

Correction of Editorial Errors related to Materials and Welding

Object of Amendment

Rules for the Survey and Construction of Steel Ships Parts K and M
Guidance for the Survey and Construction of Steel Ships Part K
Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use

Reason for Amendment

Requirements related to steel castings, steel forgings and the approval of associated welding procedures are respectively stipulated in Chapters 5 and 6 of Part K and Chapter 4 of Part M of the Rules for the Survey and Construction of Steel Ships.

Some of these requirements contained editorial errors with respect to things such as examples of standard values corresponding to the required tensile strength of steel castings, the acceptance criteria for Charpy impact testing, the relaxation requirements for steel forgings, and the number of specimens to be taken for the approval tests for welding procedures, etc. or in other ways differed from actual practice.

Accordingly, relevant requirements are amended so that they reflect actual practice.

Outline of Amendment

The main contents of this amendment are as follows:

- (1) Amends indication examples for values corresponding to the required tensile strength of steel castings so that they are expressed in SI units.
- (2) Clarifies the acceptance criteria for Charpy impact testing.
- (3) Clarifies the relaxation requirements and references related to steel forgings.
- (4) Amends the number of specimens to be sampled for the fracture tests of fillet welded joints conducted during approval tests for welding procedures from two specimens to one.

Effective Date and Application

Effective date of this amendment is 1 January 2026.

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

ID:DD25-03

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p style="text-align: center;">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p style="text-align: center;">Part K MATERIALS</p> <p style="text-align: center;">Chapter 5 CASTINGS</p> <p>5.1 Steel Castings</p> <p>5.1.6 Mechanical Properties</p>	<p style="text-align: center;">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p style="text-align: center;">Part K MATERIALS</p> <p style="text-align: center;">Chapter 5 CASTINGS</p> <p>5.1 Steel Castings</p> <p>5.1.6 Mechanical Properties</p>	

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Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p>5.1.12 Marking*</p> <p>1 Steel castings which have satisfactorily complied with the required tests are to be marked with the identification mark in accordance with 1.5.1. For steel castings to which 5.1.6-2 have been applied, the value corresponding to the required tensile strength employed is to be used to the grade mark. (e.g. Where the required tensile strength employed is 430 N/mm^2, “KSC4<u>30</u>” is to be indicated)</p> <p>(Same)</p>	<p>5.1.12 Marking*</p> <p>1 Steel castings which have satisfactorily complied with the required tests are to be marked with the identification mark in accordance with <u>the requirements</u> in 1.5.1. For steel castings to which <u>the requirements given in 5.1.6-2</u> have been applied, the value corresponding to the required tensile strength employed is to be used to the grade mark. (<u>ex.</u> Where the required tensile strength employed is 430 N/mm^2, “KSC4<u>4</u>” is to be indicated)</p> <p>2 The grade of material and the manufacturer’s name or trade mark are to be cast stamped or marked by some other appropriate method on all cast steels. In addition, cast number and test number are to be stamped or marked by some other appropriate method on all cast steels greater than 250 kg in weight. The Society’s brand indicating satisfactory compliance with the Rule requirements is to be stamped on all cast steels in the neighbourhood of the above mentioned marks.</p>	<p>Changes to SI units</p>

