INTERNATIONAL STANDARD 1704

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Shipbuilding — Anchor chains

First edition — 1973-04-01

UDC 629.12 : 672.6

Ref. No. ISO 1704-1973 (E)

Descriptors : shipbuilding, ship anchors, chains, specifications.

Price based on 12 pages

FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1704 (originally draft International Standard ISO/DIS 1704.3) was drawn up by Technical Committee ISO/TC 8 *Shipbuilding*, and circulated to the Member Bodies in June 1972.

It has been approved by the Member Bodies of the following countries :

Australia	Ireland	South Africa, Rep. of
Austria	Israel	Spain
Czechoslovakia	Japan	Sweden
Egypt, Arab Rep. of	Netherlands	Thailand
Finland	Poland	Turkey
Germany	Portugal	United Kingdom
India	Romania	U.S.S.R.

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Belgium
France
Italy
Norway

Printed in Switzerland

Published 1975-04-01

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Shipbuilding — Anchor chains

ERRATUM

Page 11 : Replace the values in the last column of the table (*m*) with the following values :

m
109
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213

Shipbuilding — Anchor chains

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the shape, proportions, tolerances and material of the component parts of anchor chains for ships.

2 SHAPE AND DIMENSIONS

2.1 Shape

The stud links, shackles, shackle bolts and studless links shall be of the shapes and proportions shown in section 5. All links and shackles shall be of uniform shape.

2.2 Dimensions

The dimensions of stud links, shackles, shackle bolts and studless links shall be in accordance with the specified proportions.

The nominal diameters of the links shall be measured at the crown of the links.

All dimensions, based on the nominal diameters d of the common links, shall be measured after the chain and shackles have been subjected to the statutory proof loads.

2.2.1 *Enlarged links*

The proportions of the enlarged links are the same as those of the common links.

2.2.2 *Common links and enlarged links*

The inside radii of common links and enlarged links shall be sufficient to allow each link to bed properly and work freely.

2.2.3 *End links and studless links*

The inside radii of end links and studless links shall be equal to half the inside width and the sides shall be parallel.

3 TOLERANCES

3.1 Nominal diameter d of the common link

The allowable manufacturing tolerances on the nominal diameter d of the common links are :

- minus 1 mm up to $d = 40$ mm;
- minus 2 mm above $d = 40$ mm, up to $d = 83$ mm;
- minus 3 mm above $d = 83$ mm.

The cross-sectional area of the link shall be at least the theoretical area of the nominal diameter.

3.2 Length of five links

The allowable manufacturing tolerance on a length of five links is $^{+2,5}_{0}$ %

3.3 All other dimensions

The allowable manufacturing tolerance is ± 2,5 %, taking into account the fact that all components of the anchor chain shall be a good fit with each other.

4 MATERIAL

The quality of the material used for the manufacture of links and shackles shall not be inferior in any respect to that of the material used for the manufacture of the other component parts forming the anchor chain.

The design, material and tests of the complete anchor chains are subject to the legal requirements of the countries concerned, as well as inspection by the competent authorities.

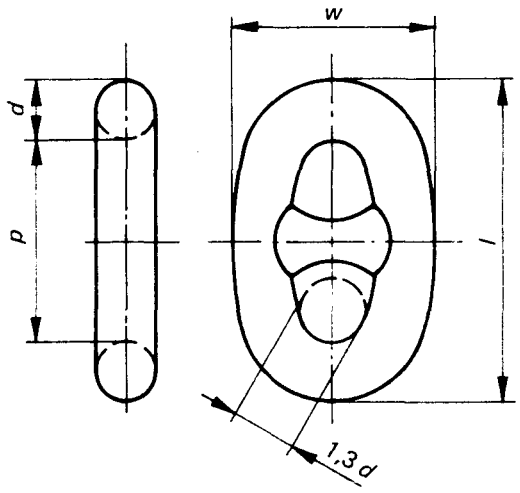
5 DIMENSIONS OF LINKS AND SHACKLES

The values given in the following tables apply to links and shackles manufactured partly or wholly from round steel bars.

The range of nominal diameters d is made up of the values specified by the Classification Societies associated in the International Association of Classification Societies (IACS).

