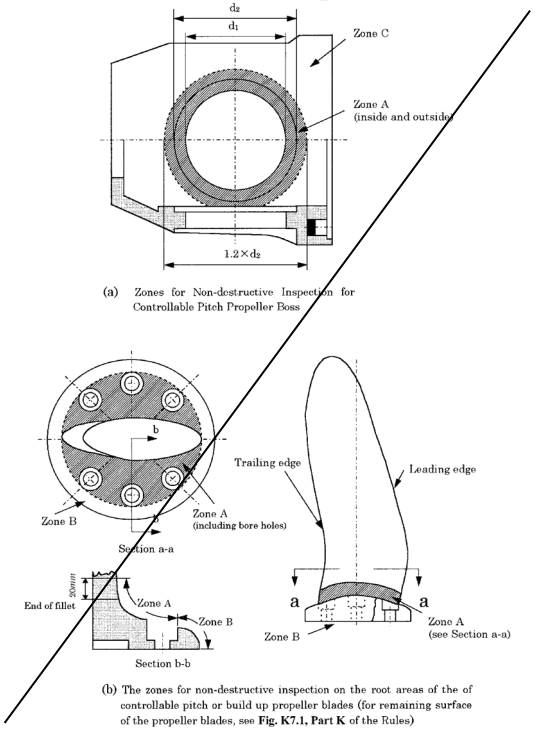
(Deleted)</td><td>K7 COPPER AND COPPER ALLOYS

K7.2 Copper Alloy Castings

<u>K7.2.8 Selection of Test Specimens</u>
<u>The wording “to be deemed appropriate by the Society” in 7.2.8-2, Part K of the Rules means that the shapes and dimensions of the test samples are to comply with those given in Fig. K7.2.8-1. The shape given by the dotted lines shown in the figure, however, may be acceptable.</u></td><td></td></tr>
</table>

Amended	Original	Remarks
~~Fig. K7.2.8-1 Shapes and Dimensions of the Test Samples~~  		(Deleted)
K7.2.9 Surface and Dimensional Inspection (Deleted) (Deleted)	**K7.2.9 Surface and Dimensional Inspection** **1** The wording "to be deemed appropriate by the Society" in the **Note (4)** of **Fig. K7.1, Part K of the Rules** means to comply with **Fig. K7.2.9-1**. **2** The wording "to be deemed appropriate by the Society" in **7.2.9-2, Part K of the Rules** means that the procedure for the straightening is to comply with the following. (1) Loading used for straightening purposes is to be static. (2) In case of hot straightening, the uniform heating is to be conducted to a sufficient area, and the temperature is to be measured by a suitable instrument. The temperature is to be maintained within the range given in **Table K7.2.9-1** during the straightening operation. Weld repaired areas	

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td></td><td>may be subject to hot straightening, provided it can be demonstrated that the weld properties are not impaired by the hot straightening operations and it is approved by the Society.
(3) Cold straightening is to be restricted to the case of minor repairs of tips and edges. Cold straightening is to be followed by a stress relieving heat treatment except KAlBC3. The heat treatment is to be conducted in accordance with the requirement of K7.2.11(3).</td><td></td></tr>
<tr><td>1 The wording “a sufficient area” in 7.2.9-3(2), Part K of the Rules means the entire area in the thickness direction of the blade at the bent region and approximately 500 mm wide zones on either side of it.</td><td>(Newly added)</td><td>IACS UR W24(Rev.5) 13.2</td></tr>
<tr><td>2 The wording “a suitable instrument” in 7.2.9-3(2), Part K of the Rules means, for example, thermocouple instruments or temperature indicating crayons.</td><td>(Newly added)</td><td>IACS UR W24(Rev.5) 13.2</td></tr>
<tr><td>3 Due to the attenuating effect of ultrasound within cast copper alloys, ultrasonic testing may not be practical in some cases, depending on the shape/type/thickness, and grain- growth direction of the casting. In such cases, effective ultrasound penetration into the casting should be practically demonstrated on the item. This would normally be determined by way of back-wall reflection, and/or target features within the casting.</td><td>(Newly added)</td><td>IACS UR W24(Rev.5) 9.4 Note</td></tr>
<tr><td>~~Table K7.2.9-1 Temperature for Hot Straightening~~
<table><tr><th>~~Grade~~</th><th>~~Temperature(°C)~~</th></tr><tr><td>~~KHBsC1~~</td><td>~~500 ~ 800~~</td></tr><tr><td>~~KHBsC2~~</td><td>~~500 ~ 800~~</td></tr><tr><td>~~KAlBC3~~</td><td>~~700 ~ 900~~</td></tr><tr><td>~~KAlBC4~~</td><td>~~700 ~ 850~~</td></tr></table></td><td></td><td>(Deleted)</td></tr>
</table>

