



# Standard Specification for Wildcats, Ship Anchor Chain<sup>1</sup>

This standard is issued under the fixed designation F 765; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers wildcats as used in windlasses to haul in and pay out anchor chain on board ships. An associated chain stopper is used to secure the chain while the ship is anchored, or the anchor is housed.

1.2 Wildcats are of the five whelp type for use with stud link anchor chain conforming to the American Bureau of Shipping Grades 1, 2, and 3. Wildcat dimensions are provided for chains in integral  $\frac{1}{8}$ -in. (3-mm) steps, ranging in size from  $\frac{3}{4}$  to  $4\frac{1}{8}$  in. (19 to 104 mm). Wildcat dimensions for chains in intermediate  $\frac{1}{16}$ -in. (1.5-mm) steps are not provided, but wildcats in these sizes are permitted within the scope of this specification.

1.3 Wildcats are configured to pass detachable links oriented parallel or perpendicular to the wildcat shaft centerline.

1.4 The values stated in inch-pound units are to be regarded as the standard. This specification is for use with anchor chain that is measured in inch-pound units.

## 2. Referenced Documents

### 2.1 ASTM Standards:

A 27/A 27M Specification for Steel Castings, Carbon, for General Application<sup>2</sup>

A 36/A 36M Specification for Structural Steel<sup>3</sup>

A 148/A 148M Specification for Steel Castings, High-Strength, for Structural Purposes<sup>2</sup>

E 10 Test Method for Brinell Hardness of Metallic Materials<sup>4</sup>

### 2.2 Other Documents:

American Bureau of Shipping, *Rules for Building and Classing Steel Vessels*, Section 43.11 Equipment<sup>5</sup>

American Welding Society *Structural Welding Code*, Chapter D1.1<sup>6</sup>

## 3. Classification

3.1 The size of the wildcat is identified by the chain size.

3.2 Wildcats are furnished in four types as follows:

3.2.1 *Type I*—Fabricated from structural steel plate for flanges, hubs, whelps, and chain pockets, joined by electric welding. Surface hardness is approximately 150 HB.

3.2.2 *Type II*—Fabricated from structural steel plate for flanges, hubs, and chain pockets; and high-strength steel castings for whelps, joined by electric welding. Surface hardness is approximately 150 HB for flanges and hubs and 300 HB for whelps.

3.2.3 *Type III*—Cast from medium-strength carbon steel castings to provide a surface hardness of approximately 150 HB.

3.2.4 *Type IV*—Cast from high-strength steel castings to provide a surface hardness of approximately 300 HB.

## 4. Descriptions of Terms

4.1 *chain groove*—circumferential groove at the chain centerline to provide clearance for links passing normal to the wildcat shaft centerline.

4.2 *chain pockets*—recesses between the flanges and whelps into which links with flat side orientated parallel to the wildcat shaft centerline lay.

4.3 *detachable link*—a “C” shaped link, closed by means of a pair of closing pieces and a taper pin, and used to join anchor chain lengths and appendages into a continuous length aboard ship.

4.4 *flanges*—circumferential rims on the outside of the whelps, chain pockets, and chain groove.

4.5 *link grip*—the inside dimension of a chain link representing the effective length of a chain link in an assembled chain. Generally four times the nominal size of a stud link anchor chain, see Fig. 1.

4.6 *whelps*—protrusions on the inside of the flanges of the wildcat that resemble gear teeth and of such shape and

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 01.04.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>5</sup> Available from American Bureau of Shipping (ABS), ABS Plaza, 16855 Northchase Dr., Houston, TX 77060.

<sup>6</sup> Available from The American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126.

