



Standard Specification for Turnbuckles, Swaged, Welded, Forged¹

This standard is issued under the fixed designation F1145; 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 reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers swaged welded, cast, or forged turnbuckles with and without jam nuts.

1.2 A turnbuckle is an internally threaded loop or sleeve intended for assembly with a threaded stud, eye, hook, or jaw at each end, used for applying tension to rods, wire rope, and so forth.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[A29/A29M Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought](#)

[A153/A153M Specification for Zinc Coating \(Hot-Dip\) on Iron and Steel Hardware](#)

[B633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel](#)

[D3951 Practice for Commercial Packaging](#)

2.2 AWS Standards:³

[AWS A5.1 Covered Carbon Steel Arc Welding Electrodes](#)

[AWS A5.2 Iron and Steel Oxyfuel Gas Welding Rods](#)

[AWS A5.5 Low Alloy Steel Covered Arc Welding Electrodes](#)

2.3 ASME Standards:⁴

[ASME B1.1 Unified Inch Screw Threads \(UN, UNR, and UNJ Thread Forms\)](#)

[ASME B18.2.2 Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts \(Inch Series\)](#)

2.4 Military Standards:⁵

[MIL-STD-1186 Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Methods](#)

[MIL-STD-2073-1 DoD Material Procedures for Development and Application of Packaging Requirements](#)

2.5 Military Specification:⁵

[MIL-L-19140 Lumber and Plywood, Fire-Retardant Treated](#)

[MIL-P-116 Preservation, Methods of](#)

2.6 Federal Specifications:⁴

[PPP-B-636 Boxes, Shipping, Fiberboard](#)

[PPP-F-320 Fiberboard: Corrugated and Solid Sheet Stock \(Container Grade\) and Cut Shapes](#)

2.7 Federal Standard:⁵

[FED-STD-123 Marking for Shipment \(Civil Agencies\)](#)

3. Classification

3.1 Turnbuckles covered under this specification shall be of the following types and grades, as specified (see [4.1.3](#) and [4.1.7](#)):

3.1.1 *Type I*—Open turnbuckle bodies (see [5.2.4](#) – [5.2.7](#)):

3.1.1.1 *Grade*:

(1) Forged

(2) Spread

(3) Resistance welded

(4) Arc or gas welded

¹ This specification is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.07 on General Requirements.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

⁴ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁵ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

3.1.2 *Type II*—Pipe turnbuckle bodies (see 5.2.8).

3.1.3 *Type III*—Rigging turnbuckle bodies (see 5.2.9).

3.2 Turnbuckles covered under this specification shall be of the following classes and sizes, as specified (see 4.1.3):

3.2.1 *Classes*:

A—turnbuckle, body only without end pulls, heads not drilled.

B—turnbuckle, body only without end pulls, heads threaded right and left hand.

C—turnbuckle with stub and stub end pulls, complete.

D—turnbuckle with eye and eye end pulls, complete.

E—turnbuckle with hook and hook end pulls, complete.

F—turnbuckle with hook and eye end pulls, complete.

G—turnbuckle with jaw and jaw end pulls, complete.

H—turnbuckle with jaw and eye end pulls, complete.

3.2.1.1 The arrangement of turnbuckle bodies and end pulls for Classes C, D, E, F, G, and H shall be similar to Fig. 1.

3.2.2 *Sizes*—Shall be as listed in Table 1 and Table 2.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 ASTM designation and year of issue,

