STUDS

METRIC STUDS AND BENT BOLTS

IFI 528 1982

SECTION A — DOUBLE END STUDS

1. Scope. This standard covers double end studs of four types and in nominal thread diameters M5 thru M100.

2. Types.

Type 1 — Unfinished
Type 2 — Finished, Full or Undersize Body
Type 3 — Finished, Full Body
Type 4 — Finished, Close Body

3. Body Diameter Tolerances. Type 1 studs shall have an unfinished body with no specified body diameter tolerances. Type 2 studs shall have a maximum body diameter equal to basic major diameter of the thread, and a minimum body diameter equal to the rolled thread blank size. Type 3 studs shall have a maximum body diameter equal to basic major diameter of the thread, and a minimum body diameter equal to the specified minimum ma-

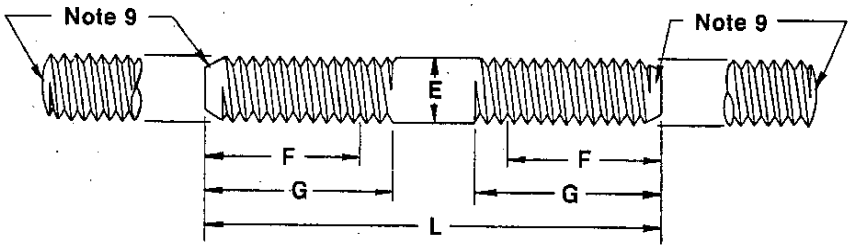

Table 1 Dimensions of Double End Studs

Nom Stud Size & Thread Pitch	Body Diameter E								Nut Ends					
									F	G	F	G	F	G
	Type 1		Type 2		Type 3		Type 4		For Studs Up To And Including 125 mm Length		For Studs Over 125 To 200 mm Length		For Studs Over 200 mm Length	
									Thread Length		Thread Length		Thread Length	
									Full Thread	Total Thread	Full Thread	Total Thread	Full Thread	Total Thread
	Max	Min	Max	Min	Max	Min	Max	Min	Min	Max	Min	Max	Min	Max
M5 × 0.8	—	—	5.00	4.36	5.00	4.82	—	—	16	19.2	22	25.2	35	38.2
M6 × 1	—	—	6.00	5.21	6.00	5.79	—	—	18	22	24	28	37	41
M8 × 1.25	—	—	8.00	7.04	8.00	7.76	—	—	22	27	28	33	41	46
M10 × 1.5	—	—	10.00	8.86	10.00	9.73	—	—	26	32	32	38	45	51
M12 × 1.75	—	—	12.00	10.68	12.00	11.70	—	—	30	37	36	43	49	56
M14 × 2	—	—	14.00	12.50	14.00	13.68	—	—	34	42	40	48	53	61
M16 × 2	—	—	16.00	14.50	16.00	15.68	—	—	38	46	44	52	57	65
M20 × 2.5	—	—	20.00	18.17	20.00	19.62	—	—	46	56	52	62	65	75
M24 × 3	—	—	24.00	21.80	24.00	23.58	—	—	—	—	60	72	73	85
M30 × 3.5	—	—	30.00	27.46	30.00	29.52	—	—	—	—	72	86	85	99
M36 × 4	—	—	36.00	33.12	36.00	35.46	—	—	—	—	—	—	97	113
M42 × 4.5	—	—	42.00	38.78	42.00	41.43	—	—	—	—	—	—	109	127
M48 × 5	—	—	48.00	44.43	48.00	47.40	—	—	—	—	—	—	121	141
M56 × 5.5	—	—	56.00	52.09	56.00	55.36	—	—	—	—	—	—	137	159
M64 × 6	—	—	64.00	59.74	64.00	63.32	—	—	—	—	—	—	153	177
M72 × 6	—	—	72.00	67.74	72.00	71.32	—	—	—	—	—	—	169	193
M80 × 6	—	—	80.00	75.74	80.00	79.52	—	—	—	—	—	—	185	209
M90 × 6	—	—	90.00	85.74	90.00	89.32	—	—	—	—	—	—	205	229
M100 × 6	—	—	100.00	95.74	100.00	99.32	—	—	—	—	—	—	225	249
See Notes	2, 3		2, 3		2, 3		2, 3		4, 7, 8					

jor diameter of the thread. Type 4 studs shall have body diameter tolerances as specified by the purchaser (milled or ground body). Tolerances are given in Table 1.

4. **Short Studs.** Continuous thread studs shall be supplied for all studs too short to accommodate the standard thread length on each end. Continuous thread studs shall be supplied when the specified stud length is shorter than 4D + 8P + 12 mm for stud lengths 125 mm and shorter, 4D + 8P + 24 mm for stud lengths over 125 mm to and incl. 200 mm, and 4D + 8P + 50 mm for stud lengths over 200 mm. D equals nominal stud diameter, and P is thread pitch.