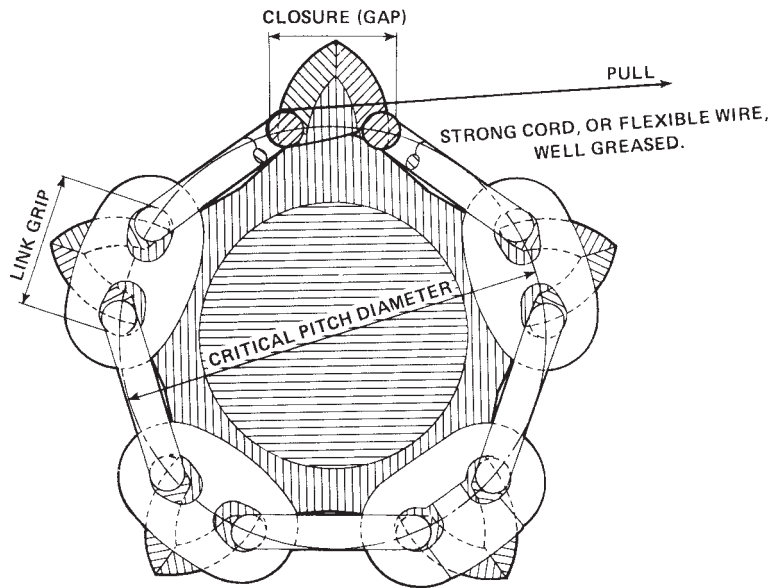


FIG. 1 Chain Wrap Test

dimensions so as to follow the path of the chain, as it enters and leaves the wildcat. Faces of protrusions are separated by the chain groove to permit links with the flat side normal to the wildcat shaft centerline to pass, but blocking links with the flat side oriented parallel to the wildcat shaft centerline.

4.7 *wildcat*—a rotating member specially contoured to receive assembled chain links and connecting links around the circumference of the member and of suitable strength to impart motion to the chain when rotated.

## 5. Ordering Information

5.1 Orders for wildcats under this specification shall include the following:

- 5.1.1 Quantity (number),
- 5.1.2 Size (chain size),
- 5.1.3 ASTM designation and date of issue,
- 5.1.4 Type (I, II, III, or IV),
- 5.1.5 Size, grade, and type of chain,
- 5.1.6 Availability of assembled chain and detachable link to be furnished by the purchaser for test (see Section 9),
- 5.1.7 As-cast or machined dimensions for wildcat bore, hub width, and outside boss diameter, and
- 5.1.8 Marking (shipping).

## 6. Materials and Manufacture

6.1 Material for Type I wildcats shall conform to Specification A 36/A 36M for flanges, hubs, whelps, and chain pockets, joined by electric welding in accordance with AWS, structural welding code Chapter D1.1. Type I wildcats in sizes 2 in. and larger shall be stress-relieved. Material for Type II wildcats shall conform to Specification A 36/A 36M for flanges and hubs, and chain pockets, and Specification A 148/A 148M for whelps, joined by electric welding in accordance with AWS, Structural Welding Code, Chapter D1.1, stress-relieved and heat-treated. Material for Type III wildcats shall conform to Specification A 27/A 27M, Grade 70-40, quenched and

tempered. Material for Type IV wildcats shall conform to Specification A 148/A 148M, Grade 150-125, quenched and tempered.

6.2 The manufacturer's name or identification mark, chain size, and pattern or drawing number shall be cast or stamped on the wildcat, using minimum  $\frac{3}{4}$ -in. (19-mm) size characters. The marking shall not appear on a wearing surface and shall be visible on an assembled windlass.

## 7. Dimensions

7.1 Wildcat must be fitted to the sample chain, and detachable link (see Section 9). Principal dimensions of Types III and IV wildcats for chains in steps of  $\frac{1}{8}$  in. (3 mm) are shown for information only in Table 1 and Table 2.

7.2 Dimensions in Table 1 and Table 2 are developed in accordance with the following (see also Fig. 2 and Fig. 3):

7.2.1 Bottom of chain pockets are relieved to clear enlargements occurring at centers of chain links as manufactured.

7.2.2 Each face of the whelp is a partial frustrum of a cone developed so that each link whose plane is parallel to the wildcat shaft centerline will have end play as noted in Table 1 and Table 2. This end play provides clearance between non-bearing side of whelp and the end of the next following link, the centerline plane of which is parallel to the axis of shaft.