Amended	Original	Remarks
~~Fig. K7.2.9-1 The Zones for Non-destructive Inspection in the Root Areas of the Controllable Pitch or Build up Propeller Blades and Controllable Pitch Propeller Bosses~~  		(Deleted)
K7.2.10 Non-destructive Inspection (Deleted) (Deleted)	**K7.2.10 Non-destructive Inspection** **1** The wording "the penetrant test deemed appropriate by the Society" in **7.2.10-1, Part K of the Rules** means to that the penetrant test which complies with the **Annex K7.2.10** "GUIDANCE FOR THE PENETRANT TEST OF PROPELLER CASTINGS". **2** The acceptance criteria or applied quality levels are to be agreed upon between the manufacturer and the Society in accordance with a recognized standard.	

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
1 The wording "equivalent thereto" in **7.2.10-1(1), Part K of the Rules** means, for example, *JIS Z* 2343. **2** The true size of the defects obtained in the tests specified in **7.2.10-1(1), Part K of the Rules** is also to be confirmed for reference.	(Newly added) (Newly added)	
K7.2.11 Repair of Defects (Deleted)	**K7.2.11 Repair of Defects** The wording "to be as deemed appropriate by the Society" in **7.2.11-3, Part K of the Rules** means to comply with the following. (1) The kinds of weldings are to be either *MIG* or *TIG* welding, and the position of welding is, in principle, to be flat. The welding consumables are, in principle, to be aluminium bronze or the common metals. (2) The welders are to have qualifications deemed appropriate by the Society. (3) The preheating and stress relieving heat treatment following the repair weldings are to be in accordance with the requirements given in **Table K7.2.11-1** and **K7.2.11-2**.The area to be heat treated is to be as large as possible. (4) Welding grooves are to be prepared in a manner that allows good fusion of the groove bottom. (5) The welding procedure qualification tests are to be carried out in the presence of a Surveyor as follows: (a) Tests for butt welding i) Test sample The minimum dimensions of the test sample are to be as shown in **Fig.K7.2.11-1**. ii) Non-destructive inspection Test assemblies are to be examined by visual and liquid penetrant tests prior to the cutting of test	

Amended	Original	Remarks
	specimens. The welded surface is to be regular and uniform and free from prejudicial defects such as cracks and undercuts. In cases where post-weld heat treatment is carried out, non-destructive inspections are to be performed after the heat treatment. Imperfections detected by liquid penetrant tests are to be assessed in accordance with **Annex K7.2.10** "GUIDANCE FOR THE PENETRANT TEST OF PROPELLER CASTINGS". iii) Macro-etching test Three test specimens are to be prepared and etched on one side to clearly reveal the weld metal, the fusion line and the *HAZ*. No pores greater than 3 *mm* and cracks in welded sections are to be permitted. iv) Tensile test The shapes and dimensions of the tensile test specimens are to be of kind *U2A* or *U2B* given in **Table 3.1, Part M of the Rules**. The number of tensile test specimens is to be two. The tensile strength is to be in compliance with Table **K7.2.11-3**. (b) Test of mold cavity welding i) Test piece The dimensions of the test piece are to be as shown in **Fig.K7.2.11-2**. ii) Macrostructure test Macrostructure tests are to confirm that no any defects such as crack exist in the cross sections of weld parts. iii) Microstructure test Microstructure tests are to confirm that the	

