RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part K Materials

2016 AMENDMENT NO.2

Rule No.82 27th December 2016

Resolved by Technical Committee on 27th July 2016

Approved by Board of Directors on 20th September 2016

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

Rule No.82 27th December 2016
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

Chapter 1 GENERAL

1.1 General

Paragraph 1.1.1 has been amended as follows.

1.1.1 Application*

1 The requirements in this Part apply to the materials intended to be used for the members or components specified in each Part of hull construction, equipment and machinery unless specified in other parts.

2 The ships carrying liquefied gases in bulk and the ships using low-flashpoint fuels are to comply with the requirements in **Part N** and **Part GF** respectively in addition to this Part.

~~**2**~~**3** Materials having characteristics differing from those specified in this Part may be used when the detailed design data, manufacturing procedure and their use are specially approved by the Society. In this case, detailed data relating to the manufacturing process, performance, etc. of the materials are to be submitted for approval to the Society.

Chapter 3 ROLLED STEELS

3.1 Rolled Steels for Hull

3.1.1 Application*

Sub-paragraph -4 has been amended as follows.

4 Steels having characteristics differing from those specified in **3.1** are to comply with the requirements in **1.1.1-~~2~~3**.

3.2 Rolled Steel Plates for Boilers

3.2.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel plates having characteristics differing from those specified in **3.2** are to comply with the requirements in **1.1.1-~~2~~3**.

3.3 Rolled Steel Plates for Pressure Vessels

3.3.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel plates having characteristic differing from those specified in **3.3** are to comply with the requirements in **1.1.1-~~2~~3**.

3.4 Rolled Steels for Low Temperature Service

3.4.1 Application

Sub-paragraphs -1 and -3 have been amended as follows.

1 The requirements are to apply to the rolled steels not exceeding 40*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**).

3 Steels having characteristics differing from those specified in **3.4** are to comply with requirements in **1.1.1-~~2~~3**.

Notes of Table K3.15 have been amended as follows.

Table K3.15 Heat Treatment and Mechanical Properties
(Table is omitted.)

Notes:

(1) 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.

(2) Heat treatment may be conducted according to *TMCP*, subject to the special approval by the Society.

(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.

~~(6) Impact test temperature for steels specified in **Part N** is given in the **Table K3.17.**~~

Table K3.17 has been deleted.

Table K3.17 ~~Impact Teat Temperature of Steels Specified in Part N~~ (Deleted)

~~Grade~~	~~Thickness *t* (*mm*)~~	~~Testing temperature($^\circ$C)~~[1]
~~*KL24A*~~	~~$t \leq 25$~~	~~-20 or (T_D -5)~~[2]
~~*KL24B*~~	~~$25 < t \leq 30$~~	~~-20 or (T_D -10)~~[2]
~~*KL27*~~	~~$30 < t \leq 35$~~	~~-20 or (T_D -15)~~[2]
~~*KL33, KL37*~~	~~$35 < t \leq 40$~~	~~(T_D -20)~~[2]
~~*KL2N30*~~	~~$t \leq 25$~~	~~-70~~
	~~$25 < t \leq 30$~~	~~-70 or (T_D -10)~~[2]
	~~$30 < t \leq 35$~~	~~-70 or (T_D -15)~~[2]
	~~$35 < t \leq 40$~~	~~-70 or (T_D -20)~~[2]
~~*KL3N32*~~	~~$t \leq 25$~~	~~-95~~
	~~$25 < t \leq 30$~~	~~-95 or (T_D -10)~~[2]
	~~$30 < t \leq 35$~~	~~-95 or (T_D -15)~~[2]
	~~$35 < t \leq 40$~~	~~-95 or (T_D -20)~~[2]
~~*KL5N43*~~	~~$t \leq 25$~~	~~-110~~
	~~$25 < t \leq 30$~~	~~-110 or (T_D -10)~~[2]
	~~$30 < t \leq 35$~~	~~-110 or (T_D -15)~~[2]
	~~$35 < t \leq 40$~~	~~-110 or (T_D -20)~~[2]
~~*KL9N53*~~	~~$t \leq 40$~~	~~-196~~
~~*KL9N60*~~		

~~Notes:~~

~~(1) T_D is the design temperature ($^\circ$C).~~

~~(2) The testing temperature is to be the lower of those specified above.~~

Paragraph 3.4.11 has been amended as follows.