7.2.3 The inner surfaces of the chain pockets, that form the flanges of the wildcat, are flat surfaces together forming the frustrums of pentagonal pyramids. The traces of the intersections of these flat surfaces or sides of the frustrums coincide with the centerline of the whelps.

7.2.4 The trace of the intersection of the plane at the bottom of the chain pocket and the side of whelp forms a hyperbolic section of a cone and is therefore a curved line.

7.2.5 Wildcat radii are as follows with all dimensions having the same units:



TABLE 1 Dimensions in Inches of Types III and IV Wildcats for Chains

Size of Chain	R	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	X	A	B	O	P	S	T	U	V	R <sub>4</sub>	R <sub>5</sub>	End Play of Link
3/4	4.12	4.09	3.00	4.87	2 3/8	1 3/8	3 3/8	1/2	1 1/16	1 15/32	2 21/32	1 3/16	3/16	2	1 3/8	3/4
7/8	4.80	4.77	3.50	5.68	2 11/16	1 1/2	3 7/8	5/8	1 13/32	1 5/8	3 3/32	7/8	7/32	2 5/16	1 1/2	7/8
1	5.49	5.43	4.00	6.49	3	1 5/8	4 3/8	3/4	1 17/32	1 13/16	3 1/2	1	1/4	2 5/8	1 3/4	1
1 1/8	6.18	6.12	4.62	7.31	3 1/4	1 7/8	4 7/8	3/4	1 27/32	2 1/8	3 31/32	1 1/8	9/32	3	2 1/16	1 1/16
1 1/4	6.87	6.81	5.12	8.12	3 1/2	2	5 3/8	7/8	2 3/32	2 7/16	4 7/16	1 1/4	5/16	3 5/16	2 1/2	1 1/8
1 3/8	7.56	7.50	5.62	8.93	3 3/4	2 1/8	5 7/8	7/8	2 9/32	2 23/32	4 7/8	1 3/8	1 1/32	3 3/8	2 5/8	1 1/8
1 1/2	8.24	8.18	6.19	9.74	4 1/16	2 1/4	6 3/8	1	2 17/32	3 1/16	5 3/8	1 1/2	3/8	4	3	1 1/8
1 5/8	8.93	8.87	6.75	10.55	4 3/8	2 1/2	6 7/8	1 1/8	2 7/8	3 3/8	5 27/32	1 5/8	1 3/32	4 5/16	3 1/4	1 3/16
1 3/4	9.63	9.57	7.31	11.37	4 11/16	2 3/4	7 3/8	1 1/8	3 1/32	3 3/8	6 1/4	1 3/4	7/16	4 5/8	3 3/16	1 1/4
1 7/8	10.31	10.25	7.87	12.18	5	2 7/8	7 7/8	1 1/4	3 1/4	3 29/32	6 23/32	1 7/8	1 5/32	4 15/16	3 13/16	1 5/16
2	10.99	10.93	8.37	12.99	5 1/4	3	8 3/8	1 1/4	3 7/16	4 5/32	7 1/8	2	1/2	5 1/4	3 3/8	1 3/8