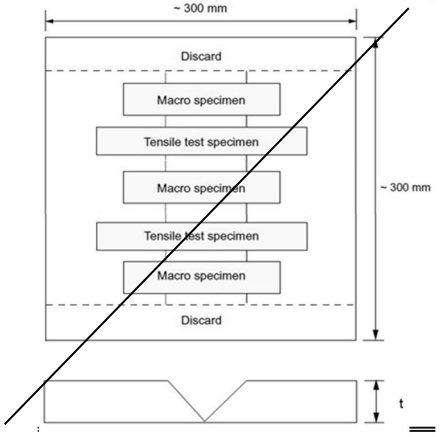
Amended	Original	Remarks
	microstructures of the deposit metal, base metal and heat-affected zones are in satisfactory condition. iv) Hardness test Hardness tests are to confirm that there is no unacceptable fluctuation in hardness between the deposit metal, base metal and heat-affected zones. (6) Where the tests specified in the preceding **(5)** fail, retests are to be in accordance with **4.2.12, Part M of the Rules**. (7) The scope of approval of the welding procedures and related specifications of propeller castings are to be in accordance with the following **(a)** through **(h)**, on the condition that the other welding conditions are same. (a) Base metal Range of approval for propeller castings is limited to be in accordance with **Table K7.2.11-4**. (b) Thickness Range of thickness is to be in accordance with **Table K7.2.11-5**. (c) Welding position Approval for a test made in any position is restricted to that position. (d) Welding process Approval is only valid for the welding process used in the welding procedure test. Single run is not qualified by a multi-run butt weld test. (e) Filler metal Approval is only valid for the filler metal used in the welding procedure test. (f) Heat input The upper limit of heat input approved is 25 % greater	

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>For the etching specified in 7.2.11-3(5)(a)iii), Part K of the Rules, a suitable etchant is 5 g iron (III) chloride, 30 ml hydrochloric acid (cone) and 100 ml water.</td><td>than that used in welding the test piece. The lower limit of heat input approved is 25 % lower than that used in welding the test piece.
(g) Preheating and interpass temperature
The minimum preheating temperature is not to be less than that used in the qualification test. The maximum interpass temperature is not to be higher than that used in the qualification test.
(h) Post-weld heat treatment
Heat treatment used in the qualification test is to be maintained during actual work. Holding time may be adjusted as a function of thickness.
(Newly added)</td><td>IACS UR W24(Rev.5)
APPENDIX A 3.4</td></tr>
<tr><td>~~Table K7.2.11-1 Temperature for Heat Treatment~~
<table><tr><th>~~Grade~~</th><th>~~Preheat temperature (°C)~~</th><th>~~Interpass temperature (°C)~~</th><th>~~Stress relief temperature (°C)~~</th></tr><tr><td>~~*KHBsC1*~~</td><td>~~150 min.~~</td><td>~~300 max.~~</td><td>~~350 ~ 500~~</td></tr><tr><td>~~*KHBsC2*~~</td><td>~~150 min.~~</td><td>~~300 max.~~</td><td>~~350 ~ 550~~</td></tr><tr><td>~~*KAlBC3*~~</td><td>~~50 min.~~</td><td>~~250 max.~~</td><td>~~450 ~ 550~~</td></tr><tr><td>~~*KAlBC4*~~</td><td>~~100 min.~~</td><td>~~300 max.~~</td><td>~~450 ~ 600~~</td></tr></table>~~Notes:~~
~~(1) The cooling rate after any stress relieving heat treatment is , in principle, not to exceed 50°C/h until the temperature reaches 200°C.~~
~~(2) Stress relieving for *KAlBC3* may be dispensed with.~~</td><td></td><td>(Deleted)</td></tr>
</table>

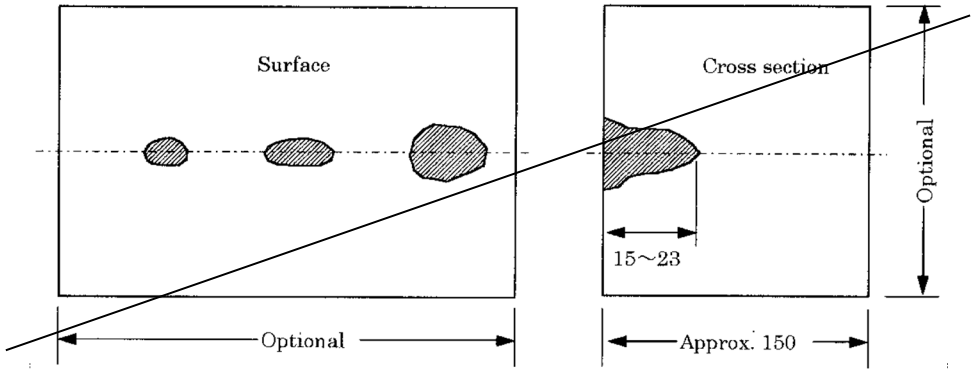
Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
Table K7.2.11.2 Soaking Times for Stress Relief Heat Treatment		(Deleted)

