



Anchors

1. Scope This Japanese Industrial Standard specifies anchors for ship and harbour use (hereinafter referred to as "anchor").

2. Reference standards The following Japanese Industrial Standards form part of this standard when referred to therein. The latest editions of these reference standards shall be used.

JIS G 4051-Carbon steels for machine structural use

JIS G 5101-Carbon steel castings

3. Classification The anchors shall be classified according to the shape as follows:

- a) Stockless anchor Type A (for ship use)
- b) Stockless anchor Type B (for ship use)
- c) Stock anchor, Type A (for ship and harbour use)
- d) Stock anchor, Type B (for ship and harbour use)
- e) Single fluke stock anchor, Type A (for harbour use)
- f) Single fluke stock anchor, Type B (for harbour use)

Remark: Stockless anchors, Type B (for ship use) may be regarded as high holding power anchors defined by a classification society if they are applied for type approval as high holding power anchors and approved as such. High holding power anchors defined by a classification society shall have two times or more the holding power than that available with stockless anchors, Type A (Hall's type anchor) of the same mass.

4. Construction, shape and dimensions

4.1 The construction, shape and dimensions of stockless anchors, Type A shall be as shown in **Attached Fig. 1** and **Attached Table 1**; stockless anchors, Type B, in **Attached Fig. 2** and **Attached Table 2**; stock anchors (for ship use) in **Attached Fig. 3** and **Attached Table 3**; single fluke stock anchors (for harbour use) in **Attached Figs. 3** and **4**, and **Attached Table 4**.

4.2 Nominal mass of anchors shall be as follows:

Stockless anchors	- Calculated gross mass
Stock anchors for ship use	- Calculated mass excluding mass of stock
Anchors for harbour use	- Calculated gross mass

4.3 Measured mass of stockless anchors excluding mass of shank should preferably be $\frac{3}{5}$ of the measured mass of anchors, measured mass of stock of stock anchor, $\frac{1}{4}$ of measured mass of anchor excluding shank, and measured mass of stock of single fluke stock anchor, $\frac{1}{4}$ of measured gross mass.

5. Permissible deviation

5.1 The permissible dimensional deviation on each part of anchor shall be $\pm 4\%$ and its maximum value shall be ± 20 mm. The length of shank of stockless anchor, however, may be modified in an unavoidable case depending on the hawse pipe length.

5.2 The weighed mass of anchor (excluding stock for ships' stock anchor) may be greater than the nominal mass with the limits of permissible dimensional deviation, but shall not be less than it.

5.3 The swing angles of stockless anchors, Type A, shall be within 39 to 42 degrees and designated by the purchaser. Swing angles of stockless anchors, Type B, shall be 35 degrees. The permissible dimensional deviation of swing angles shall be $\pm 1^\circ$. The permissible difference between outboard and inboard swing angles of anchor flukes shall be determined between the parties concerned.

6. Material The materials for each part of the anchor shall be as given in **Table 1**.

Table 1

Type	Component	Material	
		For ship use	For harbour use
Stockless anchor	Anchor head	JIS G 5101-SC 410	—
	Head pin	JIS G 4051-S 25 C or S 30 C	—
	Block	Steel bar or steel casting	—
	Shank	JIS G 4051-S 25 C or S 30 C or JIS G 5101-SC 410	—
	Anchor ring	JIS G 5101-SC 410	—
	Anchor ring bolt	JIS G 4051-S 25 C or S 30 C	—
Stock anchor and single fluke stock	Body	JIS G 5101-SC 410	JIS G 5101-SC 410
	Anchor ring	JIS G 4051-S 25 C or S 30 C or JIS G 5101-SC 410	JIS G 4051-S 25 C or S 30 C or JIS G 5101-SC 410
	Anchor ring bolt	JIS G 4051-S 25 C or S 30 C	JIS G 4051-S 25 C or S 30 C
	Stock	JIS G 4051-S 25 C or S 30 C or JIS G 5101-SC 410	JIS G 4051-S 25 C or S 30 C or JIS G 5101-SC 410
	Bulb	Steel bar, iron casting or steel casting	Steel bar, iron casting or steel casting
	Lifting ring	—	JIS G 4051-S 25 C or S 30 C or steel casting

7. **Manufacturing method** Cast steel shall be manufactured by casting in an electric furnace. Cast steel ingots shall be subjected to appropriate post-casting heat treatment according to wall thickness.

8. **Inspection** For anchors, inspections shall be carried out on the following items.
Inspections b), c) and d) shall be carried out for cast steel only. Inspection b) shall be carried out for anchors for ship use only. For anchors with a nominal mass of 0.18 or less, inspections b) and e) may be omitted.