5. **Length.** The length of stud, measured parallel to the axis, shall be the distance from extreme end to extreme end. The tolerance on length shall be:

Nom Stud Size	Tolerance on Length, mm	
	For Lengths 150 mm and Shorter	For Lengths over 150 mm
M5 thru M12	±0.8	±1.5
M14 thru M24	±1.5	±2.3
M30 and M36	±2.3	±3.0
over M36	±3.0	±6.0

6. **Threads.** Threads shall be metric coarse threads with class 6g tolerances in accordance with ANSI B1.13M, page A—8.

7. **Full Thread Length, F.** The full thread length is the distance, measured parallel to the axis of stud, from extreme end of the stud to the opposite face of a GO thread ring gage, having the chamfer and/or counterbore removed, which has been assembled by hand as far as the thread will permit.

8. **Total Thread Length, G.** The total thread length is the distance, measured parallel to the axis of stud, from the extreme end of the stud to the last scratch on cut threads or to the top of the extrusion angle on rolled threads.

9. **Point.** Both ends of the stud shall be pointed. At manufacturer's option, points may be rounded (oval) or flat and chamfered. When rounded, the stud shall have an oval point with a radius equal to approximately one times the basic stud diameter. When flat and chamfered, the end shall be chamfered from a diameter approximately 0.4 mm below the minor diameter of the thread to produce a length of chamfer or incomplete thread equivalent to 1 to 1.5 times the thread pitch.

10. **Material and Mechanical Properties.** Carbon steel studs shall conform to the requirements of the applicable property class as covered in ASTM F568, page B—1. Class 4.6 studs are available in sizes M5 thru M100; class 9.8 in sizes M5 thru M16; class 8.8 in sizes M20 thru M36; and class 10.9 in sizes M5 thru M56. Studs of other materials such as stainless steel, brass, bronze, and aluminum alloys shall have properties as agreed upon by the manufacturer and purchaser. (For guidance refer to ASTM F738, page B—19, and ASTM F468M, page B—34.)

11. **Designation.** To avoid possible misunderstanding when specifying double end studs, it is recommended that they be designated in the following sequence: Product type and name; nominal size and thread pitch; stud length; material, including grade identification; and finish (plating or coating) if required.

Example: Type 2 double end stud, M10 × 1.5 × 100, ASTM F568 class 9.8, zinc plated.

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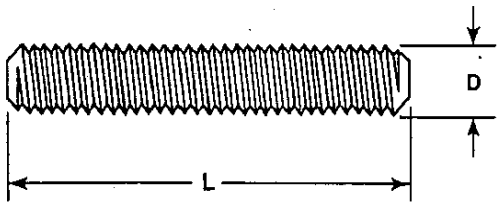
SECTION B — CONTINUOUS THREAD STUDS



1. **Scope.** This standard covers continuous thread studs in nominal thread diameters M5 thru M100.

2. **Length.** The length of stud, measured parallel to the axis, is the distance from extreme end to extreme end. The tolerance on length shall be as tabulated below:

Nom Stud Size	Tolerance on Length, mm	
	For Lengths 150 mm and Shorter	For Lengths over 150 mm
to M8	± 0.8	± 1.5
M10 thru M20	± 1.5	± 3.0
M24 and M36	± 3.0	± 4.8
Over M36	± 6.0	± 6.0

3. **Threads.** Threads shall be metric coarse threads with class 6g tolerances in accordance with ANSI B1.13M, page A—8.

4. **Point.** Both ends of the stud shall be pointed. At manufacturer's option, points may be rounded (oval) or flat and chamfered. When rounded, the stud shall have an oval point with a radius equal to approximately one times the basic stud diameter. When flat and chamfered, the end shall be chamfered from a diameter approximately 0.4 mm below the minor diameter of the thread to produce a length of chamfer or incomplete thread equivalent to 1 to 1.5 times the thread pitch.

5. **Material.** Material and mechanical requirements shall be as specified by the purchaser. (For guidance refer to ASTM F568, page B—1, ASTM F738, page B—19, and ASTM F468M, page B—34.)

6. **Designation.** To avoid misunderstanding when specifying continuous thread studs, it is recommended that they be designated in the following sequence: Product name; nominal size and thread pitch; stud length; material, and finish (plating and coating) if required.

Example: Continuous thread stud, M24 × 3 × 200, ASTM F568 class 8.8, zinc phosphate and oil.

SECTION C — BENT BOLTS

1. **Scope.** This standard covers bent bolts in nominal thread diameters M5 and larger.

Bent bolts may be obtained in the basic designs illustrated below and in conformance with dimensions, material and mechanical requirements as specified by the purchaser. All features as delineated in the illustrations for the respective bolt type should be designated in accordance with Note 6.

METRIC STUDS AND BENT BOLTS

2. **Size.** The nominal bolt size is the nominal size (basic major diameter) of the threaded portion.