Stress relief temperature (°C)	*KHBsC1* and *KHBsC2*		*KAlBC3* and *KAlBC4*	
	Hours per 25 *mm* thickness	Maximum soaking times (*h*)	Hours per 25 *mm* thickness	Maximum soaking times (*h*)
350	5	15	—	—
400	1	5	—	—
450	1/2	2	5	15
500	1/4	1	1	5
550	1/4	1/2	1/2	2
600	—	—	1/4	1

Fig. K7.2.11-1 Test Sample for Butt Welding Test (*mm*)  Note: Joint preparation and fit-up as detailed in the preliminary welding procedure specification		(Deleted)

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
~~Fig. K7.2.11-2 Test Piece for Mold Cavity Welding (*mm*)~~ 		(Deleted)
~~Table K7.2.11-3 Tensile Strength for Butt Welding Test~~		(Deleted)

~~Grade~~	~~Tensile strength (N/mm^2)~~
~~*KHBsC*1~~	~~400 min.~~
~~*KHBsC*2~~	~~400 min.~~
~~*KAlBC*3~~	~~520 min.~~
~~*KAlBC*4~~	~~550 min.~~

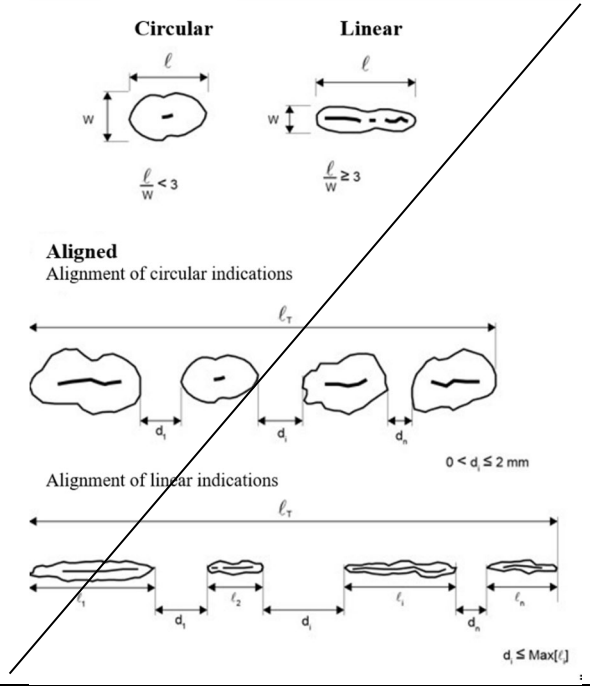
~~Table K7.2.11-4 Approval range of base metal~~		(Deleted)

~~Grade of the test sample~~	~~Approval range~~
~~*KHBsC*1~~	~~*KHBsC*1~~
~~*KHBsC*2~~	~~*KHBsC*1, *KHBsC*2~~
~~*KAlBC*3~~	~~*KAlBC*3~~
~~*KAlBC*4~~	~~*KAlBC*4~~

~~Table K7.2.11-5 Approval range of thickness~~		(Deleted)

~~Thickness of the test sample, *t* (*mm*)~~	~~Approval range~~
~~$30 \leq t$~~	~~≥ 3 *mm*~~

