GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE

Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use 2014 AMENDMENT NO.2

Notice No.71 19th December 2014
Resolved by Technical Committee on 29th July 2014

ClassNK
NIPPON KAIJI KYOKAI

Notice No.71 19th December 2014
AMENDMENT TO THE GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE

"Guidance for the approval and type approval of materials and equipment for marine use" has been partly amended as follows:

Amendment 2-1

Part 1 METALLIC MATERIALS

Chapter 1 APPROVAL OF MANUFACTURING PROCESS OF ROLLED STEELS

1.4 Approval Test

1.4.3 Details of Test

Table 1.1-3 has been amended as follows.

Table 1.1-3 Approval Testing Method and Acceptance Criteria

Approval test item		Selected location of test samples (1) (2)	Length direction of test specimen (3)	Testing method	Acceptance criteria
Base metal test	(omitted)				
Brittle fracture test	*CTOD* test or deep notch test	Top	Parallel	To be consulted with the Society the dimension of test specimen, test condition etc. When newly performing tests at the time of approval.	To be as deemed appropriate by the Society.
	Temperature gradient *ESSO* test or double tension test	—	—	~~Temperature gradient *ESSO* test is to be i~~In accordance with **Annex K3.12.2-1, Part K of the Rules.**	
	NRL drop weight test	Top	Parallel	*ASTM E* 208 or equivalent method.(17)	
(omitted)					

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 19 December 2014.
2. Notwithstanding the amendments to the Guidance, the current requirements may apply to materials other than those for which the application for survey is submitted to the Society on or after the effective date.

Amendment 2-2

Part 2 EQUIPMENT

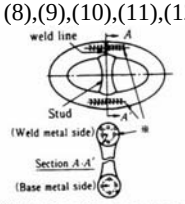
Chapter 2 APPROVAL OF MANUFACTURING PROCESS OF CHAINS

2.4 Approval Test

2.4.1 Approval Test

Table 2.2-1 has been amended as follows.

Table 2.2-1 Approval Test Items and Acceptance Criteria for Chains

<table>
<tr><td colspan="6">Test chains for approval test</td></tr>
<tr><td colspan="3">Test item</td><td>Numbers of test specimens</td><td>Selection of test specimen and details of test specimen</td><td>Test procedure</td><td>Acceptance criteria</td></tr>
<tr><td>Test of testing object of chains</td><td></td><td>(omitted)</td><td>(omitted)</td><td>(omitted)</td><td>(omitted)</td><td>(omitted)</td></tr>
<tr><td rowspan="6">Mechanical properties test of link</td><td rowspan="3">Base metal</td><td>(7)
Tensile test</td><td>1 piece</td><td rowspan="6">(7), (8),(9),(10),(11),(12)
 

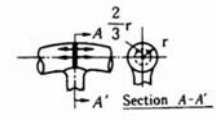
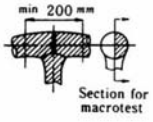
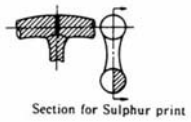
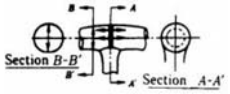
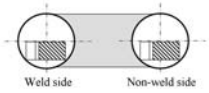
※Selection of test specimens
Tenile (U14A)
Bending (U1), Impact (U4)
Bend test specimen is to be taken from the surface.
(13)
 
</td><td rowspan="6">(7), (8), (10) and (11):
To confirm to Part K of the Rules. However, in bending test, it is to be bent in such a way that the chain surface assumes out-side. The bending radius of Grade 3, R3, R3S and R4 chains is to be 25mm. Grade R4S and R5 chains are to be as deemed appropriate by the Society.
And bending angle is to be not less than following degree; 30 for Grade R4, 45 for Grade R3S, 60 for Grade R3, and 120-180 for other Grade. And, Grade R4S and R5 chains are to be as deemed appropriate by the Society.
(9) and (12): ~~Testing temperature is to be referred to in.~~See Note (3).
(13): To be examined at its center and the point 2/3 r for the structure of HAZ, based metal and weld zone. (x 100)</td><td>To conform to Part K of the Rules.</td></tr>
<tr><td>(8)
Bending test</td><td>1 piece</td><td>To be free of harmful defect.</td></tr>
<tr><td>(9)
Impact test</td><td>See Note (3)</td><td>See Note(3).</td></tr>
<tr><td rowspan="3">Weld zone</td><td>(10)
Tensile test</td><td>2 piece</td><td>Measured tensile strength is to exceed that of the base metal. Elongation is to be for reference only.</td></tr>
<tr><td>(11)
Bending test</td><td>2 piece</td><td>To be free of harmful defect.</td></tr>
<tr><td>(12)
Impact test</td><td>See Note (3)</td><td>See Note(3).</td></tr>
<tr><td colspan="2">(13)
Micro test</td><td>2 parts of 1 piece</td><td>Coarse grain area in HAZ and degree of heat treatment are to be examined.</td></tr>
</table>

