

# **BIRO KLASIFIKASI INDONESIA**

## **Regulations for the Inspection of Anchor Chain Cables**



**EDITION 2002**

*The following Regulations come into force on 1<sup>st</sup> November 2002*

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### APPENDIX 1

## **Regulations for the Inspection of Anchor Chain Cables**

### **1. Scope**

The present Regulations are applicable to inspections of brand new and used anchor chain cables at dealer's premises.

### **2. Applicable other Regulations**

Rules for Material, Volume V, Section 12 - Anchor Chain Cables and Accessories, in the following referred to as "Rules for Anchor Chain Cables".

### **3. Requirements for Chain Cables Dealers**

- 3.1** Chain cable dealers must have at their disposal calibrated testing machines for the performance of proof load and breaking load tests in accordance with the Rules for Anchor Chain Cables. Also, they have to state the name of the institution charged by them with the performance of tensile and notched bar impact tests, if they do not have any testing facilities of their own for such purposes.
- 3.2** Chain cable dealers' premises must include roofed-over, properly lighted areas where significant defects on the cable surfaces can be seen and stampings identified. Suitable provisions must be made for ensuring inspection on the chains from a normal sight distance.
- 3.3** Chain cable dealers have to name an expert master or foreman familiar with chain inspections and with the regulations for anchor chain cables and responsible for performance of the inspections.

- 3.4** Chain cable dealers are obliged to keep correct records on all purchases and sales of chain cables so that they may at any time furnish proof to the surveyors as to where they purchased the chain cables and of the ship or customer for which/whom the chain cables are intended. To this effect, the dimensions, grades and identification marks existing are to be recorded.
- 3.5** Proof of the requirements as per items 3.1 to 3.4 being fulfilled is to be furnished to the surveyor prior to commencement of the inspections and at a later stage, at the BKI surveyor's discretion.

#### **4. Inspections of Anchor Chain Cables**

During inspection, a distinction is to be made between **brand new chain cables** previously inspected by some other classification society and provided with the prescribed stamping and **used chain cables**. Chain cables presented as being brand new, but neither stamped completely nor accompanied by an inspection certificate are to be treated like used chain cables.

##### **4.1 Checking and marking of new chain cables**

- 4.1.1** Each length of chain cable is to be presented to the surveyor on the place of testing, duly ranged, for inspection and identification. At the same time, the original inspection certificates are to be handed to the surveyor. If the stamping (both end links of each length require to be stamped) complies with the data stated in the certificate, each end link will be additionally marked with a BKI stamp (Certificate No., branch office, KI stamp, grade, month and year of inspection, Surveyor's No.), on the side opposite the original stamping.

**The original stamping must not be removed!**

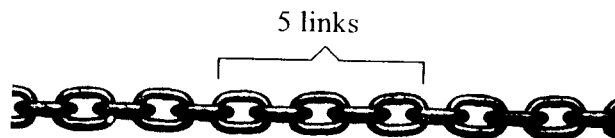
The surveyor will file the original certificate and issue a new one on Form F.262 (see annex 1). Under the heading "Remarks", he will indicate the No. of the original certificate and state that the symbols and test data of the chain cable were taken from the original certificate.

- 4.1.2** If it is not possible to present an original certificate for new chain cables, with prescribed stamping, each length is to be tested to proof load. Subsequently, each length is to be inspected, and at a randomly selected point, the dimensions of a length of 5 links ( $L_5$ ) and the diameters ( $d$ ) are to be checked.