The values of d in brackets have been added in order to meet the requirements of the Classification Societies which are members of the IACS.

5.1 Common link



d = nominal diameter of common link
l = $6\,d$
p = $4\,d$
$w \approx 3{,}6\,d$

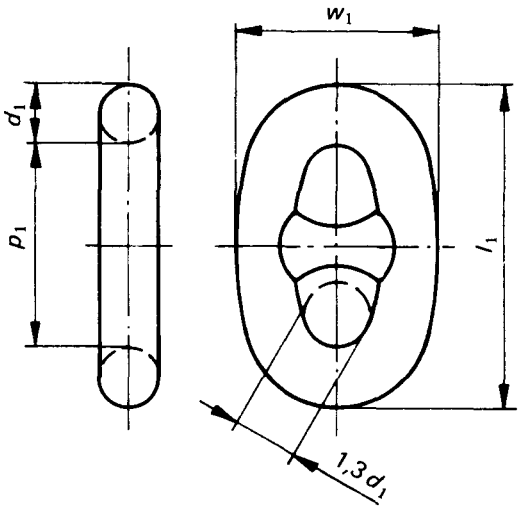
Dimensions in millimetres

d	l	p	w
17,5	105	70	63
19	114	76	68
20,5	123	82	74
22	132	88	79
24	144	96	86
26	156	104	94
28	168	112	101
30	180	120	108
32	192	128	115
34	204	136	122
36	216	144	130
38	228	152	137
40	240	160	144
42	252	168	151
44	264	176	158
46	276	184	166
48	288	192	173
50	300	200	180
52	312	208	187
54	324	216	194
56	336	224	202
58	348	232	209
60	360	240	216
62	372	248	223
64	384	256	230
66	396	264	238
68	408	272	245
70	420	280	252
73	438	292	263

Dimensions in millimetres

d	l	p	w
76	456	304	274
78	468	312	281
81	486	324	292
83	498	332	299
(84)	504	336	302
85	510	340	306
87	522	348	313
(90)	540	360	324
92	552	368	331
(95)	570	380	342
97	582	388	349
(100)	600	400	360
102	612	408	367
(105)	630	420	378
107	642	428	385
(111)	666	444	400
112	672	448	403
(114)	684	456	410
117	702	468	421
(120)	720	480	432
122	732	488	439
(124)	744	496	446
127	762	508	457
(130)	780	520	468
132	792	528	475
137	822	548	493
142	852	568	511
147	882	588	529
152	912	608	547

5.2 Enlarged link



d = nominal diameter of common link
d_1 = diameter of enlarged link $\approx 1{,}1\,d$
l_1 = $6\,d_1$
p_1 = $4\,d_1$
w_1 $\approx$ $3{,}6\,d_1$

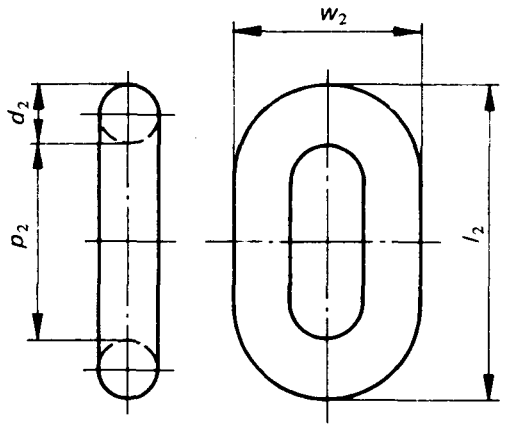
Dimensions in millimetres

d (common link)	d_1	l_1	p_1	w_1
17,5	19	114	76	68
19	20,5	123	82	74
20,5	22	132	88	79
22	24	144	96	86
24	26	156	104	94
26	28	168	112	101
28	30	180	120	108
30	34	204	136	122
32	36	216	144	130
34	38	228	152	137
36	40	240	160	144
38	42	252	168	151
40	44	264	176	158
42	46	276	184	166
44	48	288	192	173
46	50	300	200	180
48	54	324	216	194
50	56	336	224	202
52	58	348	232	209
54	60	360	240	216
56	62	372	248	223
58	64	384	256	230
60	66	396	264	238
62	68	408	272	245
64	70	420	280	252
66	73	438	292	263
68	76	456	304	274
70	78	468	312	281
73	81	486	324	292