3.4.11 Marking

Steels which have satisfactorily complied with the required test are to be marked with identification mark in accordance with the requirements in **1.5.1**. ~~For steels to which the requirements given in **Note (6)** to **Table K3.15** have been applied, the impact testing temperature and "*T*" are to be suffixed to the markings. (Example: *KL33*-50*T*)~~

3.5 Rolled Stainless Steels

3.5.1 Application*

Sub-paragraphs -1 and -3 have been amended as follows.

1 The requirements are to apply to the rolled stainless steels for tanks ~~in low-temperature service~~ of liquefied gas carriers or ships using low-flashpoint fuels, or corrosion-resisting service (hereinafter referred to as "steels" in **3.5**).
3 Steels having characteristics differing from those specified in **3.5** are to comply with the requirements in **1.1.1-~~2~~3**.

3.6 Round Bars for Chains

3.6.1 Application

Sub-paragraph -2 has been amended as follows.

2 Chain bars having characteristic differing from those specified in **3.6** are to comply with the requirements in **1.1.1-~~2~~3**.

3.7 Rolled Steel Bars for Machine Structures

3.7.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel bars having characteristics differing from those specified in **3.7** are to comply with the requirements in **1.1.1-~~2~~3**.

3.8 High Strength Quenched and Tempered Rolled Steel Plates for Structures

3.8.1 Application

Sub-paragraphs -1 and -4 have been amended as follows.

1 The requirements given in **3.8** are to apply to the high strength quenched and tempered rolled steels for structures not exceeding 70 *mm* in thickness intended for mobile offshore units, tanks of liquefied gas carriers or ships using low-flashpoint fuels, and process pressure vessels (hereinafter referred to as "steels" in **3.8**).
4 Steel plates having characteristics differing from those specified in **3.8** are to comply with the requirements in **1.1.1-~~2~~3**.

Notes of Table K3.28 have been amended as follows.

Table K3.28 Heat Treatment and Mechanical Properties
(Table is omitted.)

Notes:

(1) Heat treatment may be conducted according to *TMCP*, instead of quenching and tempering, subject to the approval by the Society.

(2) The minimum elongation for *U*1 test specimen is to be in compliance with requirements given in **Table K3.29**.

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

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

~~(5) Impact test for steels specified in **Part N** is given in **Table K3.30**.~~

Table K3.30 has been deleted.

Table K3.30 ~~Impact Test for Steels Specified in Part N~~ (Deleted)

~~Grade~~	~~Thickness *t* (*mm*)~~	~~Impact test~~		
		~~Testing temperature (°C)~~	~~Minimum mean absorbed energy(*J*)~~	
			~~*L*~~	~~*T*~~
~~*KA*420, *KD*420,~~	~~$t \leq 20$~~	~~0~~	~~41~~	~~27~~
~~*KA*460, *KD*460,~~	~~$20 < t \leq 40$~~	~~-20~~		
~~*KA*500, *KD*500,~~	~~$40 < t \leq 50$~~	~~-30~~		
~~*KA*550, *KD*550, *KA*620, *KD*620, *KA*620*N*, *KD*620*N*, *KA*690, *KD*690, *KA*690*N*, *KD*690*N*~~	~~$50 < t$~~	~~as deemed appropriate by the Society.~~		

Paragraph 3.8.11 has been amended as follows.

3.8.11 Marking

Steel plates which have satisfactorily complied with the required tests are to be marked with identification mark in accordance with the requirements in **1.5.1**. ~~and i~~In addition ~~the followings **(1)** and **(2)** :~~

~~**(1) F,**~~ for steels to which the requirements given in the provision to **3.8.5-1** have been applied, "-*M*" is to be suffixed to the marking (Example: *KA*620-*M*).