For brand-new cables, the following length tolerances, measured over a length of 5 links, are to be observed:

$$L_{5 \text{ new}} \text{ min.} = 22 \times d$$

$$L_{5 \text{ new}} \text{ max.} = 22,55 \times d$$



**Fig. 1** Length of 5 links

Following satisfactory inspection, the surveyor will mark each end link of each length in accordance with item 4.1.1 and issue a Test Certificate on Form F.262

## **4.2** Checking and marking of used chain cables

- 4.2.1** If the prescribed stamping of the chain cable, including the test stamp of the classification society can be identified beyond doubt and if the former chain cable certificate is available, each length of chain cable is to be tested as follows :

- Test to proof load, with prescribed stressing in accordance with the Rules for Anchor Chain Cables.
- Dimensional check at a random point, over a length of 5 links. For used chain cables, the following length tolerances, measured over 5 links ( $L_5$ ), are to be observed:

$$L_{5 \text{ used}} \text{ min.} = 22 \times d$$

$$L_{5 \text{ used}} \text{ max.} = 22,95 \times d$$

**Note:**

The upper tolerance limit may be exceeded, subject to approval, if proof is furnished that the chain cable will properly pass through the capstan.

- Checking of diameter tolerances at one link each, at beginning, in the middle and at the end of each length. The diameters (d) are to be measured at least at two levels, staggered at an angle of  $90^\circ$ , in both rounds and in both straight sides of the link. The mean value of the diameters measured must not be less than 12% below the nominal diameter.
- Visual inspection over the entire length.

Following satisfactory inspection, the surveyor will additionally stamp both end-links of each length with the symbols required and issue a Certificate on Form F.262. The previous stamping must not be destroyed and is to be mentioned in the BKI Certificate. Also, it is to be stated in the Certificate that the chain cable is a used one.

For this procedure, it is necessary for the chain cable dealer to present the previous chain cable certificate. Failing this, the chain cables are to be inspected in accordance with 4.2.2.

- 4.2.2** If the chain cable is not stamped or if the stamping can no longer be identified beyond doubt and if no certificate is available, in addition to scope of inspection as stipulated in 4.2.1, the following tests will have to be carried out.

Breaking load test in accordance with the Rules for Anchor Chain Cables on a 3-link specimen taken from each length. The break must occur in the link bend and must show a tough breaking structure.

In lieu of this a material test on single links taken from every length with the following scope are to be carried out:

- Tensile test at a cylindrical test specimen to be taken from the side of the link opposite to the welding seam;
- One set of ISO-V-notch impact test specimens taken from the same point (not required for K1 chain cables);
- In the case of K3 chain cables, one additional set of ISO-V notch impact specimens, with the notch being located in the centre of the welding seam.

During the tests, the requirements as per the Rules for Anchor Chain Cables have to be complied with.

Following satisfactory inspection and testing, the surveyor will stamp each end link and issue a Certificate on Form F.262. It is to be stated in the certificate that a used chain cable is concerned.

## **5. Fastening of Loose Studs**

Loose studs may be fastened either by cold working of the studs or, if the chain cables are of grades KI-K1 and KI-K2, by welding.

### **5.1 Cold working**

For cold working, the stud is strained on a solid base, by hammering with a pane or by hydraulic press, until tight fit is achieved.

### **5.2 Welding**

- 5.2.1** Welding is admissible on one stud side only, i.e. on the side opposite the flash butt weld. Prior to welding, the weld points are to be metallicity bright or ground. Welding is to be carried out prior to performance of the proof load test.

- 5.2.2** The weld point and the area surrounding it are to be preheated to approx. 80 °C to 100 °C, if the workpiece temperature is < 5°C or if humidity has formed in the neighbouring area, and also if the chain cable diameter exceeds 40 mm.
- 5.2.3** Welding is to be carried out by trained welders, in the horizontal position, using basic coated electrodes with controlled low hydrogen content (maximum 10 cm<sup>3</sup>/100 gr of weld deposit). The strength of the weld deposit may only slightly exceed that of the chain cable steel.
- 5.2.4** The seam must be free from defects that might affect the safety of the chain cable during operation. Grooves, end craters, open pores and slag are to be eliminated by grinding, with smooth transitions towards the links side. Freedom from defects is to be checked by magnetic particle or dye penetration test.
- 5.2.5** Owing to the potential changes which the base metal might undergo, in the case of KI-K3 chain cables made of quenched and tempered steel, studs may not be welded on. In the case of normalized steel chain cables of grade KI-K3, on application, welding of the stud may be permitted if the dealer submits to BKI a welding specification for approval, and has furnished proof of flawless welding at a test specimen (scope of test : 1 macro-etching each from the beginning and end of the seam, including hardness measurements; one microstructure test each of the weld deposit, the fusion line and the heat-affected zone in the chain cable steel, at a test specimen taken from the beginning of the seam. Magnetic particle test prior to cutting of the test specimen).
- 5.2.6** The dealer will have to prepare a test report on the performance of weldings and hand it to the BKI surveyor.