- a) **Construction, shape, dimensions, mass and visual inspection** The construction, shape, dimensions mass and appearance shall be inspected, and shall satisfy all the requirements specified, and shall be free from detrimental defects.
- b) **Drop inspection** The inspection shall be performed on each steel casting of the anchor with the anchor head being hung vertically; the shank and stock horizontally; the body of stock anchor horizontally and vertically, and when they are respectively dropped from 4 m height onto steel foundation, every casting shall be free from any crack or other defects. The steel foundation shall be so constructed that steel slab of 50 mm thick or more is laid over the top of concrete block of one metre thick or more.
When the body of stock anchor is dropped vertically on the foundation, two steel anvils shall be firmly arranged to accept the middle of each arm so that the anchor crown might not hit the foundation.
- c) **Hammering inspection** After the drop inspection, when steel castings of the anchor shall be hung and hammered with a hammer weighing 3 to 7 kg, they shall be free from any defects.
- d) **Bending inspection** The test pieces shall be cast integral with each casting and shall be heat-treated together with the parent metal. The bend test shall be carried out by any one of method of A, B or C as given in Table 2, and any crack or any other defects shall not be observed on the outside of bend.

Table 2

Method	A	B	C
Test piece	Rectangular section of 25 mm wide by 19 mm thick and chamfered to 1.5 mm rad.	Rectangular section of 25.4 mm wide by 12.7 mm thick and chamfered to 1.6 mm rad.	Round bar of 25.4 mm dia.
Angle of bend	120 °	120 °	90 °
Internal radius	25 mm	25.4 mm	38.1 mm

- e) **Proof loading** The stock anchor and single fluke anchor shall be subjected to proof inspection and no abnormal deformation or other defects shall be observed after the application of proof test load corresponding to the weighed mass * of anchors as given in **Attached Table 4**, onto the positions as shown in the following **Fig. 1** on each fluke or stock anchor and single fluke stock, on both flukes simultaneously one side and next on the other side in turned over state for stockless anchor. When anchors are pulled from about 10% of proof test load to full load and when released to the initial load, the permissible change in the gauge length may be up to 20 mm.

Note: * The weighed mass of anchors shall be the one excluding the stock for stock anchor and single fluke stock anchor, and shall be the total weighed mass for stockless anchor.

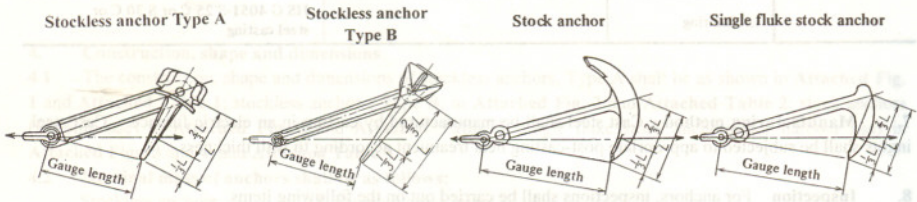


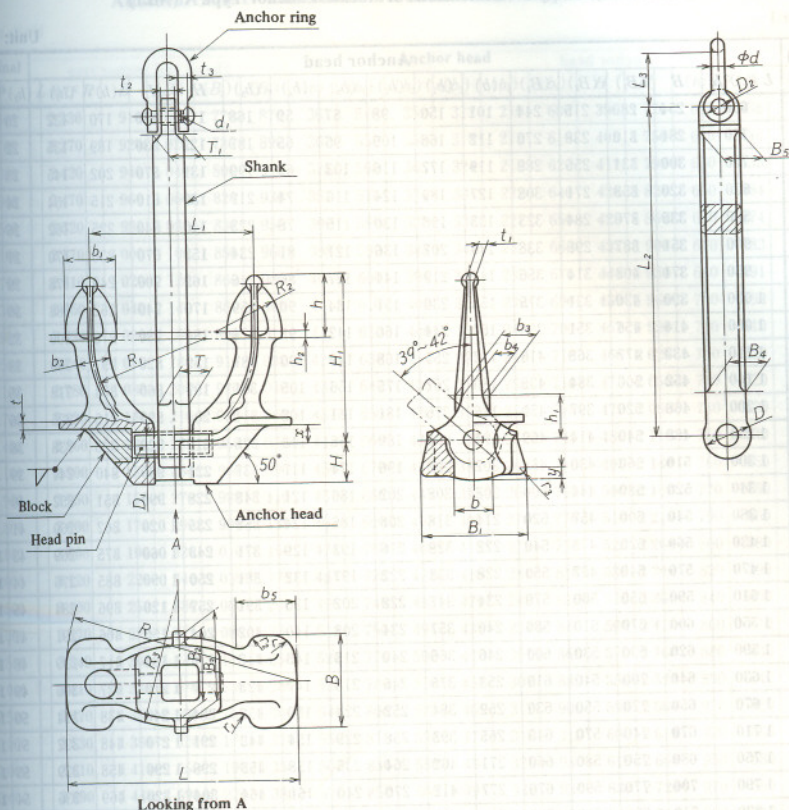
Fig. 1 Proof test

9. **Designation** The anchors shall be designated by classification and nominal mass (for stock anchors, their applications shall be indicated).