~~(2) For steels to which the requirements given in **Note (5)** to **Table K3.28** have been applied, "-*PV*" is to be suffixed to the marking (Example: *KA*620-*PV*).~~

3.9 Stainless Clad Steel Plates

3.9.1 Application

Sub-paragraphs -3 and -4 have been amended as follows.

3 Any requirements regarding the steel plates over 50*mm* in thickness are ~~left to the discretion of the Society~~ to comply with the requirements in **1.1.1-3**.

4 Steel plates having characteristics differing from those specified in **3.9** are to comply with the requirements in **1.1.1-~~2~~3**.

Chapter 4 STEEL PIPES

4.1 Steel Tubes for Boilers and Heat Exchangers

4.1.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel tubes having characteristics differing from those specified in **4.1** are to comply with the requirements in **1.1.1-~~2~~3**.

4.2 Steel Pipes for Pressure Piping

4.2.1 Application

Sub-paragraph -3 has been amended as follows.

3 Steel pipes having characteristics differing from those specified in **4.2** are to comply with the requirements in **1.1.1-~~2~~3**.

4.3 Stainless Steel Pipes

4.3.1 Application

Sub-paragraph -2 has been amended as follows.

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

4.4 Headers

4.4.1 Application

Sub-paragraph -2 has been amended as follows.

2 Headers having characteristics differing from those specified in **4.4** are to comply with the requirements in **1.1.1-~~2~~3**.

4.5 Steel Pipes for Low Temperature Service

4.5.1 Application

Sub-paragraphs -1 and -3 have been amended as follows.

1 The requirements are to apply to the seamless steel pipes and electric resistance welded steel pipes not exceeding 25*mm* in thickness, intended to be used at the design temperature lower than 0°C in liquefied gas carriers or ships using low-flashpoint fuels (hereinafter referred to as "steel pipes" in **4.5**).

3 Steel pipes having characteristics differing from these specified in **4.5** are to comply with the requirements in **1.1.1-~~2~~3**.

Notes of Table K4.28 have been amended as follows.

Table K4.28 Heat Treatment and Mechanical Properties

Grade	Heat treatment	Tensile test (1)(2)(3)				Bend test		Impact test	
		Yield point or proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation ($L = 5.65\sqrt{A}$) (%)		Inside radius of bend	Angle of bend (°)	Testing temperature (°C)	Mean absorbed energy $(J)^{(4)}$
				L	*T*				
KLPA	Normalized, normalized followed by tempering or quenched and tempered	205 min.	380 min.	26 min.	19 min.	6 times the outside diameter of pipe	90	-40~~(5)~~	27
KLPB								-50~~(5)~~	
KLPC								-60~~(5)~~	
*KLP*2		245 min.	450 min.	20 min.	14 min.			-70	34
*KLP*3								-95	
*KLP*9	Double normalized followed by tempering or quenched and tempered	520 min.	690 min.	15 min.	11 min.			-196	41

Notes:

(1) *L* (or *T*) denotes that the longitudinal axis of the test specimen is arranged parallel (or normal) to the final direction of rolling.

(2) Where the nominal diameter of steel pipes is 200*mm* and over, the tensile test specimen may be taken transversely.

(3) Where test specimen of non-tubular section is taken from electric resistance welded pipes, the test specimen is to be taken from the part that does not include the welded line.

(4) Where absorbed energy of more than one of a set of test specimens is under the required minimum mean absorbed energy, or where the absorbed energy of one test specimen is under 70% of the required value, the test is considered to be failed.

~~(5) Impact test temperature for steel pipes specified in **Part N** is to be 5℃ below the design temperature or -20℃, whichever is the lower.~~

(~~6~~5) In case where the width of test specimens required by **Table K2.5** and **K2.7** cannot be taken, impact tests may be omitted subject to satisfying the following **(a)** and **(b)**:

(a) Chemical composition contains not less than 0.010% of acid soluble aluminium or not less than 0.015% total aluminium.