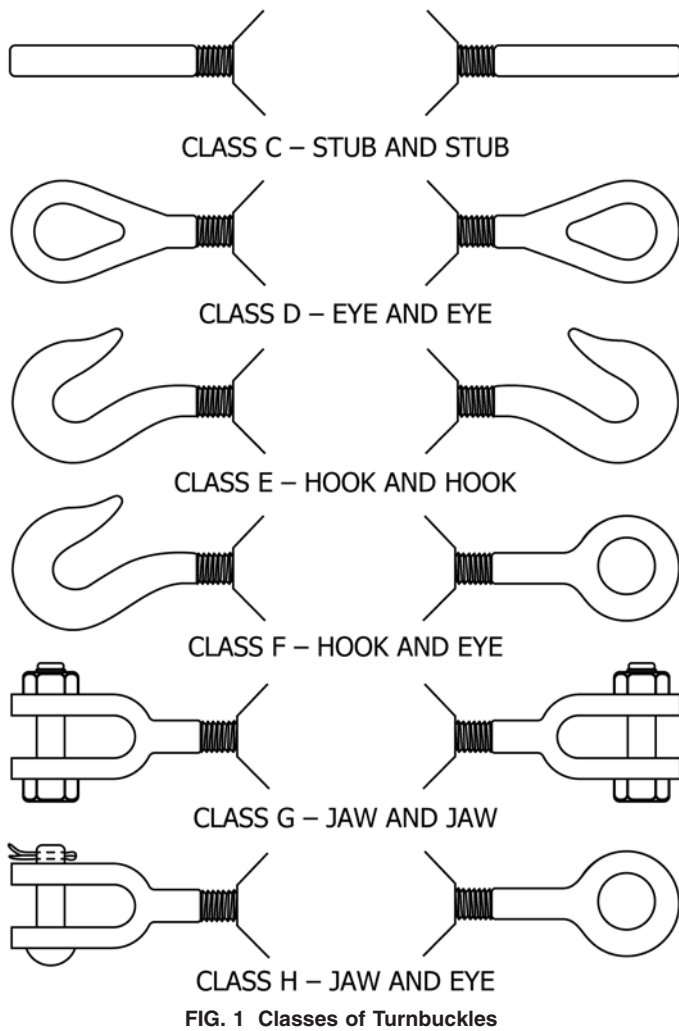


TABLE 1 Turnbuckle Bodies, Classes A and B, and Turnbuckles, Class C

NOTE 1—1 in. = 25.4 mm.

Thread, Nominal Outside Diameter, in.	Size								
	Clear Opening Between Head, in.								
	4	4½	6	9	12	18	24	36	48
¼	X	...	...	...	...	...	...	...	...
5/16	...	X	...	...	...	...	...	...	...
¾	X	...	...	...	...	...	...
½	X	X	X	...	...	...	...
5/8	X	X	X	X	...	...	...
¾	X	X	X	X	X	...	...
7/8	X	...	X	X	X	...	...
1	X	...	X	X	X	X	...
1¼	X	...	X	X	X	X	...
1¾	X	...	...	...	...	...	...
1½	X	...	X	X	X	X	X
1¾	X	...	...	X	X	X	X
2	X	...	...	...	X	X	X
2¼	X	...	...	...	X	X	X
2½	X	...	...	...	X	X	X
2¾	X	...	...	...	...	...	X
3	X	...	...	...	...	...	X
3½	X	...	...	...	...	...	X
4	X	...	...	...	...	...	X

TABLE 2 Turnbuckles, Classes D, E, F, G, and H

NOTE 1—1 in. = 25.4 mm

Thread, Nominal Outside Diameter, in.	Size								
	Clear Opening Between Heads, in.								
	4	4½	6	9	12	18	24	36	48
¼	X	...	...	...	...	...	...	...	...
5/16	...	X	...	...	...	...	...	...	...
¾	X	...	...	...	...	...	...
½	X	X	X	...	...	...	...
5/8	X	X	X	X	...	...	...
¾	X	X	X	X	X	...	...
7/8	X	X	X	...	...
1	X	X	X	X	...
1¼	X	X	X	X	...
1½	X	X	X	X	X
1¾	X	X	X	X
2	X	X	X
2¼	X	X	X
2½	X	X	X

- 4.1.2 Quantity required,
- 4.1.3 Type, class, and size (see 3.1, 3.2, and 8.1),
- 4.1.4 Material, if different (see 5.1.1),
- 4.1.5 Type thread required (see 7.3),
- 4.1.6 Type finish required (see 9.3),
- 4.1.7 Grade required, if Type I is specified (see 3.1.1),
- 4.1.8 Optional requirements, if any (see Supplementary Requirements S1 and S2).

5. Materials and Manufacture

5.1 *Materials*:

5.1.1 Unless otherwise specified (see 4.1.4), turnbuckle and end pulls shall be made from steel of a grade which will meet the requirements of Table 3.

TABLE 3 Breaking Strength of Turnbuckles (Complete With End Pulls)

NOTE 1—1 in. = 25.4 mm.

NOTE 2—1 lb = 0.45 kg.

