RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part K Materials

2022 AMENDMENT NO.2

Rule No.89 27 December 2022

Resolved by Technical Committee on 27 July 2022

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

Rule No.89 27 December 2022
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

“Rules for the survey and construction of steel ships” has been partly amended as follows:

Part K MATERIALS

Amendment 2-1

Chapter 3 ROLLED STEELS

3.4 Rolled Steels for Low Temperature Service

3.4.1 Application

Sub-paragraphs -1 and -2 have been amended as follows.

1 The requirements are to apply to the rolled steels not exceeding ~~40~~50 *mm* in thickness intended for tanks and ship’s hull structures adjacent to tanks of liquefied gas carriers or ships using low-flashpoint fuels, and other parts such as hull structures of refrigerated cargo carrier which are exposed to low temperature (hereinafter referred to as “steels” in **3.4**).
2 Any requirement regarding the steels over ~~40~~50 *mm* in thickness is left to the discretion of the Society.

3.4.5 Mechanical Properties

1 The mechanical properties of steels are to comply with the requirements given in **Table K3.15**.

2 Where deemed necessary by the Society, other tests on notch toughness may be required.

3 For steels to which the requirement in **17.12, Part N** is applicable, the specified value of the maximum yield point or proof stress may be set after obtaining verification by the Society.

Table K3.15 Heat Treatment and Mechanical Properties

Grade	Heat treatment	Tensile test			Impact test[4][5]		
		Yield point or proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation[3] ($L = 5.65 \times \sqrt{A}$) (%)	Testing temperature (℃)	Minimum mean absorbed energy(J)	
						L	*T*
*KL*24*A*	Normalized, quenched and tempered or *TMCP*[1]	235 min.	400~510	20 min.	-40	41 min.	27 min.
*KL*24*B*					-50		
*KL*27		265 min.	420~540		-60		
*KL*33		325 min.	440~560				
*KL*37		360 min.	490~610	19 min.			
*KL*2*N*30	Normalized, normalized and tempered, quenched and tempered or *TMCP*[2]	295 min.	420~570		-70		
*KL*3*N*32		315 min.	440~590		-95		
*KL*5*N*43		420 min.	540~690		-110		
*KL*9*N*53	Double normalized and tempered, quenched and tempered or *TMCP*[2]	520 min.	690~830	18 min.	-196		
*KL*9*N*60		590 min.			-196		

Notes:

(1) Controlled rolling may be used as the heat treatment procedure in cases where deemed appropriate by the Society.

(2) If it is deemed appropriate by the Society, the intermediate heat treatment (the intermediate heat treatment is an operation of cooling from a dual phase composed of austenite and ferrite intended for improving toughness which is carried out prior to tempering) may be applied.

(3) The specified value for *U*1 test specimen other than those of proportional-size type is to be in compliance with the requirements given in **Table K3.16**.

(4) *L* (or *T*) indicates that the longitudinal axis of the test specimen is arranged parallel (or transverse) to the final direction of rolling.

(5) 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 specimen is less in value than 70% of the specified minimum average absorbed energy, the test is considered to be failed.

Table K3.16 has been amended as follows.

Table K3.16 Minimum Elongation for *U*1 Specimen (%)

Grade	Thickness *t* (*mm*)									
	t≤5	5<*t*≤10	10<*t*≤15	15<*t*≤20	20<*t*≤25	25<*t*≤30	30<*t*≤35	35<*t*≤40	40<*t*≤45	45<*t*≤50
*KL*24*A*, *KL*24*B*, *KL*27	13	14	15	16	17	18	18	19	19	20
*KL*33	12	13	14	15	16	17	18	19	19	20
*KL*37	11	12	13	14	15	16	17	18	18	19
*KL*2*N*30, *KL*3*N*32, *KL*5*N*43	12	13	14	15	16	17	17	18	18	19
*KL*9*N*53, *KL*9*N*60	10	11	12	13	14	15	16	17	17	18

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 27 December 2022.