## **6. Replacement of Defective Links**

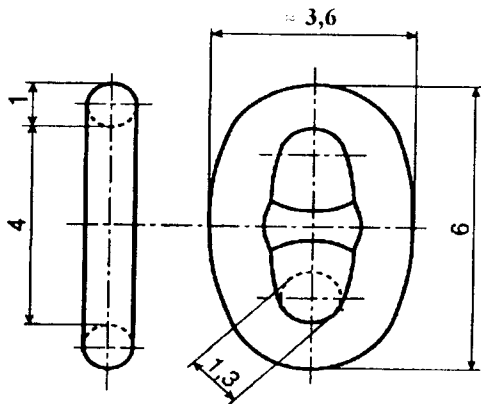
If during inspection, a chain cable link proves to be defective or if the admissible 12% tolerance for the nominal diameter is exceeded, the link will have to be cut out and replaced by a Kenter type shackle.

Repair welds at chain cable links are **not permissible!**

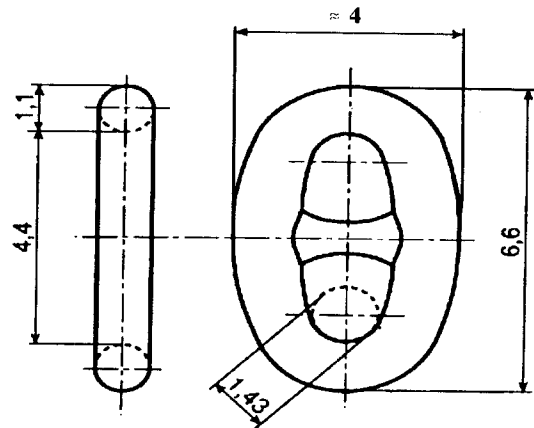


7. Dimensions for Chain Links, Swivel and Shackles

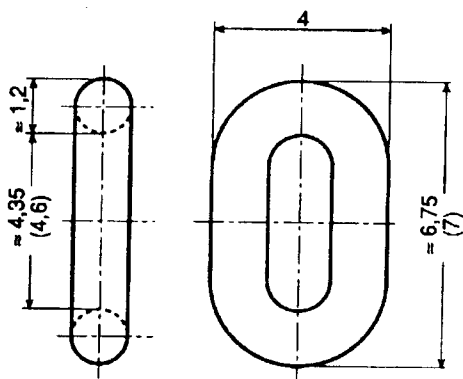
All dimensions are given as a factor of the nominal diameter  $d$  of the standard links