Example: Stock anchor type A 1.500 (for ship use)

10. **Marking** The anchors shall be marked on the body with the following.

- a) **Stockless anchor**
 - 1) Weighed mass of anchor head
 - 2) Total weighed mass
 - 3) Manufacturer's name or mark
 - 4) Proof test load
 - 5) Year and month of manufacture or serial number
- b) **Stock anchor**
 - 1) Weighed mass of stock
 - 2) Weighed mass of body
 - 3) Manufacturer's name or mark
 - 4) Proof test load
 - 5) Year and month of manufacture or serial number



Remark: The head of pin on anchor ring shall be housed inside of anchor ring.

Attached Fig. 1 Stockless anchor Type A

Attached Table 1 Dimensions of stockless anchor Type A (No.1)

Unit: mm

Nominal mass	Anchor head																
	L 及び R	B	(B_1)	(B_2)	(B_3)	(b)	(b_1)	(b_2)	(b_3)	(b_4)	(b_5)	H	H_1	(h)	(h_1)	(h_2)	L_1
0.180	650	254	280	215	244	101	150	98	87	59	168	111	480	170	122	20	459
0.240	720	281	310	238	270	112	166	109	96	65	187	122	530	189	135	22	510
0.300	770	300	331	255	289	119	177	116	103	69	199	131	570	202	145	23	540
0.360	820	320	353	271	308	127	189	124	110	74	212	139	610	215	154	24	580
0.420	860	335	370	284	323	133	198	130	115	78	223	146	640	225	162	26	610
0.480	900	351	387	298	338	140	207	136	121	81	234	153	670	236	170	27	640
0.570	950	371	408	314	356	147	219	144	127	86	246	162	700	249	178	29	670
0.660	1 000	390	430	331	375	155	230	151	134	90	259	170	740	262	188	30	710
0.780	1 060	414	456	351	398	164	244	160	142	95	274	180	780	278	200	32	750
0.900	1 110	433	477	368	416	172	255	168	149	100	287	189	820	291	209	33	780
1.020	1 160	452	500	384	435	180	267	175	156	105	301	197	860	304	218	35	820
1.140	1 200	468	520	397	450	186	276	181	161	108	311	204	890	315	226	36	850
1.290	1 250	488	540	414	469	194	288	189	168	113	325	212	920	328	238	38	880
1.440	1 300	510	560	430	488	202	299	196	174	117	337	221	960	340	244	39	920
1.590	1 340	520	580	444	500	208	308	202	180	121	348	228	990	351	252	40	950
1.740	1 380	540	600	457	520	214	318	208	185	124	358	235	1 020	362	260	41	980
1.920	1 430	560	620	473	540	222	329	216	192	129	371	243	1 060	375	269	43	1 010
2.100	1 470	570	640	487	550	228	338	222	197	132	381	250	1 090	385	276	44	1 040
2.280	1 510	590	650	500	570	234	347	228	202	136	391	257	1 120	396	284	45	1 070
2.460	1 550	600	670	510	580	240	357	234	208	140	402	264	1 150	406	291	47	1 100
2.640	1 590	620	690	530	600	246	366	240	213	143	412	270	1 180	417	299	48	1 120
2.850	1 630	640	700	540	610	253	375	246	218	147	423	277	1 210	427	306	49	1 150
3.060	1 670	650	720	550	630	259	384	252	224	150	432	284	1 240	438	314	50	1 180
3.300	1 710	670	740	570	640	265	393	258	229	154	443	291	1 270	448	322	51	1 210
3.540	1 750	680	750	580	660	271	402	264	235	158	453	298	1 290	458	329	53	1 240
3.780	1 790	700	770	590	670	277	412	270	240	161	464	304	1 320	469	336	54	1 260
4.050	1 830	710	790	610	690	284	420	276	245	165	474	311	1 350	480	344	55	1 290
4.320	1 870	730	800	620	700	290	430	282	251	168	485	318	1 380	490	352	56	1 320
4.590	1 910	750	820	630	720	296	440	288	256	172	495	325	1 410	500	359	57	1 350
4.890	1 950	760	840	650	730	302	448	295	261	176	500	332	1 440	510	367	59	1 380
5.250	2 000	780	860	660	750	310	460	302	268	180	510	340	1 480	520	376	60	1 410
5.610	2 040	800	880	680	770	316	470	308	274	184	520	347	1 510	530	383	61	1 440
6.000	2 090	820	900	690	780	324	480	316	280	188	540	355	1 540	550	393	63	1 480
6.450	2 140	840	920	710	800	332	492	323	287	193	550	364	1 580	560	402	64	1 510
6.900	2 190	850	940	730	820	340	500	331	294	197	560	372	1 620	570	412	66	1 550
7.350	2 240	870	960	740	840	347	520	338	300	202	580	380	1 650	590	421	67	1 580
7.800	2 280	890	980	750	860	354	530	344	306	205	590	388	1 680	600	429	68	1 610

