

IFI NOTE:

Standards for studs and bent bolts were originally published in Fastener Standards, 5th Edition, 1970. In 1986, these standards were updated, modestly revised and reissued as IFI-136. In 2002 another revision was completed and another in 2006.

1.0 Scope. This standard covers the general and dimensional requirements for various types of studs and bent bolts in nominal thread diameters 1-1/2 inches and smaller.

Section A details double end studs (Table 1); Section B details interference-thread double end studs (Table 2); Section C details continuous thread studs; Section D details stud bolts for pressure-temperature piping; and Section E details bent bolts.

2.0 Referenced Standards.

All standards are latest issue, unless otherwise agreed between manufacturer and purchaser.

2.1 ASME Standards.

- B1.1 *Unified Screw Threads*
- B1.3M *Screw Thread Gaging Systems for Dimensional Acceptability – Inch and Metric Screw Threads, (UN, UNR, UNJ, M and MJ)*
- B1.12 *Class 5 Interference-Fit Thread*
- B16.5 *Steel Pipe Flanges and Flanged Fittings*
- B18.2.1 *Square and Hex Bolts and Screws*

ASME standards may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

2.2 ASTM Specifications.

- A307 *Carbon Steel Externally Threaded Standard Fasteners*
- A354 *Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners*
- A449 *Quenched and Tempered Steel Bolts and Studs*
- A675/A675M *Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties*
- F468 *Nonferrous Bolts, Hex Cap Screws, and Studs for General Use*
- F593 *Stainless Steel Bolts, Hex Cap Screws, and Studs*

ASTM standards may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

2.3 SAE Standards.

- J429 *Mechanical and Material Requirements for Externally Threaded Fasteners*

IFI STANDARD ®	STUDS AND BENT BOLTS	IFI-136 Page 1 of 9
Published and issued by the Industrial Fasteners Institute of Independence, OH		Issued: 1970 Revised: 2006

All standards and specifications are advisory only. Their use by anyone is entirely voluntary. Reliance thereon for any purpose by anyone is at the sole risk of that person or the user of the product, and the IFI is not responsible for any loss, claim, or damage arising therefrom. In formulating and approving standards and specifications, the IFI has not investigated and will not investigate patents which may apply to the subject matter. Prospective users of the standards and specifications are responsible for advising themselves of and protecting themselves against any patent infringement liability which may arise out of such use. © INDUSTRIAL FASTENERS INSTITUTE 2006

INDUSTRIAL FASTENERS INSTITUTE
6363 Oak Tree Boulevard • Independence, Ohio 44131 USA, www.indfast.org

SAE standards may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.4 IFI Standards.

- IFI-140 *Carbon and Alloy Steel Wire, Rods and Bars for Mechanical Fasteners*

IFI standards may be obtained from the Industrial Fasteners Institute, 6363 Oak Tree Boulevard, Independence, OH 44131-2500.

3.0 Section A — Double End Studs.

3.1 Types. There are four types of double end studs —

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

3.2 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 major 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.

3.3 Short Studs. Continuous thread studs shall be supplied for all studs too short to accommodate the standard thread length on each end.

3.4 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 0.016 in. below the minor diameter of the thread to produce a length of chamfer or incomplete thread not to exceed two times the thread pitch.

3.5 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:

Nominal Stud Size	1/4 thru 1/2	9/16 thru 1-1/4	1-3/8 and Over
Nominal Stud Length	Tolerance on Length, in.		
Up to 6 in., incl.	± 0.03	± 0.06	± 0.09
Over 6 in.	± 0.06	± 0.09	± 0.12

3.6 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.

3.7 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.

IFI STANDARD ®	STUDS AND BENT BOLTS	IFI-136 Page 2 of 9
Published and issued by the Industrial Fasteners Institute of Independence, OH		Issued: 1970 Revised: 2006

All standards and specifications are advisory only. Their use by anyone is entirely voluntary. Reliance thereon for any purpose by anyone is at the sole risk of that person or the user of the product, and the IFI is not responsible for any loss, claim, or damage arising therefrom. In formulating and approving standards and specifications, the IFI has not investigated and will not investigate patents which may apply to the subject matter. Prospective users of the standards and specifications are responsible for advising themselves of and protecting themselves against any patent infringement liability which may arise out of such use. © INDUSTRIAL FASTENERS INSTITUTE 2006