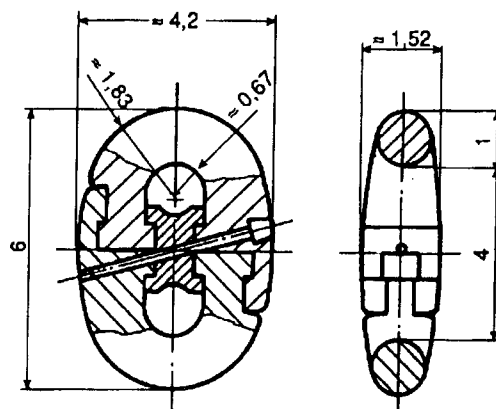
Standard Link



Large Link



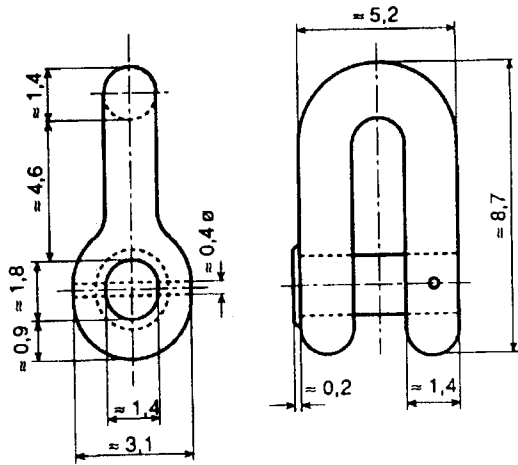
Studless Link



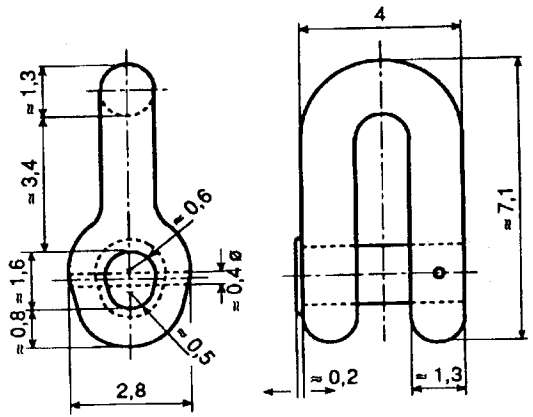
Kenter Shackle

Note :

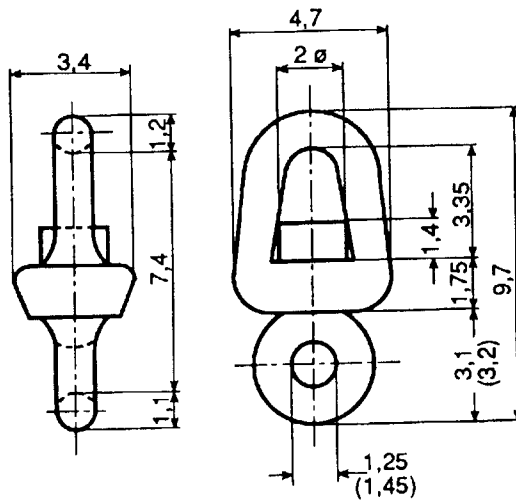
The dimension in brackets ( ) may be chosen for studless links in fore runner



End Shackle



Connecting Shackle



Swivel

Note :  
The dimension in brackets ( ) apply to cast steel swivels.

Table of proof and breaking loads for stud link chain cables

Chain diameter [mm]	Grade KI-K1		Grade KI-K2		Grade KI-K3		Weight [kg/m] <sup>1)</sup>
	Proof load [kN]	Breaking load [kN]	Proof load [kN]	Breaking load [kN]	Proof load [kN]	Breaking load [kN]	
1	2	3	4	5	6	7	8
11	36	51	51	72	72	102	2,65
12,5	46	66	66	92	92	132	3,40
14	58	82	82	116	116	165	4,30
16	76	107	107	150	150	216	5,60
17,5	89	127	127	179	179	256	6,70
19	105	150	150	211	211	301	7,90
20,5	123	175	175	244	244	349	9,2
22	140	200	200	280	280	401	10,6
24	167	237	237	332	332	476	12,6
26	194	278	278	389	389	556	14,8
28	225	321	321	449	449	642	17,2
30	257	368	368	514	514	735	19,7
32	291	417	417	583	583	833	22,4
34	328	468	468	655	655	937	25,3
36	366	523	523	732	732	1050	28,4
38	406	581	581	812	812	1160	31,6
40	448	640	640	896	896	1280	35,0
42	492	703	703	981	981	1400	38,6
44	538	769	769	1080	1080	1540	42,4
46	585	837	837	1170	1170	1680	46,3
48	635	908	908	1270	1270	1810	50,4
50	696	981	981	1370	1370	1960	54,8
52	739	1060	1060	1480	1480	2110	59,2
54	794	1140	1140	1590	1590	2270	63,8
56	851	1220	1220	1710	1710	2430	68,7
58	909	1290	1290	1810	1810	2600	73,6
60	969	1380	1380	1940	1940	2770	78,8
62	1030	1470	1470	2060	2060	2940	84,2
64	1100	1560	1560	2190	2190	3130	89,7
66	1160	1660	1660	2310	2310	3300	95,4
68	1230	1750	1750	2450	2450	3500	101,3
70	1290	1840	1840	2580	2580	3690	107,3
73	1390	1990	1990	2790	2790	3990	116,7
76	1500	2150	2150	3010	3010	4300	126,5
78	1580	2260	2260	3160	3160	4500	133,2
81	1690	2410	2410	3380	3380	4820	143,7
84	1800	2580	2580	3610	3610	5160	154,5
87	1920	2750	2750	3850	3850	5500	165,8
90	2050	2920	2920	4090	4090	5840	177,4
92	2130	3040	3040	4260	4260	6080	185,4
95	2260	3280	3280	4510	4510	6440	197,6