Table 2.2-1 Approval Test Items and Acceptance Criteria for Chains (Continued)

Test chains for approval test						
Test item			Numbers of test specimens	Selection of test specimen and details of test specimen	Test procedure	Acceptance criteria
Mechanical properties test of link	Weld zone	(14) Macro test	1 piece	(14) 	(14): Welded part of link in longitudinal section is to be macro-etched. (15): Sulphur print of longitudinal section of link is to be taken. (16): Hardness distribution of base metal and weld zone is to be measured at proper intervals. <u>See Note(7).</u> (17): See Note(4)	To be free of harmful defect.
		(15) Sulphur print	1 piece	(15) 		To be free of harmful defect.
		(16) Hardness test	3 parts of 1 piece	(16) 		To be for reference only. However, hardness is to be max 330 <u>*HBW*</u> for Grade *R*4*S*, and 340 <u>*HBW*</u> for Grade *R*5.
		(17) *CTOD* test	6 pieces for offshore chain (from 3 links on each weld side and non weld side)	(17)  Chain diameter is less than 120*mm*: 50*mm* x 25*mm* Chain diameter is 120*mm* and above: 80*mm* x 40*mm*		To conform to **Table 2.2-3**

Notes:

(1) The test links used in the approval test are to, in principle, be of the desired largest diameter for approval.

(2) In the case of cast links, their mechanical properties tests are to be carried out in a manner corresponding to those applied to weld zone. Of those items of test of the testing object, the tensile test and compression test may be substituted by magnetic particles testing.

(3) <u>Impact test temperatures and minimum mean absorbed energy</u> ~~Temperatures of impact test~~ are to be in accordance with **Table 2.2-2**.

(4) The *CTOD* test as in specified in **Table 2.2-1** is performed for the purpose of evaluating low temperature toughness characteristics, and this test may be omitted in case appropriate records prepared by the manufacturer are available and in case appropriate to the Society. For the initial approval test, a *CTOD* test is to be carried out. Tests are to be taken at -20 $^{\circ}C$. *BS* 7488 or other standard deemed appropriate by the Society.

(5) In the case of the approval test in association with the change in the manufacturing process as shown in **2.7**, the diameter and number of test link, or the approval test items may be reduced.

(6) When steel materials, manufacturing process or heat treatment methods which are not specified in the rules are to be employed, the Society may request other tests or submission of reference materials in addition to the specified test items.

(7) <u>For chains other than offshore chains, hardness tests of base metal may be omitted in cases deemed appropriate by the Society.</u>

Title of Table 2.2-2 has been amended as follows.

Table 2.2-2 ~~Temperature of~~ Impact Test

Chapter 3 APPROVAL OF MANUFACTURING PROCESS OF CHAIN ACCESSORIES

3.2 Approval Application Procedures

Paragraph 3.2.2 has been amended as follows.

3.2.2 Reference Data to be Submitted

(-1 is omitted)

2 When an enlarged link or end link complying with the provisions of **3.1.1-3** is manufactured by flash butt welding, the provisions in **2.2.2-1(1)** are to apply.

~~**2**~~**3** For approval of the manufacturing process of grade *R*4*S* and *R*5 chain accessories, reports which include relevant supporting data about the steel (fatigue tests, hot ductility tests, welding parameter research, heat treatment study, strain age resistance, temper embrittlement study, stress corrosion cracking data and hydrogen embrittlement study etc.) are to be submitted.

3.4 Approval Test

Paragraph 3.4.1 has been amended as follows.

3.4.1 Approval Test

1 The approval test is to be carried out on each item of chain accessories under application for each manufacturing factory. The details of ~~approved~~approval test are to be as indicated in **Table 2.3-1**, and the test is to be carried out in the presence of the Surveyor of the Society unless otherwise specified.

2 Notwithstanding **-1** above, when an enlarged link or end link complying with the provisions of **3.1.1-3** is manufactured by flash butt welding, the details of approval test are to be in accordance with the requirements of the following **(1)** and **(2)**:

(1) The "Mechanical properties test of link" in **Table 2.2-1**

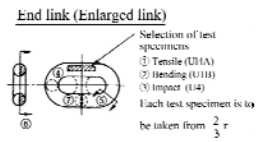
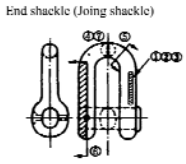
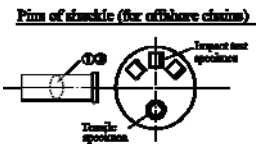
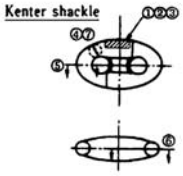
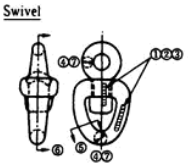
(2) The "Test on testing object of chain accessories" in **Table 2.3-1**. However, in the case of non-destructive tests, the test details are to be in accordance with the requirements in **Table 2.2-1** except for the number of test specimens.

~~**2**~~**3** For the manufacturing of offshore mooring chain accessories, in cases where using semi-finished products and ingots from a number of suppliers, the approval test specified in this Chapter are to be carried out for each supplier.