Dimensions in millimetres

d (common link)	d_1	l_1	p_1	w_1
76	84	504	336	302
78	85	510	340	306
81	90	540	360	324
83	92	552	368	331
(84)	92	552	368	331
85	95	570	380	342
87	97	582	388	349
(90)	100	600	400	360
92	102	612	408	367
95	105	630	420	378
97	107	642	428	385
(100)	111	666	444	400
102	112	672	448	403
(105)	114	684	456	410
107	117	702	468	421
(111)	122	732	488	439
112	124	744	496	446
(114)	124	744	496	446
117	130	780	520	468
(120)	132	792	528	475
122	137	822	548	493
(124)	137	822	548	493
127	142	852	568	511
(130)	142	852	568	511
132	147	882	588	529
137	152	912	608	547
142	157	942	628	565
147	162	972	648	583
152	167	1 002	668	601

5.3 End link



d = nominal diameter of common link
d_2 = diameter of end link $\approx 1{,}2\,d$
l_2 = $p_2 + 2\,d_2 \approx 6{,}75\,d$
p_2 $\approx$ $4{,}35\,d$
W_2 = $4\,d$

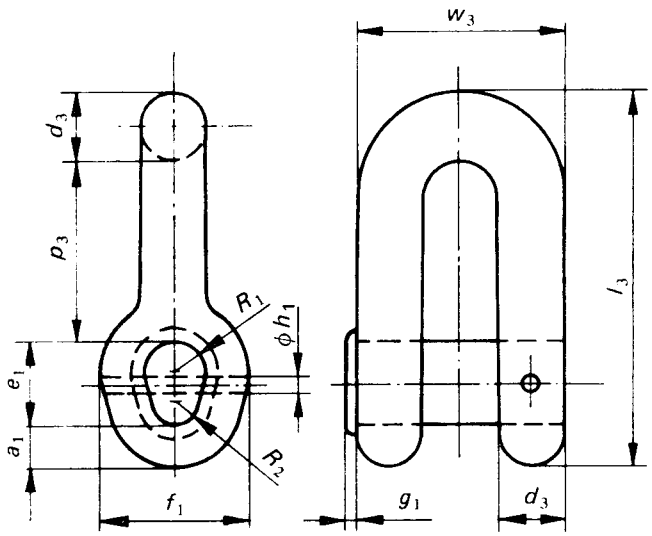
Dimensions in millimetres

d (common link)	d_2	l_2	p_2	w_2
17,5	20,5	118	76	70
19	22	128	83	76
20,5	24	138	89	82
22	26	149	96	88
24	28	162	104	96
26	32	176	113	104
28	34	189	122	112
30	36	203	131	120
32	38	216	139	128
34	40	230	148	136
36	44	243	157	144
38	46	257	165	152
40	48	270	174	160
42	50	284	183	168
44	52	297	191	176
46	56	311	200	184
48	58	324	209	192
50	60	338	218	200
52	62	351	226	208
54	64	365	235	216
56	68	378	244	224
58	70	392	252	232
60	73	405	261	240
62	73	419	270	248
64	76	432	278	256
66	81	446	287	264
68	81	459	296	272
70	84	473	305	280
73	87	493	318	292

Dimensions in millimetres

d (common link)	d_2	l_2	p_2	w_2
76	92	513	331	304
78	95	527	339	312
81	97	547	352	324
83	100	560	361	332
(84)	100	567	365	336
85	102	574	370	340
87	105	587	378	348
(90)	107	608	392	360
92	111	621	400	368
(95)	115	641	413	380
97	117	655	422	388
(100)	120	675	435	400
102	122	689	444	408
(105)	127	709	457	420
107	130	722	465	428
(111)	132	749	483	444
112	137	756	487	448
(114)	137	770	496	456
117	142	790	509	468
(120)	147	810	522	480
122	147	824	531	488
(124)	152	837	539	496
127	152	857	552	508
(130)	156	878	566	520
132	160	891	574	528
137	165	925	596	548
142	170	959	618	568
147	180	992	639	588
152	185	1 026	661	608