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks																			
<p>Chapter 6 STEEL FORGINGS</p> <p>6.1 Steel Forgings</p> <p>6.1.2 Manufacturing Process*</p>	<p>Chapter 6 STEEL FORGINGS</p> <p>6.1 Steel Forgings</p> <p>6.1.2 Manufacturing Process*</p>	<p>Corrects typo errors to align with the Rules for Japanese-flagged ships.</p>																			
<p>Table K6.1 Forging Ratio</p>																					
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:35%;">Type</th> <th style="width:30%;">Dimension ⁽¹⁾</th> <th style="width:35%;">Forging ratio ⁽²⁾</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align:center;">Forgings made from ingots or from forged blooms or billets</td> <td style="text-align:center;">$L > D$</td> <td style="text-align:center;">$S = 3$</td> </tr> <tr> <td style="text-align:center;">$L \leq D$</td> <td style="text-align:center;">$S = 1.5$</td> </tr> <tr> <td rowspan="2" style="text-align:center;">Forgings made from rolled products</td> <td style="text-align:center;">$L \leq D$</td> <td style="text-align:center;">$S = 4$</td> </tr> <tr> <td style="text-align:center;">$L \geq D$</td> <td style="text-align:center;">$S = 2$</td> </tr> <tr> <td style="text-align:center;">Forgings made by upsetting ⁽³⁾</td> <td style="text-align:center;">—</td> <td style="text-align:center;">$U = 1/3$</td> </tr> <tr> <td style="text-align:center;">Rolled bars</td> <td style="text-align:center;">—</td> <td style="text-align:center;">$S = 6.3$</td> </tr> </tbody> </table>			Type	Dimension ⁽¹⁾	Forging ratio ⁽²⁾	Forgings made from ingots or from forged blooms or billets	$L > D$	$S = 3$	$L \leq D$	$S = 1.5$	Forgings made from rolled products	$L \leq D$	$S = 4$	$L \geq D$	$S = 2$	Forgings made by upsetting ⁽³⁾	—	$U = 1/3$	Rolled bars	—	$S = 6.3$
Type	Dimension ⁽¹⁾	Forging ratio ⁽²⁾																			
Forgings made from ingots or from forged blooms or billets	$L > D$	$S = 3$																			
	$L \leq D$	$S = 1.5$																			
Forgings made from rolled products	$L \leq D$	$S = 4$																			
	$L \geq D$	$S = 2$																			
Forgings made by upsetting ⁽³⁾	—	$U = 1/3$																			
Rolled bars	—	$S = 6.3$																			
<p>Notes:</p> <p>(1) L and D are respectively the length and the diameter of the forged products.</p> <p>(2) Forging ratio is to be calculated by the following equation: $S = \frac{A}{a}, \quad U = \frac{1}{L_i / L_f}$ where: A : Mean sectional area of original ingot (m^2) a : Sectional area of the portion after forging (m^2) L_i : Length before upsetting (m) L_f : Length after upsetting (m)</p> <p>(3) In the case of an initial forging ratio of at least $S = 1.5$, the forging ratio may be not more than $U = 1/2$ of the length before upsetting.</p>																					

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p>6.1.4 Chemical Composition (Same)</p> <p>(Same)</p> <p>3 For steel forgings for rudder stocks and pintles, chemical composition is to be of a weldable quality. In this case, “<u>W</u>” is to be suffixed to the markings.</p> <p>(Same)</p> <p>(Same)</p>	<p>6.1.4 Chemical Composition</p> <p>1 Steel forgings are to have the chemical composition given in Table K6.2(a) and Table K6.3(b).</p> <p>2 For steel forgings intended for welded constructions, “<i>W</i>” is to be suffixed to their respective grade markings (e.g. <i>KSF440W</i> and <i>KSFA600W-H</i>).</p> <p>3 For steel forgings for rudder stocks and pintles, chemical composition is to be of a weldable quality. <u>In cases where high strength carbon steel forgings are used, -2 above may be relaxed subject to approval by the Society.</u> In this case, “<u>(W)</u>” is to be suffixed to the markings.</p> <p>4 Steel forgings may be added with <i>Al</i>, <i>Nb</i> or <i>V</i> element for greater grain refining of the metal crystal.</p> <p>5 The manufacturer is to make an analysis of each melt in ladles (multiple heats tapped into a common ladle are considered as one heat.) and the results are to be reported to the surveyor.</p>	<p>Amends reference (Transfer to Remarks in Table K6.2(a) and K6.2(b))</p>