2. Notwithstanding the amendments to the Rules, the current requirements apply to steels for which the application for survey is submitted to the Society before the effective date.

Amendment 2-2

Chapter 2 TEST SPECIMENS AND MECHANICAL TESTING PROCEDURES

2.2 Test Specimens

2.2.2 Tensile Test Specimens*

1 Tensile test specimens are to be of size and dimensions given in **Table K2.1**, and the both ends of the test specimen may be machined to such a shape as to fit the holder of the testing machine.

2 The manufacturers may use the test specimens approved by the Society, besides those specified in **Table K2.1**. In this case, the required elongation is to be calculated from the following formula:

$$n = a \cdot E \cdot \left(\frac{\sqrt{A}}{L}\right)^{b}$$

n : Required elongation of test specimen
E : Required elongation for the proportional specimens specified in **Table K2.1**
A : Actual sectional area of test specimen
L : Actual gauge length of test specimen
a, b : Constants given in **Table K2.2** in accordance with the kind of materials.

3 The permissible variation (difference between the maximum and minimum values) at the machine-finished parallel part of test specimens is to be as specified in **Table K2.3**.

Table K2.2 has been amended as follows.

Table K2.2 Values of *a* and *b*

Material	Constant	
	a	*b*
Material I	2.0	0.40
Material II	2.6	0.55
Material III	1.25	0.127

Notes:
(1) Material I: For carbon and low alloy steels with a specified tensile strength not exceeding 600 N/mm^2 in the hot rolled, annealed, normalized, or normalized and tempered conditions.
(2) Material II: For carbon and low alloy steels in the quenched and tempered condition.
(3) Material III: For austenitic stainless steels with tensile strengths from 450 N/mm^2 to 750 N/mm^2 in the solid solution treatment.
(~~3~~4) The values of *a* and *b* for materials other ~~kinds of materials~~ than Material I, Material II and Material III are to be as deemed appropriate by the Society.

Table K2.3 has been amended as follows.

Table K2.3 Permissible Variation

Diameter of test specimens where they are machined to a circular section, or thickness and width where they are machined to a rectangular section (*mm*)	Permissible variation (*mm*)	
	Circular cross section	Rectangular cross section
Over 3 up to 6	Max. 0.03	Max. 0.06
Over 6 up to ~~16~~18	Max. 0.04	Max. 0.08
Over ~~16~~18 up to 30	Max. 0.05	Max. 0.10

2.3 Mechanical Testing Procedures

2.3.2 Impact Test

Sub-paragraph -1 has been amended as follows.

1 The impact test is to be conducted on a Charpy impact testing machine having a capacity not less than 150 *J* ~~and a striking velocity between 4.5 and 6 *m/s*~~. with the test specimens at the temperature controlled with in ±2°C of the specified temperature.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 1 January 2023.

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

(1) materials for which the application for survey is submitted to the Society on or after effective date; or

(2) materials being used on ships for which the date of contract for construction* is on or after the effective date.

* "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 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.

Amendment 2-3

Chapter 4 STEEL PIPES

4.3 Stainless Steel Pipes

4.3.1 Application

1 The requirements apply to the stainless steel pipes for low temperature service or corrosion-resistance service (hereinafter referred to as “stainless steel pipes” in **4.3**).

2 Stainless steel pipes having characteristics differing from those specified in **4.3** are to comply with the requirements in **1.1.1-3**.

4.3.2 Kinds

The stainless steel pipes are classified as specified in **Table K4.19**.

4.3.4 Chemical Composition

The chemical composition of stainless steel pipes is to comply with the requirements given in **Table K4.19**.

Table K4.19 has been amended as follows.