2 1/8	11.68	11.62	8.87	13.80	5 9/16	3 1/8	8 7/8	1 3/8	3 19/32	4 15/32	7 5/8	2 1/8	1 7/32	5 5/8	4 1/4	1 7/16
2 1/4	12.37	12.31	9.50	14.62	5 7/8	3 3/8	9 1/4	1 3/8	3 29/32	4 3/4	7 31/32	2 1/4	9/16	5 15/16	4 5/8	1 1/2
2 3/8	13.05	12.99	10.00	15.42	6 3/16	3 1/2	9 3/4	1 1/2	4 1/8	5 1/16	8 7/16	2 3/8	1 9/32	6 1/4	4 11/16	1 17/32
2 1/2	13.74	13.68	10.62	16.24	6 1/2	3 5/8	10 1/4	1 1/2	4 7/16	5 3/8	8 15/16	2 1/2	5/8	6 5/8	5 1/4	1 9/16
2 5/8	14.43	14.37	11.25	17.05	6 13/16	3 7/8	10 3/4	1 5/8	4 19/32	5 5/8	9 3/8	2 5/8	2 1/32	6 15/16	5 3/8	1 5/8
2 3/4	15.11	15.06	11.75	17.86	7 1/8	4	11 1/4	1 3/4	4 29/32	6	9 15/16	2 3/4	1 1/16	7 1/4	5 3/4	1 11/16
2 7/8	15.80	15.74	12.25	18.67	7 7/16	4 1/4	11 3/4	1 3/4	5 1/16	6 3/16	10 9/16	2 7/8	2 3/32	7 5/8	5 15/16	1 3/4
3	16.48	16.42	12.75	19.48	7 3/4	4 3/8	12 1/4	1 7/8	5 1/4	6 1/2	10 23/32	3	3/4	7 13/16	6 5/16	1 7/8
3 1/8	17.17	17.11	13.25	20.30	8 1/16	4 5/8	12 3/4	1 7/8	5 17/32	6 29/32	11 3/16	3 1/8	2 5/32	8 1/4	6 1/2	1 15/16
3 1/4	17.85	17.79	13.87	21.10	8 3/8	4 3/4	13 1/4	1 7/8	5 23/32	7 1/32	11 3/8	3 1/4	1 3/16	8 5/8	6 5/8	2
3 3/8	18.55	18.49	14.37	21.92	8 11/16	5	13 3/4	2	6 1/32	7 5/16	12 1/16	3 3/8	2 7/32	8 15/16	7 1/16	2 1/16
3 1/2	19.23	19.17	15.00	22.73	9	5 1/8	14 1/4	2	6 3/16	7 9/16	12 7/16	3 1/2	7/8	9 1/4	7 5/16	2 1/8
3 5/8	19.92	19.86	15.50	23.54	9 5/16	5 3/8	14 3/4	2 1/8	6 19/32	7 31/32	13	3 5/8	2 9/32	9 9/16	7 11/16	2 3/16
3 3/4	20.60	20.54	16.00	24.35	9 5/8	5 5/8	15 1/4	2 1/4	6 3/4	8 1/8	13 7/16	3 3/4	1 5/16	9 7/8	8	2 1/4
3 7/8	21.30	21.24	16.62	25.17	9 15/16	5 3/4	15 3/4	2 1/4	6 31/32	8 7/16	13 3/8	3 7/8	3 1/32	10 1/4	8 3/16	2 5/16
4	21.98	21.92	17.00	25.98	10 1/4	6	16 1/4	2 3/8	7 1/16	8 13/16	14 5/16	4	1	10 7/16	8 9/16	2 3/8
4 1/8	22.67	22.61	17.50	26.39	10 9/16	6 1/4	16 3/4	2 3/8	7 5/8	9 1/16	14 13/16	4 1/8	1 1/32	10 7/8	8 7/8	2 7/16