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended		Original										Remarks
Table K6.2(a) Chemical Composition of Machinery Steel Forgings												
Kind		Chemical Composition (%) ⁽¹⁾										
		<i>C</i>	<i>Si</i>	<i>Mn</i>	<i>P</i>	<i>S</i>	<i>Cr</i> ⁽²⁾	<i>Mo</i> ⁽²⁾	<i>Ni</i> ⁽²⁾	<i>Cu</i> ⁽²⁾	Total residual elements	
Steel forgings not intended for welding	Carbon steel forgings	0.65 max. ⁽⁴⁾	0.45 max.	0.30~1.50	0.035 max.	0.035 max.	0.30 max.	0.15 max.	0.40 max.	0.30 max.	0.85 max.	Deletes relaxation requirement for the carbon content of carbon steel forgings.
	Alloy steel forgings	0.45 max.	0.45 max.	0.30~1.00	0.035 max.	0.035 max.	0.40 min. ⁽³⁾	0.15 min. ⁽³⁾	0.40 min. ⁽³⁾	0.30 max.	—	
Steel forgings intended for welding	Carbon steel forgings	0.23 max. ⁽⁴⁾	0.45 max.	0.30~1.50	0.035 max.	0.035 max.	0.30 max.	0.15 max.	0.40 max.	0.30 max.	0.85 max.	
	Alloy steel forgings ⁽⁵⁾	0.25 max.	0.45 max.	0.30~1.00	0.035 max.	0.035 max.	0.40 min. ⁽³⁾	0.15 min. ⁽³⁾	0.40 min. ⁽³⁾	0.30 max.	—	
Notes:												
(1) Where other elements approved by the Society are added, their contents are to be described in the test results.												
(2) Elements considered to be residual elements except in cases where a minimum value is indicated. Residual elements are not to be intentionally added to the steel. The contents of residual elements are to be described in the test results.												
(3) One or more of the elements is to comply with the minimum content.												
(4) Carbon content may be increased in cases where the carbon equivalent (C_{eq}) specified in 1.5.2-2(6) is less than 0.41 %. <u>In cases where high strength carbon steel forgings for rudder stocks and pintles are used, limits of the carbon content and the carbon equivalent (C_{eq}) may be relaxed subject to approval by the Society. In this case, “(W)” is to be suffixed to the markings instead of “W”.</u>												
(5) The chemical composition in this table is to be applied unless otherwise deemed appropriate by the Society.												Transfers the relaxation requirements from 6.1.4-3

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended				Original						Remarks		
Table K6.3(a) Mechanical Properties of Machinery Steel Forgings												
Kind	Grade ⁽⁷⁸⁾	Tensile strength ⁽¹⁾ (N/mm ²)	Yield point or proof stress (N/mm ²)	Elongation ($L = 5.65\sqrt{A}$) (%)		Reduction of area (%)		Brinell hardness ⁽²⁾ HBW	Charpy V-notch impact test ⁽⁶⁷⁾			
				L	T	L	T		Test temperature (°C)	Minimum average energy (J) ⁽³⁾⁽⁴⁾		
										L	T	
For machinery ⁽⁸⁹⁾	Carbon steel forgings	KSF400-M	400 min.	200 min.	26 min.	19 min.	50 min.	35 min.	110~150	AT ⁽⁹¹⁰⁾	27	18
		KSF440-M	440 min.	220 min.	24 min.	18 min.	50 min.	35 min.	125~160			
		KSF480-M	480 min.	240 min.	22 min.	16 min.	45 min.	30 min.	135~175			
		KSF520-M	520 min.	260 min.	21 min.	15 min.	45 min.	30 min.	150~185			
		KSF560-M	560 min.	280 min.	20 min.	14 min.	40 min.	27 min.	160~200			
		KSF600-M	600 min.	300 min.	18 min.	13 min.	40 min.	27 min.	175~215			
		KSF640-M	640 min.	320 min.	17 min.	12 min.	40 min.	27 min.	185~230			
		KSF680-M	680 min.	340 min.	16 min.	12 min.	35 min.	24 min.	200~240			
		KSF720-M	720 min.	360 min.	15 min.	11 min.	35 min.	24 min.	210~250			
		KSF760-M	760 min.	380 min.	14 min.	10 min.	35 min.	24 min.	225~265			
	Alloy steel forgings	KSFA600-M	600 min.	360 min.	18 min.	14 min.	50 min.	35 min.	175~215			
		KSFA700-M	700 min.	420 min.	16 min.	12 min.	45 min.	30 min.	205~245			
		KSFA800-M	800 min.	480 min.	14 min.	10 min.	40 min.	27 min.	235~275			
		KSFA900-M	900 min.	630 min.	13 min.	9 min.	40 min.	27 min.	260~320			

Adds acceptance criteria for Charpy impact test (Same as in Remark (3) of Table K3.4)

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended					Original							Remarks	
		<i>KSFA1000-M</i>	1000 min.	700 min.	12 min.	8 min.	35 min.	24 min.	290~365				
		<i>KSFA1100-M</i>	1100 min.	770 min.	11 min.	7 min.	35 min.	24 min.	320~385				

Notes:

- (1) For steel forgings whose specified minimum tensile strength is less than 900 N/mm^2 , a tensile strength range of 150 N/mm^2 may additionally be specified. For steel forgings whose specified minimum tensile strength is 900 N/mm^2 or more, a tensile strength range of 200 N/mm^2 may additionally be specified.
- (2) Hardness values are standard and are given for information purposes only.
- (3) The letters “L” and “T” refer to longitudinal and tangential respectively and indicate the direction in which the specimen is to be taken with respect to the product.
- (4) When the absorbed energy of two or more test specimens among a set of test specimens is less in value than the specified minimum mean absorbed energy or when the absorbed energy of a single test specimens is less in value than 70 % of the specified minimum mean absorbed energy, the test is considered to be failed.
- (45) The requirement for carbon steel forgings is applicable to those annealed, normalised, normalised and tempered, or quench and tempered.
- (56) The requirement for low alloy steel forgings is applicable to those quenched and tempered. In cases where they are normalised and tempered, their mechanical properties are subject to Society approval.
- (67) Special consideration may be given to alternative requirements for Charpy V-notch impact test, depending on design and application, and subject to Society approval.
- (78) For steel forgings complying with 6.1.4-2, “W” is to be suffixed to their respective grade markings.
- (89) For steel forgings complying with the table, “-M” is to be suffixed to their respective grade markings (e.g. *KSF400-M* and *KSFA600W-M*)
- (910) AT refers to the ambient temperature specified in ISO 148-1:2016 (i.e. 23 °C ± 5 °C).

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended				Original				Remarks			
Table K6.3(b) Mechanical Properties of Hull Steel Forgings											
Kind	Grade ⁽⁶⁷⁾	Tensile strength ⁽¹⁾ (N/mm ²)	Yield point or proof stress (N/mm ²)	Elongation ($L = 5.65 \sqrt{A}$) (%)		Reduction of area (%)		Charpy V-notch impact test ⁽⁵⁶⁾			
				L	T	L	T	Test temperature (°C)	Minimum average energy (J) ⁽²⁾ ₍₃₎		
									L	T	
For hull ⁽⁷⁸⁾	Carbon steel forgings	KSF400-H	400 min.	200 min.	26 min.	19 min.	50 min.	35 min.	0	27	18
		KSF440-H	440 min.	220 min.	24 min.	18 min.	50 min.	35 min.			
		KSF480-H	480 min.	240 min.	22 min.	16 min.	45 min.	30 min.			
		KSF520-H	520 min.	260 min.	21 min.	15 min.	45 min.	30 min.			
		KSF560-H	560 min.	280 min.	20 min.	14 min.	40 min.	27 min.			
		KSF600-H	600 min.	300 min.	18 min.	13 min.	40 min.	27 min.			
	Alloy steel forgings	KSFA550-H	550 min.	350 min.	20 min.	14 min.	50 min.	35 min.			
		KSFA600-H	600 min.	400 min.	18 min.	13 min.	50 min.	35 min.			
		KSFA650-H	650 min.	450 min.	17 min.	12 min.	50 min.	35 min.			

Adds acceptance criteria for Charpy impact test (Same as in Remark (3) of Table K3.4)

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p>Notes:</p> <p>(1) For steel forgings whose specified minimum tensile strength is less than 600 N/mm^2, a tensile strength range of 120 N/mm^2 may additionally be specified. For steel forgings whose specified minimum tensile strength is 600 N/mm^2 or more, a tensile strength range of 150 N/mm^2 may additionally be specified.</p> <p>(2) The letters “L” and “T” refer to longitudinal and tangential respectively and indicate the direction in which the specimen is taken with respect to the product.</p> <p>(3) <u>When the absorbed energy of two or more test specimens among a set of test specimens is less in value than the specified minimum mean absorbed energy or when the absorbed energy of a single test specimens is less in value than 70 % of the specified minimum mean absorbed energy, the test is considered to be failed.</u></p> <p>(34) The requirement for carbon steel forgings is applicable to those annealed, normalised, normalised and tempered, or quench and tempered.</p> <p>(45) The requirement for low alloy steel forgings is applicable to those quenched and tempered. In cases where they are normalised and tempered, their mechanical properties are subject to Society approval.</p> <p>(56) Special consideration may be given to alternative requirements for Charpy V-notch impact test, depending on design and application, and subject to Society approval.</p> <p>(67) For steel forgings complying with 6.1.4-2, “W” is to be suffixed to their respective grade markings.</p> <p>(78) For steel forgings complying with the table, “-H” is to be suffixed to their respective grade markings (e.g. <i>KSF400-H</i> and <i>KSFA600W-H</i>)</p>		