5.4 Joining shackle with shackle pin



d = nominal diameter of common link
d_3 = diameter of joining shackle ≈ 1,3 d
l_3 ≈ 7,1 d
p_3 = $l_3 - (d_3 + a_1 + e_1)$ ≈ 3,4 d
w_3 = 4 d
a_1 ≈ 0,8 d
e_1 ≈ 1,6 d
f_1 ≈ 2,8 d
g_1 ≈ 0,2 d
h_1 ≈ 0,4 d
R_1 ≈ 0,6 d
R_2 ≈ 0,5 d

Dimensions in millimetres

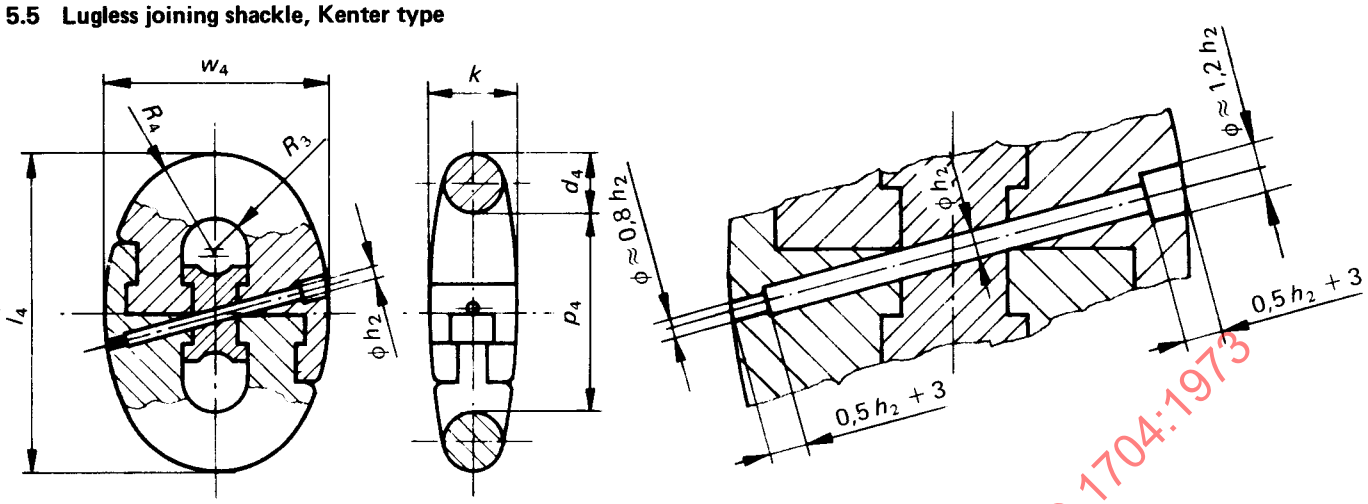
d (common link)	d_3	l_3	p_3	w_3	a_1	e_1	f_1	g_1	h_1	2 R_1	2 R_2
17,5	23	124	59	70	14	28	49	3,5		21	17,5
19	25	135	65	76	15	30	53	4		23	19
20,5	27	146	69,5	82	16,5	33	57	4		25	20,5
22	29	156	74,5	88	17,5	35	61	4,5		27	22
24	31	170	82	96	19	38	67	5	8	29	24
26	34	185	88	104	21	42	73	5		31	26
28	36	199	95,5	112	22,5	45	78	5,5		34	28
30	39	213	102	120	24	48	84	6		36	30
32	42	227	108,5	128	25,5	51	90	6,5		38	32
34	44	241	116	136	27	54	95	7		41	34
36	47	256	122	144	29	58	101	7		43	36
38	49	271	129	152	31	62	106	7,5		46	38
40	52	284	136	160	32	64	112	8	18	48	40
42	55	300	143	168	34	68	118	8,5		50	42
44	57	312	150	176	35	70	123	9		53	44
46	60	327	156	184	37	74	129	9		55	46
48	62	341	163,5	192	38,5	77	134	9,5		58	48
50	65	355	170	200	40	80	140	10		60	50
52	68	369	177	208	41	83	146	10,5		62	52
54	70	383	184	216	43	86	151	11		65	54
56	73	398	190	224	45	90	157	11		67	56
58	75	412	198	232	46	93	162	11,5		70	58
60	78	426	204	240	48	96	168	12		72	60
62	81	440	210	248	50	99	174	12,5	28	74	62
64	83	454	218	256	51	102	180	13		77	64
66	86	469	224	264	53	106	185	13		79	66
68	88	483	232	272	54	109	190	13,5		82	68
70	91	497	238	280	56	112	196	14		84	70
73	95	518	248	292	58	117	204	14,5		88	73