TABLE 2 Dimensions in Millimetres of Types III and IV Wildcats for Chains

Size of Chain	R	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	X	A	B	O	P	S	T	U	V	R <sub>4</sub>	R <sub>5</sub>	End Play of Link
3/4	104.6	103.9	76.2	123.7	60.3	34.9	85.7	12.7	33.3	37.3	67.5	20.6	4.8	50.8	34.9	19.1
7/8	121.9	121.2	88.9	144.3	68.3	38.1	98.4	15.9	35.7	41.3	78.6	22.2	5.6	58.7	38.1	22.2
1	138.4	137.9	101.6	164.8	76.2	41.3	111.1	19.1	38.9	46.0	88.9	25.4	6.4	66.7	44.5	25.4
1 1/8	157.0	155.4	117.3	185.7	82.6	47.6	123.8	19.1	46.8	54.0	100.8	28.6	7.1	76.2	52.4	27.0
1 1/4	174.5	173.0	130.0	206.2	88.9	50.8	136.5	22.2	53.2	61.9	112.7	31.8	7.9	84.1	63.5	28.6
1 3/8	192.0	190.5	142.7	226.8	95.3	54.0	149.2	22.2	57.9	69.1	123.8	34.9	8.7	92.1	66.7	28.6
1 1/2	209.3	207.8	157.2	247.4	103.2	57.2	161.9	25.4	64.3	77.8	136.5	38.1	9.5	101.6	76.2	28.6
1 5/8	226.8	225.3	171.5	268.0	111.1	63.5	174.6	28.6	73.0	85.7	148.4	41.3	10.3	109.5	82.6	30.2
1 3/4	244.6	243.1	185.7	288.8	119.1	69.9	187.3	28.6	77.0	92.1	158.8	44.5	11.1	117.5	90.5	31.8
1 7/8	261.9	260.4	199.9	309.4	127.0	73.0	200.0	31.8	82.6	99.2	170.7	47.6	11.9	125.4	96.8	33.3
2	279.1	277.6	212.6	329.9	133.4	76.2	212.7	31.8	87.3	105.6	181.0	50.8	12.7	133.4	98.4	34.9
2 1/8	296.7	295.1	225.3	350.5	141.3	79.4	225.4	34.9	91.3	113.5	193.7	54.0	13.5	142.9	108.0	36.5
2 1/4	314.2	312.7	241.3	371.3	149.2	85.7	235.0	34.9	99.2	120.7	202.4	57.2	14.3	150.8	117.5	38.1
2 3/8	331.5	329.9	254.0	391.7	157.2	88.9	247.7	38.1	104.8	128.6	214.3	60.3	15.1	158.8	119.1	38.9
2 1/2	349.0	347.5	269.8	412.5	165.1	92.1	260.4	38.1	112.7	136.5	227.0	63.5	15.9	168.3	133.4	39.7
2 5/8	366.5	365.0	285.8	433.1	173.0	98.4	273.1	41.3	116.7	142.9	238.1	66.7	16.7	176.2	136.5	41.3
2 3/4	383.8	382.5	298.5	453.6	181.0	101.6	285.8	44.5	124.6	152.4	252.4	69.9	17.5	184.2	146.1	42.9
2 7/8	401.3	399.8	311.2	474.2	188.9	108.0	298.5	44.5	128.6	157.2	261.9	73.0	18.3	193.7	150.8	44.5
3	418.6	417.1	323.9	494.8	196.9	111.1	311.2	47.6	133.4	165.1	272.3	76.2	19.1	198.4	160.3	47.6
3 1/8	436.1	434.6	336.6	515.6	204.8	117.5	323.9	47.6	140.5	172.2	284.2	79.4	19.8	209.6	165.1	49.2
3 1/4	453.4	451.9	352.3	535.9	212.7	120.7	336.6	47.6	145.3	178.6	288.9	82.6	20.6	219.1	168.3	50.8
3 3/8	471.2	469.6	365.0	556.8	220.7	127.0	349.3	50.8	153.2	185.7	306.4	85.7	21.4	227.0	179.4	52.4
3 1/2	488.4	486.9	381.0	577.3	228.6	130.2	362.0	50.8	157.2	192.1	315.9	88.9	22.2	235.0	185.7	54.0
3 5/8	506.0	504.4	393.7	597.9	236.5	136.5	374.7	54.0	167.5	202.4	330.2	92.1	23.0	242.9	195.3	55.6
3 3/4	523.2	521.7	406.4	618.5	238.1	142.9	387.4	57.2	171.5	206.4	341.3	95.3	23.8	250.8	203.2	57.2
3 7/8	541.0	539.5	422.1	639.3	252.4	146.1	400.1	57.2	177.0	214.3	352.4	98.4	24.6	260.4	208.0	58.7
4	558.3	556.8	431.8	659.9	260.4	152.4	412.8	60.3	182.6	223.9	363.5	101.6	25.4	268.3	214.3	60.3
4 1/8	575.8	574.3	444.5	680.5	268.3	158.8	425.5	60.3	193.7	230.2	376.2	104.8	26.2	276.2	225.4	61.9