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p style="text-align: center;">Part M WELDING</p> <p style="text-align: center;">Chapter 4 WELDING PROCEDURE AND RELATED SPECIFICATIONS</p> <p>4.3 Tests for Fillet Weld Joints</p> <p>4.3.7 Fracture Tests</p> <p>1 In cases where the test assembly is a plate, <u>a</u> test specimen <u>is</u> to be taken from the remainder of the test assembly after the macro-structure specimen has been removed.</p> <p>(Same)</p> <p>(Same)</p>	<p style="text-align: center;">Part M WELDING</p> <p style="text-align: center;">Chapter 4 WELDING PROCEDURE AND RELATED SPECIFICATIONS</p> <p>4.3 Tests for Fillet Weld Joints</p> <p>4.3.7 Fracture Tests</p> <p>1 In cases where the test assembly is a plate, <u>two (2)</u> test specimens <u>are</u> to be taken from the remainder of the test assembly after the macro-structure specimen has been removed.</p> <p>2 In cases where the test assembly is a pipe (or tube), an appropriate number of test specimens is to be taken from the remainder of the test assembly after the macro-structure specimen has been removed.</p> <p>3 The test assemblies are to be broken by pressing as shown in Fig. M4.6, without cracks, poor penetrations, blow holes and injurious defects in the fractured surface. Where, however, the sum of lengths having blow holes (include poor penetrations), except at both ends of the specimen (only for plate test assemblies), is not greater than 10% of the total welded length, the test may be regarded as satisfactory.</p>	<p>In the case of fillet welding, the weld line is one side, so the specimen is one.</p>

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p style="text-align: center;">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p style="text-align: center;">Part K MATERIALS</p> <p style="text-align: center;">K6 STEEL FORGINGS</p> <p>K6.1 Steel Forgings</p> <p>K6.1.2 Manufacturing Process (Same)</p> <p>2 In relation to 6.1.2-6, Part K of the Rules, where gas workings are being carried out on the parts subjected to high stress such as mass removal of crankshaft, the data related to the processes (including pre-heating) and change of material due to working are to be submitted approval of the Society.</p>	<p style="text-align: center;">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p style="text-align: center;">Part K MATERIALS</p> <p style="text-align: center;">K6 STEEL FORGINGS</p> <p>K6.1 Steel Forgings</p> <p>K6.1.2 Manufacturing Process</p> <p>1 The wording “unless otherwise deemed appropriate by the Society” in 6.1.2-4(4), Part K of the Rules means the requirements may be suitably modified at the discretion of the surveyor according to the size or form, or the use for which they are intended, except for compression deformations of steel ingots or forging materials in the longitudinal direction (i.e. upsetting).</p> <p>2 In relation to 6.1.2-7, Part K of the Rules, where gas workings are being carried out on the parts subjected to high stress such as mass removal of crankshaft, the data related to the processes (including pre-heating) and change of material due to working are to be submitted approval of the Society.</p>	<p>Amends reference</p>

Amended-Original Requirements Comparison Table (Correction of Editorial Errors related to Materials and Welding)

Amended	Original	Remarks
<p>GUIDANCE FOR THE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE</p> <p>Part I GENERAL</p> <p>Part 1 METALLIC MATERIALS</p> <p>Chapter 3 APPROVAL OF MANUFACTURING PROCESS OF STEEL CASTINGS AND STEEL FORGINGS</p> <p>3.1 General</p> <p>3.1.1 Scope (Same)</p> <p>2 This chapter applies also to the case where the surface of steel castings and forgings are subjected to hardening process in accordance with the provisions of 5.1.2-4 and 6.1.2-5, Part K of the Rules.</p>	<p>GUIDANCE FOR THE APPROVAL <u>AND TYPE APPROVAL</u> OF MATERIALS AND EQUIPMENT FOR MARINE USE</p> <p>Part I GENERAL</p> <p>Part 1 METALLIC MATERIALS</p> <p>Chapter 3 APPROVAL OF MANUFACTURING PROCESS OF STEEL CASTINGS AND STEEL FORGINGS</p> <p>3.1 General</p> <p>3.1.1 Scope</p> <p>1 This chapter applies to the testing and inspection for the approval of manufacturing castings and forgings (except those of casting and forging equipment specified in Part L of the Rules), specified in the provisions of Chapter 5 and Chapter 6, Part K of the Rules for the Survey and Construction of Steel Ships (hereinafter referred to as “the Rules”), in accordance with the provisions of 1.2, Part K of the Rules.</p> <p>2 This chapter applies also to the case where the surface of steel castings and forgings are subjected to hardening process in accordance with the provisions of 5.1.2-4 and 6.1.2-7, Part K of the Rules.</p>	<p>Amends reference</p>

