



# Standard Specification for Warping Heads, Rope Handling (Gypsy Head, Capstan Head)<sup>1</sup>

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## 1. Scope

1.1 This specification covers warping heads used with windlass, winch, and capstan drive units to pull rope on board ships. Warping heads are primarily for use with fiber rope, natural, or synthetic.

1.2 Warping heads with external ribs or whelps on the barrel, notched flanges, attached storage drums, unfinished drums, or non heat-treated fabrications, are considered special and are permitted within the scope of this specification when fully described under special ordering information.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 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 Carbon Structural Steel<sup>3</sup>

A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless<sup>4</sup>

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

A 501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing<sup>4</sup>

A 724/A 724M Specification for Pressure Vessel Plates, Carbon-Manganese-Silicon Steel, Quenched and Tempered, for Welded Layered Pressure Vessels<sup>3</sup>

A 735/A 735M Specification for Pressure Vessel Plates, Low-Carbon Manganese-Molybdenum-Columbium Alloy Steel, for Moderate and Lower Temperature Service<sup>3</sup>

E 10 Test Method for Brinell Hardness of Metallic Materials<sup>5</sup>

### 2.2 AWS Standard:

D 1.1 Structural Welding Code<sup>6</sup>

2.3 ANSI Standard:

ASA B 46.1 Surface Texture<sup>7</sup>

2.4 Military Standards:

Fed-Spec T-R-605 Manila, Three Strand<sup>8</sup>

MIL-R-24050 Nylon, Double Braided<sup>8</sup>

## 3. Definitions of Terms Specific to This Standard

3.1 *barrel*—cylindrical or conical midbody portion of a warping head.

3.1.1 *Discussion*—The barrel may have a uniform diameter through the length or may be tapered from one end to the other.

3.2 *flanges*—circumferential rims at the ends of the barrel used to retain wraps of rope on the barrel portion of the warping head.

3.3 *rope contact surfaces*—portions of the barrel, flanges, and connecting fillets that a rope will contact when led in tangent to the barrel and normal to the shaft centerline, wrapped around the barrel, and led away tangent to the barrel as in normal use. (See Fig. 1 and Fig. 2.)

3.4 *warping head (also known as a gypsy head or capstan head)*—cylindrical or conical rotating member to receive multiple wraps of rope around the circumference of the member and of suitable strength to impart a pulling motion to the rope by friction contact when the member is rotated.

## 4. Classification

4.1 The size of the warping head shall be identified by the nominal barrel diameter measured at the smallest point of the barrel.

4.2 Warping heads under this specification are furnished in two types as follows:

4.2.1 *Type I Warping Head With Cylindrical Barrel*—Generally used in but not restricted to horizontal shaft applications. Also known as a gypsy head (see Fig. 1).

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.03 on Outfitting.

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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 01.01.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>6</sup> Available from American Welding Society, 550 N.W. Le Jeune Rd., Miami, FL 33126.