5.4 (*concluded*)

Dimensions in millimetres

d (common link)	d_3	l_3	p_3	w_3	a_1	e_1	f_1	g_1	h_1	$2R_1$	$2R_2$
76	99	540	258	304	61	122	213	15	28	91	76
78	101	554	266	312	62	125	218	15,5		94	78
81	105	575	275	324	65	130	227	16		97	81
83	108	589	282	332	66	133	232	16,5		100	83
(84)	109	596	286	336	67	134	236	17		101	84
85	111	604	289	340	68	136	238	17	36	102	85
87	113	618	296	348	70	139	244	17,5		104	87
(90)	117	639	306	360	72	144	252	18		108	90
92	120	653	312	368	74	147	258	18,5		110	92
(95)	124	675	323	380	76	152	266	19		114	95
97	126	689	330	388	78	155	272	19,5		116	97
(100)	130	710	340	400	80	160	280	20		120	100
102	133	724	346	408	82	163	286	20,5		122	102
(105)	137	746	357	420	84	168	294	21		126	105
107	139	760	364	428	86	171	300	21,5	46	128	107
(111)	144	788	377	444	89	178	311	22		133	111
112	146	795	379	448	90	180	314	22,5		134	112
(114)	148	809	388	456	91	182	319	23		137	114
117	152	831	398	468	94	187	328	23,5		140	117
(120)	156	852	408	480	96	192	336	24		144	120
122	159	866	414	488	98	195	342	24,5		146	122
(124)	161	880	422	496	99	198	347	25		149	124
127	165	902	432	508	102	203	356	25,5		152	127
(130)	169	923	442	520	104	208	364	26		156	130
132	172	937	448	528	106	211	370	26,5		158	132
137	178	973	466	548	110	219	384	27,5		164	137
142	185	1 008	482	568	114	227	398	28,5		170	142
147	191	1 044	500	588	118	235	412	29,5		176	147
152	198	1 079	516	608	122	243	426	30,5		182	152

5.5 Lugless joining shackle, Kenter type



d = nominal diameter of common link
d_4 = diameter of lugless joining shackle = d
l_4 = 6 d
p_4 = 4 d
w_4 ≈ 4,2 d
h_2 ≈ 0,4 d
k ≈ 1,52 d
R_3 ≈ 0,67 d
R_4 ≈ 1,83 d

Dimensions in millimetres

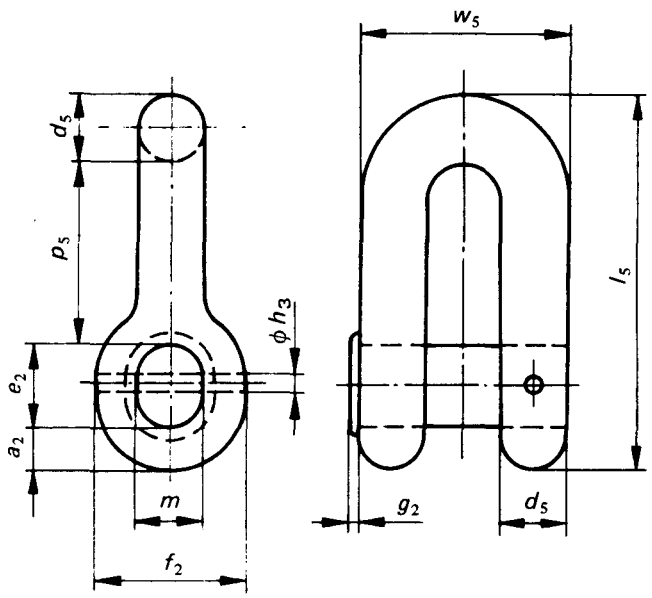
d (common link) $= d_4$	l_4	p_4	w_4	h_2	k	R_3	R_4
17,5	105	70	74	8	27	12	32
19	114	76	80		29	13	35
20,5	123	82	86		31	14	38
22	132	88	92		33	15	40
24	144	96	101		36	16	44
26	156	104	109		40	17,5	48
28	168	112	118		43	19	51
30	180	120	126		46	20	55
32	192	128	134	18	49	21,5	59
34	204	136	143		52	23	62
36	216	144	151		55	24	66
38	228	152	160		58	25	70
40	240	160	168		61	27	73
42	252	168	176		64	28	77
44	264	176	185		67	29	81
46	276	184	193		70	31	84
48	288	192	202		73	32	88
50	300	200	210		76	34	92
52	312	208	218		79	35	95
54	324	216	227		82	36	99
56	336	224	235	28	85	38	102
58	348	232	244		88	39	106
60	360	240	252		91	40	110
62	372	248	260		94	42	113
64	384	256	269		97	43	117
66	396	264	277		100	44	121
68	408	272	286		103	46	124
70	420	280	294		106	47	128
73	438	292	307		111	49	134