Table K4.19 Grades and Chemical Composition

Grade (Symbol)	Chemical composition (%)								
	C	*Si*	*Mn*	*P*	*S*	*Ni*	*Cr*	*Mo*	Others
*K*304*TP*	0.08 max.	1.00 max.	2.00 max.	0.040 max.	0.030 max.	8.00~ 11.00	18.00~ 20.00	-	-
*K*304*LTP*	0.030 max.					9.00~ 13.00			
*K*309*STP*	0.08 max.					12.00~ 15.00	22.00~ 24.00		
*K*310*STP*		1.50 max.				19.00~ 22.00	24.00~ 26.00		
*K*316*TP*		1.00 max.				10.00~ 14.00	16.00~ 18.00	2.00~ 3.00	
*K*316*LTP*	0.030 max.					12.00~ 16.00			
*K*317*TP*	0.08 max.					11.00~ 15.00	18.00~ 20.00	3.00~ 4.00	
*K*317*LTP*	0.030 max.								
*K*321*TP*	0.08 max.					9.00~ 13.00	17.00~ 19.00	-	$Ti \geq 5 \times C$
*K*329*J*1*TP*	0.08 max.	1.00 max.	1.50 max.	0.040 max.	0.030 max.	3.00~ 6.00	23.00~ 28.00	1.00~ 3.00	-
*K*329*J*3*LTP*	0.030 max.	1.00 max.	1.50 max.	0.040 max.	0.030 max.	4.50~ 6.50	21.00~ 24.00	2.50~ 3.50	*N*: 0.08~0.20
*K*329*J*4*LTP*	0.030 max.	1.00 max.	1.50 max.	0.040 max.	0.030 max.	5.50~ 7.50	24.00~ 26.00	2.50~ 3.50	*N*: 0.08~0.30
*K*347*TP*	0.08 max.	1.00 max.	2.00 max.	0.040 max.	0.030 max.	9.00~ 13.00	17.00~ 19.00	-	$Nb \geq 10 \times C$

Notes:

Symbols indicating the method of manufacture are to be added to the ends of the above-mentioned symbols as follows:

Hot finished seamless steel tube	: *-S-H*
Cold finished seamless steel tube	: *-S-C*
Automatic arc welded steel tube	: *-A*
Cold finished automatic arc welded steel tube	: *-A-C*
Bead conditioned automatic arc welded steel tube	: *-A-B*
Laser welded steel tube	: *-L*
Cold finished laser welded steel tube	: *-L-C*
Bead conditioned laser welded steel tube	: *-L-B*
Electric-resistance welded steel tube (other than hot and cold finished)	: *-E-G*
Cold finished electric-resistance welded steel tube	: *-E-C*

4.3.9 Marking

Marking for stainless steel pipes is to comply with the requirements given in **4.2.9**.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2023.

2. Notwithstanding the amendments to the Rules, the current requirements apply to stainless steel pipes for which the application for survey is submitted to the Society before the effective date.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part K Materials

2022 AMENDMENT NO.1

Notice No.64 27 December 2022

Resolved by Technical Committee on 27 July 2022

Notice No.64 27 December 2022
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part K MATERIALS

Amendment 1-1

K2 TEST SPECIMENS AND MECHANICAL TESTING PROCEDURES

K2.2 Test Specimens

K2.2.2 Tensile Test Specimens

Sub-paragraph -2 has been amended as follows.

1 The gauge length of the *U*14*B* tensile test specimens specified in **Table K2.1, Part K of the Rules** may be round off as given in **Table K2.2.2-1** in accordance with **Note (2)** in **Table K2.1, Part K of the Rules**:

Table K2.2.2-1 Rounding of Gauge Length

Thickness of test specimen t (*mm*)	Width of test specimen W (*mm*)	Gauge length L (*mm*)
$3 \leq t \leq 4$	25	50
$4 < t \leq 5$		60
$5 < t \leq 7$		70
$7 < t \leq 10$		80
$10 < t \leq 15$		100
$15 < t \leq 20$		120
$20 < t \leq 30$		140
$30 < t \leq 40$		160

2 In **2.2.2-2, Part K of the Rules**, corrections for elongation are to be in accordance with the following:

(1) ~~Stainless steel and a~~Aluminium alloy specified in **Part K of the Rules** are to be considered as Material Ⅰ in **Table K2.2, Part K of the Rules**.