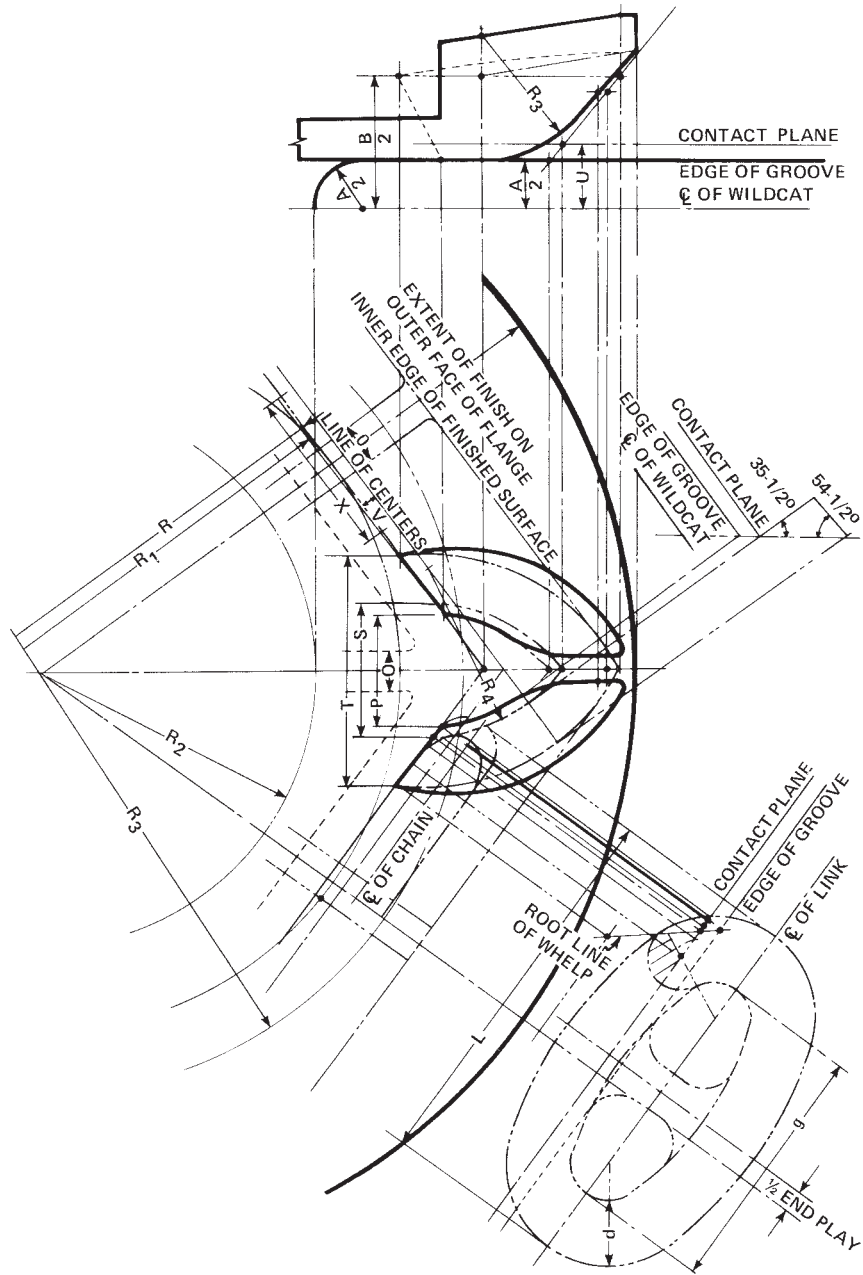
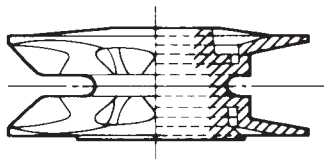
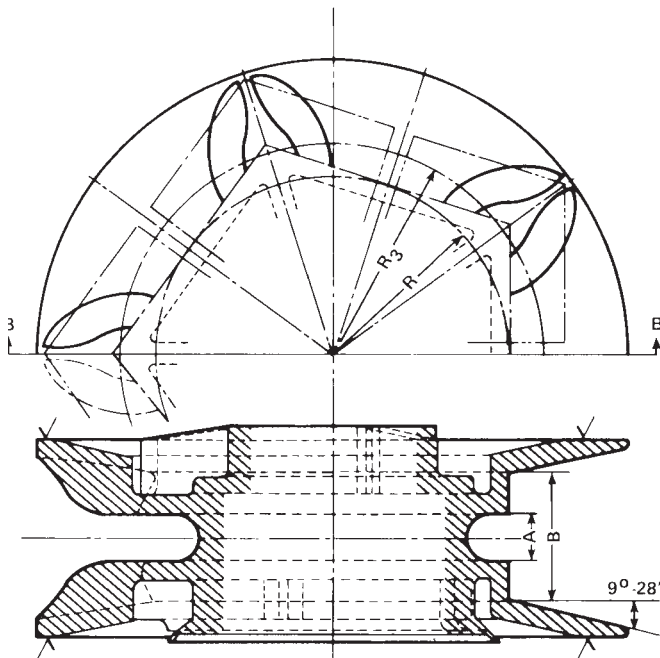