5.5 (*concluded*)

Dimensions in millimetres

d (common link) $= d_4$	l_4	p_4	w_4	h_2	k	R_3	R_4
76	456	304	319	28	115	51	139
78	468	312	328		119	52	143
81	486	324	340		123	54	148
83	498	332	349		126	56	152
(84)	504	336	353		128	57	154
85	510	340	357	36	129	57	156
87	522	348	365		132	58	159
(90)	540	360	378		137	60	165
92	552	368	386		140	62	168
(95)	570	380	399		144	64	174
97	582	388	407		147	65	178
(100)	600	400	420		152	67	183
102	612	408	428		155	68	187
(105)	630	420	441		160	70	192
107	642	428	449	46	163	72	196
(111)	666	444	466		169	74	203
112	672	448	470		170	75	205
(114)	684	456	479		173	76	207
117	702	468	491		178	78	214
(120)	720	480	504		182	80	220
122	732	488	512		185	82	223
(124)	744	496	521		188	83	227
127	762	508	533		193	85	232
(130)	780	520	546		198	87	238
132	792	528	554		201	88	242
137	822	548	575		208	92	251
142	852	568	596		216	95	260
147	882	588	617		223	98	269
152	912	608	638		231	102	278

5.6 End shackle



d = nominal diameter of common link
d_5 = diameter of end shackle $\approx 1{,}4\,d$
$l_5 \approx 8{,}7\,d$
$p_5 \approx l_5 - (d_5 + a_2 + e_2) \approx 4{,}6\,d$
$w_5 \approx 5{,}2\,d$
$a_2 \approx 0{,}9\,d$
$e_2 \approx 1{,}8\,d$
$f_2 \approx 3{,}1\,d$
$g_2 \approx 0{,}2\,d$
$h_3 \approx 0{,}4\,d$
$m \approx 1{,}4\,d$