INDUSTRIAL FASTENERS INSTITUTE

6363 Oak Tree Boulevard • Independence, Ohio 44131 USA, www.indfast.org

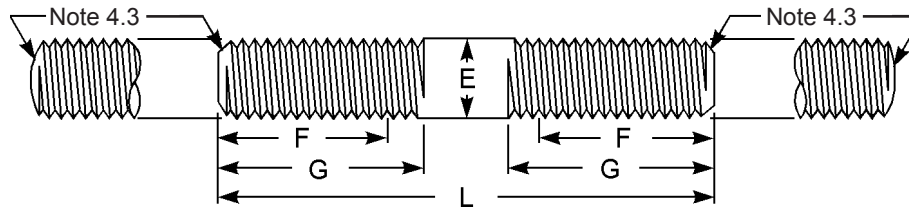


Table 1 Dimensions of Double End Studs

Nominal Size or Basic Stud Diameter	Body Diameter								Nut Ends				
	E								F	G	F	G	G
	Type 1		Type 2		Type 3		Type 4		For Studs Up To and Including 6 in. Length		For Studs Over 6 in. Length		For Short Studs
									Thread Length		Thread Length		Thread Length
									Full Thread	Total Thread	Full Thread	Total Thread	
	Max	Min	Max	Min	Max	Min	Max	Min	Min	Max	Min	Max	
1/4 0.2500	—	—	0.2500	0.2127	0.2500	0.2408	—	—	0.750	0.875	1.000	1.125	—
5/16 0.3125	—	—	0.3125	0.2712	0.3125	0.3026	—	—	0.875	1.031	1.125	1.281	—
3/8 0.3750	—	—	0.3750	0.3287	0.3750	0.3643	—	—	1.000	1.188	1.250	1.438	—
7/16 0.4375	—	—	0.4375	0.3850	0.4375	0.4258	—	—	1.125	1.344	1.375	1.594	—
1/2 0.5000	—	—	0.5000	0.4435	0.5000	0.4876	—	—	1.250	1.500	1.500	1.750	—
9/16 0.5625	—	—	0.5625	0.5016	0.5625	0.5495	—	—	1.375	1.656	1.625	1.906	—
5/8 0.6250	—	—	0.6250	0.5589	0.6250	0.6113	—	—	1.500	1.812	1.750	2.062	—
3/4 0.7500	—	—	0.7500	0.6773	0.7500	0.7353	—	—	1.750	2.125	2.000	2.375	—
7/8 0.8750	—	—	0.8750	0.7946	0.8750	0.8592	—	—	2.000	2.438	2.250	2.688	—
1 1.0000	—	—	1.0000	0.9100	1.0000	0.9830	—	—	2.250	2.750	2.500	3.000	—
1-1/8 1.1250	—	—	1.1250	1.0228	1.1250	1.1064	—	—	2.500	3.062	2.750	3.312	—
1-1/4 1.2500	—	—	1.2500	1.1476	1.2500	1.2314	—	—	2.750	3.375	3.000	3.625	—
1-3/8 1.3750	—	—	1.3750	1.2563	1.3750	1.3544	—	—	3.000	3.688	3.250	3.928	—
1-1/2 1.5000	—	—	1.5000	1.3812	1.5000	1.4794	—	—	3.250	4.000	3.500	4.250	—
See Para. 3.12	3.1, 3.2								3.6	3.7	3.6	3.7	3.3

3.8 Threads. Threads, when rolled, shall be Unified inch coarse, fine, or 8 thread series (UNRC, UNRF, or 8 UNR series), Class 2A, in accordance with ASME B1.1. Threads produced by other methods shall preferably be UNRC, UNRF, or 8 UNR, but at manufacturer's option, may be Unified inch coarse, fine, or 8 thread series (UNC, UNF, or 8 UN series), Class 2A. Acceptability of screw threads shall be determined based on System 21 of ASME B1.3M.

3.9 Thread Runout. Total runout (eccentricity and angularity) of thread in relation to stud body shall be such that the stud will meet the requirements specified in Appendix II of ASME B18.2.1. If agreed at time of order, the requirements of Appendix I of ASME B18.2.1 may be applied.

3.10 Material. Chemical and mechanical requirements shall be in accordance with IFI-140. Properties of carbon steel studs are covered in SAE J429, ASTM A307, ASTM A449, and ASTM A354. Properties of several grades of stainless steel are covered in ASTM F593, and of several nonferrous materials in ASTM F468.

IFI STANDARD ® Published and issued by the Industrial Fasteners Institute of Independence, OH	STUDS AND BENT BOLTS	IFI-136 Page 3 of 9
		Issued: 1970 Revised: 2006

All standards and specifications are advisory only. Their use by anyone is entirely voluntary. Reliance thereon for any purpose by anyone is at the sole risk of that person or the user of the product, and the IFI is not responsible for any loss, claim, or damage arising therefrom. In formulating and approving standards and specifications, the IFI has investigated and will not investigate patents which may apply to the subject matter. Prospective users of the standards and specifications are responsible for advising themselves of and protecting themselves against any patent infringement liability which may arise out of such use. © INDUSTRIAL FASTENERS INSTITUTE 2006