(2) Corrections for elongation may not be required in the case of copper alloy.

(3) Where test specimens differing from those specified in **Table K2.1, Part K of the Rules** are used, the standard value of elongation are to be corrected according to the following formula:

$n = E/F$

E : Elongation equivalent corresponding to standard to where the proportion specimens ($L = 5.65\sqrt{A}$) specified in **Table K2.1, Part K of the Rules** are used

n : Elongation where optional test specimens are used

F : Coefficient of correction for elongation are shown in **Table K2.2.2-2, Part K** below according to the gauge length

(4) In case **(3)** above, the elongation (*n*) is to be recorded in the certificates of the material test.

(5) Diagrams for conversion of elongation between the test specimens having gauge length *L*=200 *mm* or *L*=50 *mm* and the proportional specimens are as shown in **Fig. K2.2.2-1** and **Fig. K2.2.2-2**. However, in case the of Material III, the diagram for conversion of elongation is to be according to *ISO* 2566-2:1984.

Table K2.2.2-2 has been amended as follows.

Table K2.2.2-2 Values of *F*

Gauge length	Material I	Material II	Material III
$L = 8D$	1.21	1.29	1.06
$L = 8\sqrt{A}$	1.15	1.21	1.04
$L = 4D$	0.91	0.88	0.97
$L = 4\sqrt{A}$	0.87	0.82	0.95

Notes:

D : Diameter of the test specimen

A : Sectional area of the test specimen

K3 ROLLED STEELS

K3.11 Additional Requirements for Through Thickness Properties

Paragraph K3.11.5 has been amended as follows.

K3.11.5 Non-destructive Testing

Ultrasonic testing is to be performed, with a probe frequency of 4 *MHz*~~.~~, in accordance with either *EN* 10160 Level S1/E1:1999 or *ASTM* A578 Level C:2017 or with other standards which is left to the discretion of the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 1 January 2023.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to materials other than materials that fall under any of the following:

(1) materials for which the application for survey is submitted to the Society on or after effective date; or

(2) materials being used on ships for which the date of contract for construction* is on or after the effective date.

* "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 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.

Amendment 1-2

K8 ALUMINIUM ALLOYS

K8.1 Aluminium Alloy Plates and Extruded Shapes

Paragraph K8.1.8 has been amended as follows.

K8.1.8 Corrosion Resistance Test

Testing method and judging criteria of corrosion resistance test are to comply with the following requirements.

(1) Metallographic examination

Metallographic examination is to be performed in accordance with *ASTM B* 928:2015 9.6.1 or other standards which is left to the discretion of the Society.

(2) Corrosion test

Corrosion test is to be performed with respect to both exfoliation and intergranular corrosion resistance, and the test requirements are in accordance with the following **(a)** or **(b)**:

(a) *ASTM G* 66:2018 and *ASTM G* 67:2018 carried out under the conditions specified in *ASTM B* 928:2015

The evaluation criteria are as follows:

i) When subjected to the test described in *ASTM G* 66:2018, the samples are to have exhibited no evidence of exfoliation corrosion and a pitting rating of *N*, *PA* or *PB*.

ii) When subjected to the test described in *ASTM G* 67:2018, the samples are to have exhibited resistance to intergranular corrosion at a mass loss no greater than 15 mg/cm^2.

(b) Standards deemed appropriate by the Society

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 January 2023.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to aluminium alloys other than aluminium alloys that fall under any of the following:

(1) aluminium alloys for which the application for survey is submitted to the Society on or after effective date; or

(2) aluminium alloys being used on ships for which the date of contract for construction* is on or after the effective date.

* "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 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.