~~**3**~~**4** For approval of the manufacturing process of the semi-finished products and ingots using offshore mooring chain accessories, the approval test specified in **3.4** is to be carried out in the case of initial approval and/or changes in any approved conditions.

Table 2.3-1 has been amended as follows.

Table 2.3-1 Approval Test Items and Acceptance Criteria for Accessories

Test item		Numbers of test specimens	Selection of test specimen and details of test specimen	Test procedure	Acceptance criteria
Mechanical properties test for chain accessories:	(1) Tensile test	2 piece		(1) and (2): To conform to **Part K of the Rules**. However in bending test, However, in bending test, the bending radius of Grade 3, *R*3, *R*3*S* & *R*4 chains accessories is to be 25*mm*. Grade *R*4*S* and *R*5 chains are to be as deemed appropriate by the Society. And bending angle is to be not less than following degree; 30 for Grade *R*4, 45 for Grade *R*3*S*, 60 for Grade *R*3, and 120-180 for other Grade. And, Grade *R*4*S* and *R*5 chain~~s~~ accessories are to be as deemed appropriate by the Society. (3): ~~Testing temperature is to be referred to in~~See Note (2). (4): To be examined at its surface, 2/3 *r* and center (x 10) (5): Areas shown in the figure are to be macroetched. (6): Sulphur print of the chain accessories in longitudinal section is to be taken. (7): Hardness distribution in diametric direction is to be measured at proper intervals See Note (7) (8): ~~To be referred to **Table 2.2-1.**~~See Note (5)	To conform to **Part K of the Rules**.
	(2) Bending test	2 piece			To be free of harmful defect.
	(3) Impact test	See Note (2)			See Note (2)
	(4) Micro test	3 parts of 1 piece			The degree of heat treatment is diametric direction is to be examined.
	(5) Macro test	1 part			To be free of harmful defect.
	(6) Sulphur print	1 piece			To be free of harmful defect.
	(7) Hardness test	1 piece			To be for reference only. However, hardness is to be max 330 *HBW* for Grade *R*4*S*, and 340 *HBW* for Grade *R*5.
	(8) *CTOD* test	3 pieces			To be as deemed appropriate by the Society.
Test on testing object of chain accessories	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)

Notes:

(1) The test chain accessories used for approval test are to, in principle, be two or three, in number, of the larges diameter under application.

(2) The number of impact test specimens, test temperatures and minimum mean absorbed energy are to be in accordance with **Table 2.3-2**.

(3) In the case of the approval test required in connection with the change in the manufacturing as shown in **3.5**, the Society may reduce the requirements in the diameter and number of test chain accessories with respect to the test items.

(4) When any steel materials, manufacturing process or heat treatment not specified in the Rules are intended to be used, the Society may request other testing procedure or submission of reference data in addition to those specified in the

Rules.

(5) *CTOD* tests are required for the initial approval of offshore mooring chain accessories. Test pieces are to be taken from the quarter thickness location. ~~and t~~Test piece dimensions and test procedure are to conform to **Table 2.2-1**.

(6) Each specimen is to be capable of withstanding 1.1 times of the specified breaking test load specified in **Table L3.10**. In case of offshore chain accessories, each specimen is to be capable of withstanding their breaking test loads without fracturing for at least 30 *seconds*.

(7) For chain accessories other than offshore mooring chain accessories, hardness tests may be omitted in cases deemed appropriate by the Society.

Paragraph 3.4.3 has been amended as follows.

3.4.3 Omission of Approval Test for Manufacturing Process

(1) When the test for chain has accessories of higher grade has been passed, the approval test for manufacturing process for chain accessories of the same or of the smaller diameter manufactured by the same casting or forging method may be omitted. When enlarged links and end links complying with the provisions of **3.1.1-3** are manufactured by flash butt welding, the provisions in **2.4.3** are to apply.

(2) When the test either for swivel or for kenter shackle has been passed, the approval test for manufacturing process for another product not subjected to approval test may be omitted provided that discrimination between the casting procedure and forging procedure is specified.

(3) When the test either for swivel or for kenter shackle has been passed, the approval test for manufacturing process for the enlarged link and end link of the same diameter as that of the swivel and kenter shackle or less may be omitted provided that they are manufactured by the same manufacturing process used for the swivel or kenter shackle.

(4) When the test for end shackle has been passed, the approval test for manufacturing process of the connecting shackle of the same diameter thereof or less may be omitted.

(5) When the test either for connecting shackle of end shackle has been passed, the approval test for manufacturing process of the enlarged link and end link of the same diameter thereof or less may be omitted provided that they are manufactured by the same manufacturing process used for the connecting shackle or end shackle.

(6) The diameter of the chain accessories shown in items **(1)** through **(5)** above corresponding to that of the common link to which they are fitted.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 19 December 2014.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to chains and chain accessories other than those for which the application for approval of manufacturing process is submitted to the Society on or after the effective date.