Dimensions in millimetres

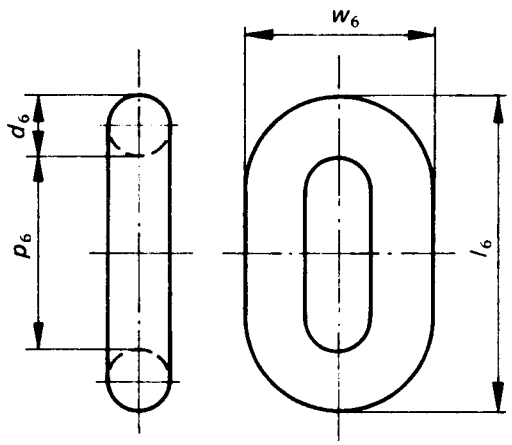
d (common link)	d_5	l_5	p_5	w_5	a_2	e_2	f_2	g_2	h_3	m
17,5	24,5	152	81	91	15,5	31	54	3,5		24,5
19	26,5	165	87,5	99	17	34	59	4		26,5
20,5	28,5	178	94	107	18,5	37	64	4		28,5
22	31	191	101	114	20	39	68	4,5	8	31
24	34	209	110	125	22	43	74	5		34
26	37	226	120	135	23	46	81	5		37
28	39	244	129	146	25	51	87	5,5		39
30	42	261	138	156	27	54	93	6		42
32	45	278	147	166	29	57	99	6,5		45
34	48	296	156	176	30	62	105	7		48
36	50	313	166	187	32	65	112	7		50
38	53	331	175	198	34	69	118	7,5		53
40	56	348	184	208	36	72	124	8		56
42	59	365	193	218	38	75	130	8,5	18	59
44	62	383	202	229	40	79	136	9		62
46	64	400	212	239	41	83	143	9		64
48	67	418	221	250	43	87	149	9,5		67
50	70	435	230	260	45	90	155	10		70
52	73	452	239	270	47	93	161	10,5		73
54	76	470	248	281	49	97	167	11		76
56	78	487	258	291	50	101	174	11		78
58	81	505	267	302	52	105	180	11,5		81
60	84	522	276	312	54	108	186	12		84
62	87	539	285	322	56	111	192	12,5		87
64	90	557	294	333	58	115	198	13		90
66	92	574	304	343	59	119	205	13		92
68	95	592	313	354	61	123	211	13,5		95
70	98	609	322	364	63	126	217	14	28	98
73	102	635	336	380	66	131	226	14,5		102
76	106	661	350	395	68	137	236	15		106

5.6 (*concluded*)

Dimensions in millimetres

d (common link)	d_5	l_5	p_5	w_5	a_2	e_2	f_2	g_2	h_3	*m*
78	109	678	359	406	70	140	242	15,5	28	109
81	113	705	373	421	73	146	251	16		113
83	116	722	382	432	75	149	257	16,5		116
(84)	118	731	386	437	76	151	260	17		118
85	119	740	391	442	77	153	264	17	36	119
87	122	757	400	452	78	157	270	17,5		122
(90)	126	783	414	468	81	162	279	18		126
92	129	800	422	478	83	166	285	18,5		129
(95)	133	827	437	494	86	171	295	19		133
97	136	844	446	504	87	175	301	19,5		136
(100)	140	870	460	520	90	180	310	20		100
102	143	887	468	530	92	184	316	20,5		102
(105)	147	914	483	546	95	189	326	21		105
107	150	931	492	556	96	193	332	21,5	46	107
(111)	155	966	511	577	100	200	344	22		111
112	157	974	514	582	101	202	347	22,5		112
(114)	160	992	524	593	103	205	353	23		114
117	164	1 018	538	608	105	211	363	23,5		117
(120)	168	1 044	552	624	108	216	372	24		120
122	171	1 061	560	634	110	220	378	24,5		122
(124)	174	1 079	570	645	112	223	384	25		124
127	178	1 105	584	660	114	229	394	25,5		127
(130)	182	1 131	598	676	117	234	403	26		130
132	185	1 148	606	686	119	238	409	26,5		132
137	192	1 192	630	712	123	247	425	27,5		137
142	199	1 235	652	738	128	256	440	28,5		142
147	206	1 279	676	764	132	265	456	29,5		147
152	213	1 322	698	790	137	274	471	30,5		152

5.7 Studless link



d = nominal diameter of common link (17,5 to 50 mm)
d_6 = diameter of studless link = d (except for d = 17,5 and d = 20,5)
l_6 = $5\,d_6$
p_6 = $l_6 - 2\,d_6 = 3\,d_6$
w_6 ≈ $3{,}4\,d_6$

Dimensions in millimetres

d (common link)	d_6	l_6	p_6	w_6
	10	50	30	34
	11	55	33	37
	13	65	39	44
	15	75	45	51
17,5	17	85	51	58
19	19	95	57	64
20,5	20	100	60	68
22	22	110	66	75
24	24	120	72	81
26	26	130	78	88
28	28	140	84	96
30	30	150	90	102
32	32	160	96	109
34	34	170	102	116
36	36	180	108	122
38	38	190	114	129
40	40	200	120	136
42	42	210	126	143
44	44	220	132	150
46	46	230	138	156
48	48	240	144	163
50	50	250	150	170

Studless links cannot be substituted for stud links of the same size.