(b) In cases where the actual impact test records of material which is manufactured on a like-for-like basis regarding manufacturing process and chemical composition are found to be satisfactory.

Paragraph 4.5.10 has been amended as follows.

4.5.10 Marking

Marking for steel pipes is generally to comply with the requirements given in **4.2.9**. ~~and in case the requirement in **Note (5)** of **Table K4.28** has been applied, "*T*" is to be suffixed to the marking. (Example: *KLPA*-25*T*)~~

Chapter 5 CASTINGS

5.1 Steel Castings

5.1.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel castings having characteristics differing from those specified in **5.1** are to comply with the requirements in **1.1.1-~~2~~3.**

5.2 Steel Castings for Chains

5.2.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel castings having characteristics differing from those specified in **5.2** are to comply with the requirements in **1.1.1-~~2~~3**.

5.3 Stainless Steel Castings

5.3.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel castings having characteristics differing from those specified in **5.3** are to comply with the requirements in **1.1.1-~~2~~3**.

5.4 Steel Castings for Low Temperature Service

5.4.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel castings other than specified in **5.4** or those used in other parts than specified in **-1** are to comply with the requirements given in **1.1.1-~~2~~3**.

Notes of Table K5.8 have been amended as follows.

Table K5.8 Mechanical Properties

	Tensile test				Impact test(~~2~~1)	
Grade	Yield point or proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%) ($L=5d$)	Reduction of area (%)	Testing temperature (℃)	Mean absorbed energy (J)
KLCA	245 min.	450 min.	21 min.	35 min.	-45(~~1~~)	27 min.
KLCB					-60(~~1~~)	
KLC2	275 min.				-70	34 min.
KLC3					-95	

Note~~s~~:

~~(1) Impact test temperature for castings specified in **Part N** is to be 5℃ below the design temperature or -20℃, whichever is the lower.~~

(~~2~~1) There the absorbed energy of more than one of a set of test specimens is under the required minimum mean absorbed energy, or where the absorbed energy of one test specimens is under 70% of required value, the test is considered to be failed.

Paragraph 5.4.8 has been amended as follows.

5.4.8 Marking

Marking of the steel casting is to comply with the requirements given in **5.1.12**. ~~and in case the requirement in **Note (1)** of **Table K5.8** has been applied, "*T*" is to be suffixed to the marking. (Example: *KLCA*-25*T*)~~

5.5 Gray Iron Castings

5.5.1 Application

Sub-paragraph -2 has been amended as follows.

2 Iron castings other than specified in **5.5** are to comply with the requirements given in **1.1.1-~~2~~3.**

5.6 Spheroidal or Nodular Graphite Iron Castings

5.6.1 Application

Sub-paragraph -2 has been amended as follows.

2 Iron castings other than specified in **5.~~5~~6** are to comply with the requirements given in **1.1.1-~~2~~3**.

5.7 Stainless Steel Propeller Castings

5.7.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel propeller castings with characteristics differing from those specified in **5.7** are to comply with the requirements in **1.1.1-~~2~~3**.

Chapter 6 STEEL FORGING

6.1 Steel Forgings

6.1.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel forgings having characteristics differing from those specified in **6.1** are to comply with the requirements in **1.1.1-~~2~~3**.

6.2 Stainless Steel Forgings

6.2.1 Application

Sub-paragraph -2 has been amended as follows.

2 Stainless steel forgings having characteristics differing from those specified in **6.2** are to comply with the requirements in **1.1.1-~~2~~3**.

6.3 Steel Forgings for Chains

6.3.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel forgings having characteristics differing from those specified in **6.3** are to comply with the requirements in **1.1.1-~~2~~3**.

6.4 Steel Forgings for Low Temperature Service

6.4.1 Application

Sub-paragraph -2 has been amended as follows.

2 Steel forgings other than specified in **6.4** or those used in other parts than specified in **-1** are to comply with the requirements given **1.1.1-~~2~~3**.

Notes of Table K6.12 have been amended as follows.