<sup>7</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

<sup>8</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

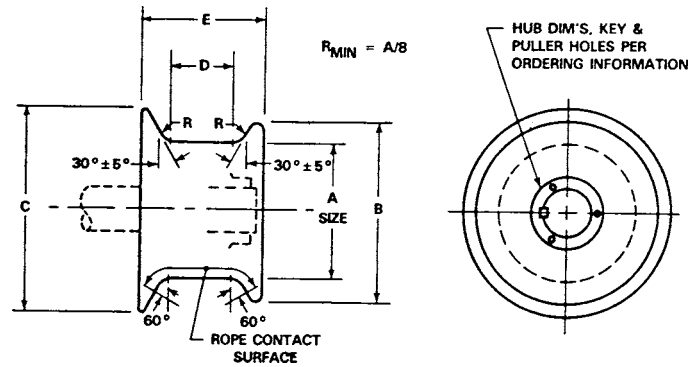


TABLE Continued

A Diameter, in.	Rope Pull, 1000 lb	B Diameter, in.	C Diameter, in.	D Diameter, in.	E Length, in.	Tolerance, in. ± <sup>A</sup>	Concentricity, in. <sup>B</sup>
6	12.5	8	9 <sup>1</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	5 <sup>15</sup> / <sub>32</sub>	1/4	1/8
9	25.0	12	13 <sup>3</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>16</sub>	8 <sup>3</sup> / <sub>16</sub>	3/8	3/16
12	37.5	16	18 <sup>3</sup> / <sub>16</sub>	5 <sup>7</sup> / <sub>16</sub>	10 <sup>31</sup> / <sub>32</sub>		
15	50.0	20	22 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	13 <sup>11</sup> / <sub>16</sub>	1/2	1/4
18	75.0	24	27 <sup>9</sup> / <sub>16</sub>	8 <sup>1</sup> / <sub>16</sub>	16 <sup>13</sup> / <sub>32</sub>		
21	100.0	28	31 <sup>7</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>16</sub>	19 <sup>9</sup> / <sub>16</sub>	5/8	5/16
24	125.0	32	36 <sup>3</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	21 <sup>7</sup> / <sub>8</sub>		
27	150.0	36	41 <sup>15</sup> / <sub>16</sub>	12 <sup>3</sup> / <sub>16</sub>	24 <sup>31</sup> / <sub>32</sub>	3/4	3/8
30	175.0	40	45 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	27 <sup>3</sup> / <sub>8</sub>		
33	200.0	44	50 <sup>1</sup> / <sub>16</sub>	14 <sup>13</sup> / <sub>16</sub>	30 <sup>9</sup> / <sub>32</sub>	7/8	7/16
36	225.0	48	54 <sup>5</sup> / <sub>8</sub>	16 <sup>3</sup> / <sub>16</sub>	32 <sup>7</sup> / <sub>8</sub>		

<sup>A</sup> Tolerance for dimensions A, B, C, D, and E.

<sup>B</sup> Concentricity of rope contact surface and flanges relative to bore.

NOTE 1—1 in. = 25.4 mm.

FIG. 1 Type I Warping Head

4.2.2 *Type II Warping Head With a Conical Barrel*—Mounted with the large end of the barrel toward the drive machinery. Generally used in but not restricted to vertical shaft applications. Also known as a capstan head (see Fig. 2).

4.3 Warping heads are divided into four grades as follows:

4.3.1 *Grade 1*—Fabricated from any combination of structural steel plate, pipe, tubing, or steel castings and joined by electric welding.

4.3.2 *Grade 2*—Cast from mild to medium strength steel.

4.3.3 *Grade 3*—Fabricated from any combination of steel plate or steel castings and joined by electric welding. Heat treated to provide a surface hardness (1/8 in. (3 mm) deep) of 200 to 250 Brinell on rope contact surface. Rope contact surface finished to an average 125- to 160- $\mu$ in. (3175- to 4064- $\mu$ m) finish.

4.3.4 *Grade 4*—Cast from high strength steel castings and heat treated to provide a surface hardness (1/8 in. (3 mm) deep) of 200 to 250 Brinell on rope contact surface. Rope contact surface finished to an average 125- to 160- $\mu$ in. (3175- to 4064- $\mu$ m) finish.

4.4 When required by ordering information, an accessory cover will be provided to cover the open end of the warping head.

## 5. Ordering Information

5.1 Orders for warping heads under this specification shall include the following:

5.1.1 Quantity (number),

5.1.2 ASTM designation and year of issue,

5.1.3 Size (barrel diameter),

5.1.4 Type (I or II),

5.1.5 Grade (1, 2, 3, or 4),

5.1.6 As-cast or machined dimensions for warping head bore, hub length and location, hub puller holes, and shaft keying,

5.1.7 Requirement for optional accessory cover on open end of warping head (see 4.4),

5.1.8 Special features required (ribs or whelps on barrel, notched flanges, and attached storage drums), and

5.1.9 Product marking (shipping).

## 6. Material and Manufacture

6.1 Material for Grade 1 warping heads shall conform to Specification A 36/A 36M or Specification A 27/A 27M for barrel, flanges, hubs, and structural webs or diaphragms. Materials conforming to Specifications A 53 or A 501 may be used as an alternate for the barrel. Component parts may be formed by rolling or flanging, and joined by electric welding in accordance with ASW D1.1. Warping head weldment shall be stress relieved.

6.2 Material for Grade 2 warping heads shall conform to Specification A 27/A 27M annealed.

6.3 Material for Grade 3 warping heads shall conform to Specifications A 148/A 148M, A 724/A 724M Grade B, or Specification A 735/A 735M Class 4. Component parts may be formed by casting, rolling or flanging, and joined by electric welding, in accordance with AWS D1.1. Warping head weldment shall be stress relieved and heat treated for a surface