Table of proof and breaking loads for stud link chain cables (continued)

Chain diameter [mm]	Grade KI-K1		Grade KI-K2		Grade KI-K3		Weight [kg/m] <sup>1)</sup>
	Proof load [kN]	Breaking load [kN]	Proof load [kN]	Breaking load [kN]	Proof load [kN]	Breaking load [kN]	
1	2	3	4	5	6	7	8
97	2340	3340	3340	4680	4680	6690	206,1
100	2470	3530	3530	4940	4940	7060	219,0
102	2560	3660	3660	5120	5120	7320	227,8
105	2700	3850	3850	5390	5390	7700	241,4
107	2790	3980	3980	5570	5570	7960	250,7
111	2970	4250	4250	5940	5940	8480	269,8
114	3110	4440	4440	6230	6230	8890	284,6
117	3260	4650	4650	6510	6510	9300	299,8
120	3400	4850	4850	6810	6810	9720	315,4
122	3500	5000	5000	7000	7000	9990	326,0
124	3600	5140	5140	7200	7200	10280	336,7
127	3750	5350	5350	7490	7490	10710	353,2
130	3900	5570	5570	7800	7800	11140	370,2
132	4000	5720	5720	8000	8000	11420	381,6
137	4260	6080	6080	8510	8510	12160	411,0
142	4520	6450	6450	9030	9030	12910	441,6
147	4790	6840	6840	9560	9560	13660	473,2
152	5050	7220	7220	10100	10100	14430	506,0
157	5320	7600	7600	10640	10640	15200	539,8
162	5590	7990	7990	11170	11170	15970	574,7

<sup>1)</sup> Approximate weight data calculated according to the formula  $\text{kg/m} = 0,0219 \cdot d^2$  (d in mm)



# BIRO KLASIFIKASI INDONESIA

## SERTIPIKAT RANTAI JANGKAR *Certificate for anchor chain cable*

No.

Tanggal:  
*Date*

Dengan ini diterangkan bahwa rantai jangkar tersebut dibawah ini telah diuji dan  
*This is to certify that anchor chain cable described below has been tested and*

memenuhi persyaratan dari Peraturan Biro Klasifikasi Indonesia  
*complied with the requirement of the Rules of Biro Klasifikasi Indonesia*

Jenis rantai:  
*Kind of chain*

Cara pembuatan:  
*Kind of Manufacture*

Pembuat:  
*Maker*

Kualitas:  
*Grade*

Jumlah segel x Panjang tiap segel (m):  
*Number of length x Length each*

Diameter x Panjang x Lebar mata rantai (mm):  
*Diameter x Length x Breadth of link*

Jumlah dan jenis hubung segel:  
*Number and type of connecting shackles*

Berat total (kg):  
*Total weight*

No. sertipikat uji bahan:  
*Material test certificate no.*

Beban putus (kN):  
*Breaking load*

Beban percobaan (kN):  
*Proof load*

Tempat dan tanggal uji:  
*Place and date of test*

Penggunaan:  
*Intended for*

Penandaan:  
*Marking*

Catatan:  
*Remarks*

**HEAD OF BRANCH OFFICE**