Table K6.12 Mechanical Properties

	Tensile test				Impact test~~(2)~~(1)	
Grade	Yield point or proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation ($L = 5.65\sqrt{A}$) (N/mm^2)	Reduction of area (%)	Testing temperature (℃)	Mean absorbed energy (J)
KLFA	205min.	410min.	23min.	40min.	-40~~(1)~~	27min.
KLFB	275min.	490min.	20min.		-50~~(1)~~	
KLFC	205min.	410min.	23min.		-60~~(1)~~	
*KLF*3	275min.	490min.	23min.	50min.	-95	34min.
*KLF*9	520min.	680min.	19min.	45min.	-196	41min.

Note~~s~~:

~~(1) Impact test temperature for steel forgings specified in **Part N** is to be 5℃ below the design temperature or -20℃, whichever is the lower.~~

(~~2~~1) Where the absorbed energy of more than one of a set of test specimens is under the required minimum mean absorbed energy, or where the absorbed energy of one test specimen is under 70% of the required value, the test is considered to be failed.

Paragraph 6.4.8 has been amended as follows.

6.4.8 Marking

Marking of the steel castings is to comply with the requirements given in **6.1.12**. ~~and in case the requirement in **Note (1)** of **Table K6.12** has been applied, "*T*" is to be suffixed to the making. (Example: *KLFA*-25*T*)~~

Chapter 7 COPPER AND COPPER ALLOYS

7.1 Copper and Copper Alloy Pipes and Tubes

7.1.1 Application

Sub-paragraph -3 has been amended as follows.

3 Copper and copper alloy pipes and tubes having characteristics differing from those specified in **7.1** are to comply with the requirements in **1.1.1-~~2~~3**.

7.2 Copper Alloy Castings

7.2.1 Application

Sub-paragraph -2 has been amended as follows.

2 Propeller castings having characteristics differing from those specified in **7.2** are to comply with the requirements in **1.1.1-~~2~~3**.

Chapter 8 ALUMINIUM ALLOYS

8.1 Aluminium Alloy Plates and Extruded Shapes

Paragraph 8.1.1 has been amended as follows.

8.1.1 Application

1 The requirements in this section are to apply to the plates and extruded shapes made of aluminium alloys (hereinafter referred to as "aluminium alloys" in this section.) intended to be used for tanks of liquefied gas carriers or ships using low-flashpoint fuels, and for hull structures.

2 Aluminium alloys having characteristics differing from those specified in **8.1** are to comply with the requirements in **1.1.1-~~2~~3**.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2017.

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

(1) for which the building contract is placed on or after the effective date; or

(2) in the absence of a building contract, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2017; or

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1%* of the estimated mass of all structural material, whichever is the less.

* For high speed craft, "1%" is to be read as "3%".

(3) the delivery of which is on or after 1 January 2021.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules apply to the ships that fall under the following:

(1) which convert to using low-flashpoint fuels on or after the effective date; or

(2) which, on or after the effective date, undertake to use low-flashpoint fuels different from those which it was originally approved to use before the effective date.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part K Materials

2016 AMENDMENT NO.1

Notice No.83 27th December 2016

Resolved by Technical Committee on 27th July 2016

Notice No.83 27th December 2016
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

K1 GENERAL

K1.1 General

K1.1.1 Application

Sub-paragraph -3 has been amended as follows.

3 In the application of **1.1.1-~~2~~3**, **Part K of the Rules for the Survey and Construction of Steel Ships**, those pipes made from metallic materials other than steels (for example titanium pipes, including primary material of pipes) are to be accordance with **Chapter 2**, **Part 1 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2017.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships other than ships that fall under the following:
(1) for which the building contract is placed on or after the effective date; or
(2) in the absence of a building contract, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2017; or
(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1%* of the estimated mass of all structural material, whichever is the less.
* For high speed craft, "1%" is to be read as "3%".
(3) the delivery of which is on or after 1 January 2021.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance apply to the ships that fall under the following:
(1) which convert to using low-flashpoint fuels on or after the effective date; or
(2) which, on or after the effective date, undertake to use low-flashpoint fuels different from those which it was originally approved to use before the effective date.