Size, Nominal Outside Diameter of Thread, in.	Strength Breaking, min, lbf (kN)				Recommended Working Loads, lbf (kN)			
	Type I, Grade 1		All Others		Type I, Grade 1		All Others	
	Jaw, Eye, or Stub End Pulls	Hook End Pulls	Jaw, Eye, or Stub End Pulls	Hook End Pulls	Jaw, Eye, or Stub End Pulls	Hook End Pulls	Jaw, Eye, or Stub End Pulls	Hook End Pulls
1/4	2 500 (11)	1 500 (7)	1 550 (7)	1 050 (5)	500 (2)	300 (1.3)	310 (1.4)	210 (0.9)
5/16	3 500 (16)	2 500 (11)	2 700 (12)	1 650 (7.3)	700 (3)	500 (2.2)	540 (2.4)	330 (1.5)
3/8	5 200 (23)	3 500 (16)	4 100 (18)	2 300 (10)	1 040 (4.6)	700 (3.1)	820 (3.6)	460 (2)
1/2	9 000 (40)	5 200 (23)	7 550 (34)	3 700 (16.4)	1 800 (8)	1 040 (8)	1 500 (7)	740 (3.3)
5/8	13 500 (60)	8 000 (36)	12 100 (54)	5 400 (24)	2 700 (12)	1 600 (7.1)	2 400 (11)	1 080 (4.8)
3/4	20 000 (89)	10 000 (44)	18 100 (81)	7 500 (33)	4 000 (18)	2 000 (9)	3 600 (16)	1 500 (7)
7/8	29 000 (129)	12 000 (53)	25 100 (112)	10 000 (44)	5 800 (26)	2 400 (11)	5 000 (22)	2 000 (9)
1	38 000 (169)	14 500 (64)	33 100 (147)	12 800 (57)	7 600 (34)	2 900 (13)	6 600 (29)	2 560 (11.4)
1 1/4	60 000 (267)	23 000 (102)	53 600 (238)	20 600 (92)	12 000 (53)	4 600 (20)	10 700 (48)	4 120 (18.3)
1 3/8	72 000 (320)	29 000 (129)	63 400 (282)	24 300 (108)	14 400 (64)	5 800 (26)	12 600 (56)	4 860 (22)
1 1/2	85 000 (378)	36 000 (160)	77 700 (345)	29 300 (130)	17 000 (76)	7 200 (32)	15 500 (69)	5 860 (26.1)
1 3/4	115 000 (511)	...	105 000 (467)	...	23 000 (102)	...	21 000 (93)	...
2	150 000 (667)	...	138 000 (614)	...	30 000 (133)	...	27 600 (122)	...
2 1/4	197 000 (876)	...	181 000 (805)	...	39 400 (175)	...	36 200 (161)	...
2 1/2	242 000 (1076)	...	223 000 (992)	...	48 400 (215)	...	44 600 (198)	...
2 3/4	304 000 (1352)	...	277 000 (1232)	...	60 800 (270)	...	55 400 (246)	...
3	350 000 (1556)	...	337 000 (1499)	...	70 000 (311)	...	67 400 (300)	...
3 1/4	400 000 (1779)	...	400 000 (1779)	...	80 000 (356)	...	80 000 (356)	...
3 1/2	475 000 (2112)	...	475 000 (2113)	...	95 000 (423)	...	95 000 (423)	...
3 3/4	550 000 (2446)	...	550 000 (2446)	...	110 000 (489)	...	110 000 (489)	...
4	635 000 (2824)	...	635 000 (2824)	...	127 000 (565)	...	127 000 (565)	...

5.1.2 For materials used for welded turnbuckle bodies, eye and jaw end pulls, the carbon shall be 0.25 % maximum, sulfur 0.05 % maximum, and phosphorus 0.05 % maximum.

5.1.3 Heavy jam nuts shall be right-hand or left-hand threaded, as required, and made of carbon steel of a type selected from Groups 1016 to 1020, inclusive in accordance with Specification A29/A29M.

5.1.4 Jaw end pulls 5/8 in. (16 mm) and smaller shall be provided with a steel hexagon head bolt and nut of commercial quality. Jaw end pulls 3/4 in. (19 mm) and larger shall be provided with a round head steel pin and cotter of commercial value.

5.2 Manufacture:

5.2.1 Eye End Pulls—Eye end pulls shall be forged, resistance welded, or arc or gas welded, at the option of the producer, except that when forged bodies are specified, forged-eye end pulls shall be required.

5.2.1.1 Each forged-eye end pull shall be forged at elevated temperature to final shape and size and shall be similar to Fig. 2. The shape of the eye may be either oval or round.

5.2.1.2 Resistance-welded eye end pulls shall be similar to Fig. 3. They shall be fabricated from one piece of material by bending the material to form the eye and joined by resistance welding process.

5.2.1.3 Arc- or gas-welded eye end pulls shall be similar to Fig. 4. They shall be fabricated from one piece of material by bending the material to form the eye and joined by welding. The cross-sectional area through the weld shall be not less than the cross-sectional area of the bar.

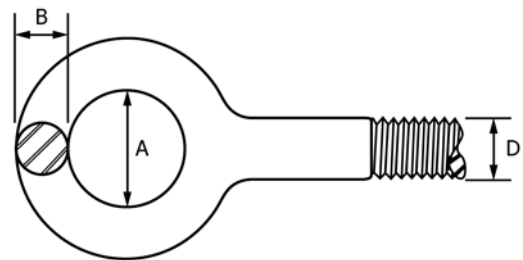
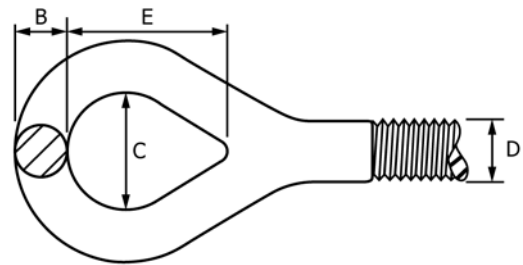


FIG. 2 Forged-Eye End Pull

5.2.2 Jaw End Pulls—Jaw end pulls shall be forged, arc or gas welded, or upset, at the option of the producer, except that if forged bodies are specified, forged-jaw end pulls shall be provided.

5.2.2.1 Forged-jaw end pulls shall be similar to Fig. 5.

5.2.2.2 Arc- or gas-welded end pulls shall be similar to Fig. 6.

5.2.2.3 Upset jaw end pulls shall be similar to Fig. 7.