Remarks: Dimensions in parentheses are given for reference only.

- (1) Weighted mass of stock
- (2) Weighted mass of head
- (3) Manufacturer's name or mark
- (4) Drawn area factor
- (5) Yield strength of material, type of stock surface

Attached Table 1 Dimensions of stockless anchor Type A (Continued)

Unit: mm

Nominal mass	Anchor head																
	L 及び R	B	(B_1)	(B_2)	(B_3)	(b)	(b_1)	(b_2)	(b_3)	(b_4)	(b_5)	H	H_1	(h)	(h_1)	(h_2)	L_1
8.300	2 330	910	1 000	770	870	361	540	352	312	210	600	396	1 720	610	438	70	1 650
8.700	2 370	920	1 020	780	890	367	550	358	318	213	610	403	1 750	620	446	71	1 670
9.300	2 420	940	1 040	800	910	375	560	365	324	218	620	411	1 790	630	455	73	1 710
9.900	2 470	960	1 060	820	930	383	570	374	331	222	640	420	1 820	650	464	74	1 740
10.500	2 520	980	1 080	830	950	390	580	380	338	227	650	428	1 860	660	474	76	1 780
11.100	2 570	1 000	1 100	850	960	398	590	388	344	232	660	437	1 900	670	483	77	1 820
11.700	2 610	1 020	1 120	860	980	405	600	394	350	235	670	444	1 930	680	491	78	1 840
12.300	2 650	1 040	1 140	880	1 000	411	610	400	355	239	690	450	1 960	700	498	80	1 870
12.900	2 690	1 050	1 160	890	1 010	417	620	406	360	242	700	457	1 990	710	510	81	1 900
13.500	2 740	1 070	1 180	910	1 030	425	630	414	367	247	710	466	2 020	720	520	82	1 940
14.100	2 780	1 080	1 200	920	1 040	431	640	420	373	250	710	473	2 050	730	520	83	1 960
14.700	2 820	1 100	1 210	930	1 060	437	650	426	378	254	720	479	2 080	740	530	85	1 990
15.400	2 860	1 120	1 230	950	1 070	443	660	432	383	257	740	486	2 110	750	540	86	2 020
16.100	2 900	1 130	1 250	960	1 090	450	670	438	389	261	750	493	2 140	760	550	87	2 050
16.900	2 950	1 150	1 270	980	1 110	457	680	445	395	266	760	500	2 180	770	550	89	2 080
17.800	3 000	1 170	1 290	990	1 130	465	690	453	402	270	770	510	2 210	790	560	90	2 120
18.800	3 060	1 190	1 320	1 010	1 150	474	700	462	410	275	790	520	2 260	800	580	92	2 160
20.000	3 120	1 220	1 340	1 030	1 170	484	720	471	418	281	810	530	2 300	820	590	94	2 200
21.500	3 200	1 250	1 380	1 060	1 200	496	740	483	429	288	820	540	2 360	840	600	96	2 260
23.000	3 270	1 280	1 410	1 080	1 230	510	750	494	438	294	840	560	2 410	860	610	98	2 310
24.500	3 340	1 300	1 440	1 110	1 250	520	770	500	448	301	860	570	2 460	880	630	100	2 360
26.000	3 410	1 330	1 470	1 130	1 280	530	780	510	457	307	880	580	2 520	890	640	102	2 410
27.500	3 470	1 350	1 490	1 150	1 300	540	800	520	465	312	900	590	2 560	910	650	104	2 450
29.000	3 530	1 380	1 520	1 170	1 320	550	810	530	473	318	910	600	2 610	920	660	106	2 490
31.000	3 610	1 410	1 550	1 190	1 350	560	830	550	484	325	930	610	2 660	950	680	108	2 550
33.000	3 690	1 440	1 590	1 220	1 380	570	850	560	494	332	950	630	2 720	970	690	111	2 610
35.500	3 780	1 470	1 630	1 250	1 420	590	870	570	510	340	970	640	2 790	990	710	113	2 670
38.500	3 830	1 510	1 670	1 280	1 460	600	890	590	520	349	1 000	660	2 860	1 020	730	116	2 740
42.000	4 000	1 560	1 720	1 320	1 500	620	920	600	540	360	1 030	680	2 950	1 050	750	120	2 820
46.000	4 120	1 610	1 770	1 360	1 550	640	950	620	550	371	1 070	700	3 040	1 080	770	124	2 910