3. **Threads.** Threads may be cut or rolled and shall be metric coarse threads with class 6g tolerances in accordance with ANSI B1.13M, page A—8. On rolled thread bolts the diameter of the unthreaded portion may be undersize.

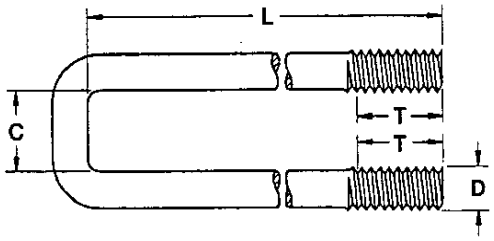
4. **Thread Length.** The full thread length shall be measured, parallel to the axis of thread, from the extreme end of the bolt to the last complete (full form) thread.

5. **Material.** Material and mechanical requirements shall be as specified by the purchaser. (For guidance refer to ASTM F568, page B—1, ASTM F738, page B—19, and ASTM F468M, page B—34.)

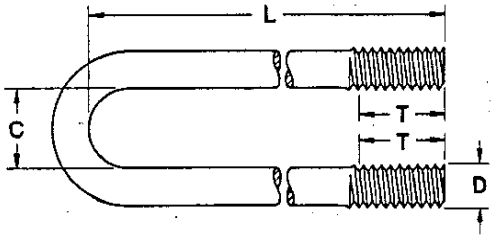
6. **Designation.** To avoid possible misunderstanding when specifying bent bolts, it is recommended that dimensional features be given in the sequence shown in brackets adjacent to the bolt type callouts above each illustration; followed by product name; material; and finish (plating or coating), if required.

Example: If a medium carbon heat treated steel J-Bolt is required with D = 10 mm, L = 150 mm, C = 25 mm, E = 16 mm, thread length T = 40 mm, M = 20 mm and N = 30 mm, it should be specified as M10 × 150 × 25 × 16 × 40 × 20 × 30 J-Bolt, ASTM F568 class 9.8.

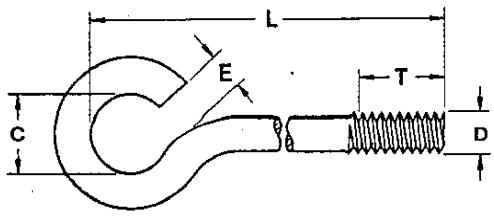
U-Bolt, Square Bend
(DxLxCxT)



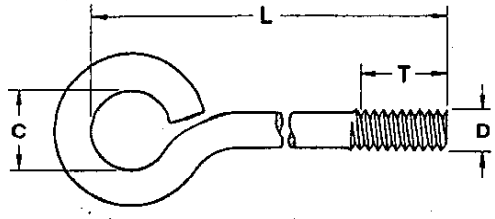
U-Bolt, Round Bend
(DxLxCxT)



Eye Bolt Open
(DxLxCxExT)



Eye Bolt, Closed
(DxLxCxT)



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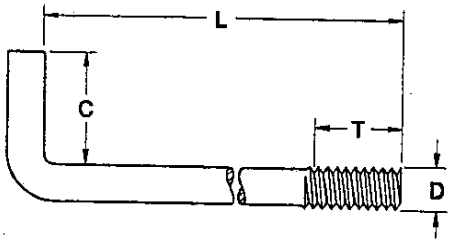
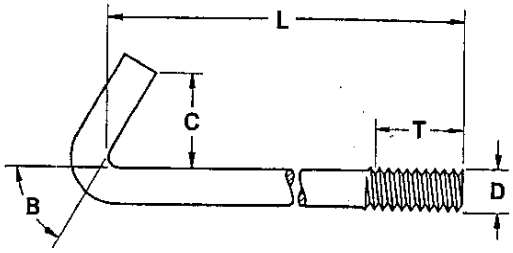
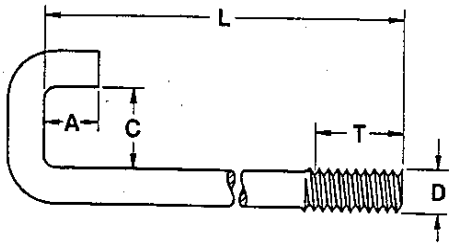
Hook Bolt, Right Angle Bend
(DxLxCxT)



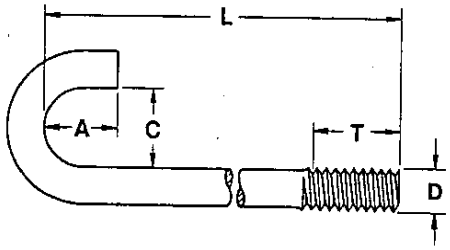
Hook Bolt, Special (DxLxCxTxB)
(B expressed in degrees)



Hook Bolt, Square Bend
(DxLxCxAxT)



Hook Bolt, Round Bend
(DxLxCxAxT)



J-Bolt
(DxLxCxExTxMxN)