FIG. 2 Wildcat Development



Elevation and Section on B-B



View B-B

FIG. 3 Wildcat Sections

- $R_3$  = mean effective radius, measured to the outside center of a link laying in the displaced position in a pocket,
- $d$  = bar diameter (chain size),
- $L$  = overall length of link,
- $g$  = link grip,
- $\sin 18^\circ = 0.309\ 02$ ,
- $\cos 18^\circ = 0.951\ 06$ ,
- $R_3 = \frac{\sqrt{\left(\frac{g}{0.309\ 02}\right)^2 + \left(\frac{d}{0.951\ 06}\right)^2}}{2}$ , and
- $R_4 = L - 3.36d$ .

**8. Workmanship, Finish, and Appearance**

8.1 Castings shall be smooth, of fine grain, and free of cracks, hot tears, and blow holes, detrimental to end use.  
 8.2 Castings shall have all flash material, vents, and gates removed and ground flush to match the surrounding surface.  
 8.3 Welds shall be extended around the ends of members and be free of pockets and irregularities that would tend to trap water or mud.

8.4 Castings and weldments shall be sand- or shot-blasted to remove all loose scale and slag.

8.5 The outside faces of the wildcat flanges shall be machined to the extent necessary to rotate in true planes.

**9. Test Method**

9.1 To test the fit of the sample chain on the wildcat, use a nine-link sample consisting of five joined common links, one detachable link, and three joined common links. The sample chain shall be uniform, representative of the chain to be used, and conform to American Bureau of Shipping Grade 1, 2, or 3.

9.2 Wrap the sample chain tightly around the wildcat, starting with the first common link in a pocket (see Fig. 1). The link grip dimension of the closure (gap) shall not exceed the link grip length or be less than the link grip length minus 3/8 times the chain size.

9.3 The dimensions of the wildcat may be reduced by chipping, grinding, or air-arc cutting for an acceptable chain fit. If air-arc cutting is used, not less than the last 1/8 in. (3 mm) of material shall be removed to a smooth contour by grinding. Do not use flame cutting.

9.4 By consent of the purchaser, weld cladding or hard surfacing may be used to build up chain contact surfaces for an acceptable chain fit. The Brinell hardness of the finished weld deposit shall be the same as the adjacent area of the base material, plus or minus 25-HB hardness points for Types I and III, and plus or minus 50-HB hardness points for Types II and IV. Hardness measurements shall be made in accordance with requirements of Test Method E 10.

**10. Inspection**

10.1 The wildcat shall be visually inspected for workmanship, finish, and appearance, after cleaning by sand- or shot-blasting.

**11. Marking (Shipping)**


11.1 Each wildcat, when furnished as a separate component, shall be marked with the ASTM designation, purchase order, and item number. Marking shall be by point or weatherproof tag.

**12. Packaging**

12.1 Wildcats, when furnished as a separate component, shall be crated, skidded, or attached to a pallet in a manner acceptable for handling by a common carrier. When wildcats are furnished with machined bore and hub, machined surfaces shall be protected against corrosion in open weather storage for periods of at least one year.

**13. Keywords**

13.1 anchor chain; stud link anchor chain; wildcats; windlasses

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