Remarks: Dimensions in parentheses are given for reference only.

8.300	2 330	910	1 000	770	870	361	540	352	312	210	600	396	1 720	610	438	70	1 650
8.700	2 370	920	1 020	780	890	367	550	358	318	213	610	403	1 750	620	446	71	1 670
9.300	2 420	940	1 040	800	910	375	560	365	324	218	620	411	1 790	630	455	73	1 710
9.900	2 470	960	1 060	820	930	383	570	374	331	222	640	420	1 820	650	464	74	1 740
10.500	2 520	980	1 080	830	950	390	580	380	338	227	650	428	1 860	660	474	76	1 780
11.100	2 570	1 000	1 100	850	960	398	590	388	344	232	660	437	1 900	670	483	77	1 820
11.700	2 610	1 020	1 120	860	980	405	600	394	350	235	670	444	1 930	680	491	78	1 840
12.300	2 650	1 040	1 140	880	1 000	411	610	400	355	239	690	450	1 960	700	498	80	1 870
12.900	2 690	1 050	1 160	890	1 010	417	620	406	360	242	700	457	1 990	710	510	81	1 900
13.500	2 740	1 070	1 180	910	1 030	425	630	414	367	247	710	466	2 020	720	520	82	1 940
14.100	2 780	1 080	1 200	920	1 040	431	640	420	373	250	710	473	2 050	730	520	83	1 960
14.700	2 820	1 100	1 210	930	1 060	437	650	426	378	254	720	479	2 080	740	530	85	1 990
15.400	2 860	1 120	1 230	950	1 070	443	660	432	383	257	740	486	2 110	750	540	86	2 020
16.100	2 900	1 130	1 250	960	1 090	450	670	438	389	261	750	493	2 140	760	550	87	2 050
16.900	2 950	1 150	1 270	980	1 110	457	680	445	395	266	760	500	2 180	770	550	89	2 080
17.800	3 000	1 170	1 290	990	1 130	465	690	453	402	270	770	510	2 210	790	560	90	2 120
18.800	3 060	1 190	1 320	1 010	1 150	474	700	462	410	275	790	520	2 260	800	580	92	2 160
20.000	3 120	1 220	1 340	1 030	1 170	484	720	471	418	281	810	530	2 300	820	590	94	2 200
21.500	3 200	1 250	1 380	1 060	1 200	496	740	483	429	288	820	540	2 360	840	600	96	2 260
23.000	3 270	1 280	1 410	1 080	1 230	510	750	494	438	294	840	560	2 410	860	610	98	2 310
24.500	3 340	1 300	1 440	1 110	1 250	520	770	500	448	301	860	570	2 460	880	630	100	2 360
26.000	3 410	1 330	1 470	1 130	1 280	530	780	510	457	307	880	580	2 520	890	640	102	2 410
27.500	3 470	1 350	1 490	1 150	1 300	540	800	520	465	312	900	590	2 560	910	650	104	2 450
29.000	3 530	1 380	1 520	1 170	1 320	550	810	530	473	318	910	600	2 610	920	660	106	2 490
31.000	3 610	1 410	1 550	1 190	1 350	560	830	550	484	325	930	610	2 660	950	680	108	2 550
33.000	3 690	1 440	1 590	1 220	1 380	570	850	560	494	332	950	630	2 720	970	690	111	2 610
35.500	3 780	1 470	1 630	1 250	1 420	590	870	570	510	340	970	640	2 790	990	710	113	2 670
38.500	3 830	1 510	1 670	1 280	1 460	600	890	590	520	349	1 000	660	2 860	1 020	730	116	2 740
42.000	4 000	1 560	1 720	1 320	1 500	620	920	600	540	360	1 030	680	2 950	1 050	750	120	2 820
46.000	4 120	1 610	1 770	1 360	1 550	640	950	620	550	371	1 070	700	3 040	1 080	770	124	2 910

Remarks: Dimensions in parentheses are given for reference only.