Amended	Original	Remarks
(Deleted)	**Annex K7.2.10 GUIDANCE FOR THE PENETRANT TEST OF PROPELLER CASTINGS** **1.1 Application** This guidance applies to the penetrant test of propeller castings. **1.2 Methods of Testing** The methods of the testing are to conform to the standard of *ISO* 3452-1, *JIS Z* 2343 or equivalent thereto. The aforementioned standards, in principle, refer to the most recent version published. Where indications of defects appear, the type of the defects and the size of the indications are to be recorded in detail. These records are to be presented to the Surveyor. For reference, the true size of the defects are also to be confirmed. **1.3 Areas of Test** The areas of test are classed to Zones A, B and C as specified in **Fig. K7.1, Part K of the Rules**. The test on Zone A is to be carried out in the presence the Surveyor. The test on Zones B and C is to be performed by the manufacturer and may be witnessed by the Surveyor upon his request. **1.4 Types of Defects** The defects detected by the penetrant test are divided into following types of **(1)** to **(4)** (see **Fig. 1**). (1) Cracks: the defects regarded as crack. (2) Circular defects: the defects other than crack, in which the length (l) is less than 3 times the width (w). (3) Linear defects: the defects other than crack, in which the length (l) is equal to or greater than 3 times the width (w). (4) Aligned defects: Aligned defects consisting of three or	

Amended	Original	Remarks
	more circular defects which are almost aligned and the spacings (*d*) between them are not exceed 2 *mm*. In addition, aligned defects consisting of two or more linear defects which are almost aligned and the spacing (*d*) between them does not exceed the longest indications of defects. The length of an aligned defect is to be as the sum of the lengths of all individual defects and all spacings between them.	
~~Fig. 1 Shapes of indications of defects~~  		(Deleted)

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
(Deleted)	**1.5 Acceptance Criteria** The defects to be evaluated are to be indications of defects which the length exceeds 1.5 *mm*. Where cracks or other defects which do not meet the acceptance criteria given in **Table 1** are detected by the penetrant test, the defects are to be repaired in accordance with the requirements in **7.2.10, Part K of the Rules**. Areas which are prepared for welding are always to be assessed according to zone A regardless of their location.	
~~Table 1 Acceptance Criteria~~ ~~Notes:~~ ~~(1) The defects are to be repaired when they do not meet the one or more criteria of (I) through (III) in this table.~~ ~~(2) The counting of the number of defects is to be conducted to the most unfavourable location relative to the indication being evaluated. The area of a reference zone is to be 100 cm^2. Each reference area may be square or rectangular with the major dimension not exceeding 250 *mm*.~~ ~~(3) Singular circular indications less than 2 *mm* for zone A and less than 3 *mm* for other zones may be disregarded.~~ ~~(4) Where only circular defects were detected, all defects are to be counted for the judgement.~~		(Deleted)

~~Area of Test~~	~~Type of Defect (excluding crack)~~	~~Acceptance Criteria~~		
		~~Max. total number of all defects (I)~~	~~Defects of same type~~	
			~~Max. number of each type (II)~~	~~Max. size for each indication (III)(*mm*)~~
~~Zone A~~	~~Circular~~	~~7~~	~~5~~	~~4~~
	~~Linear~~		~~2~~	~~3~~
	~~Aligned~~		~~2~~	~~3~~
~~Zone B~~	~~Circular~~	~~14~~	~~10~~	~~6~~
	~~Linear~~		~~4~~	~~6~~
	~~Aligned~~		~~4~~	~~6~~
~~Zone C~~	~~Circular~~	~~20~~	~~14~~	~~8~~
	~~Linear~~		~~6~~	~~6~~
	~~Aligned~~		~~6~~	~~6~~

Amended	Original	Remarks
EFFECTIVE DATE AND APPLICATION **1.** The effective date of the amendments is 1 January 2025. **2.** Notwithstanding the amendments to the Guidance, the current requirements apply to propeller castings other than propeller castings that fall under any of the following: (1) propeller castings being used on ships for which the date of contract for construction* is on or after the effective date; or (2) propeller castings for which the application for approval is submitted to the Society on or after effective date. (3) propeller castings for which the application for survey is submitted to the Society on or after effective date; or * "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29. IACS PR No.29 (Rev.0, July 2009) **1.** The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding. **2.** The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided: (1) such alterations do not affect matters related to classification, or (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted		

Amended-Original Requirements Comparison Table (Propellors)

Amended	Original	Remarks
between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed. **3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply. **4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Note: This Procedural Requirement applies from 1 July 2009.		