

FED. SUPPLY CLASS

5307

1. SCOPE

- 1.1 Scope. This specification covers locked in studs which have integrated locking keys to prevent rotation of the stud when installed in the tapped holes.

2. APPLICABLE DOCUMENTS

2.1 Government documents

- 2.1.1 Specifications and standards. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

Federal

~~QQ A 225/8 Aluminum Alloy 6061, Bar, Rod, Wire and Special Shapes, Rolled, Drawn or Cold Finished~~

Military

~~MIL S 5626 Steel, Chrome Molybdenum (4140) Bars and Reforging Stock (For Aircraft Applications)~~

STANDARDS

Federal

FED-STD-H28/2 Screw-Thread Standards for Federal Services, Section 2, Unified Inch Screw Threads-UN and UNR Thread Forms

FED-STD-H28/20 Screw-Thread Standards for Federal Services, Section 20, Inspection Methods for Acceptability of UN, UNR, UNJ, M and MJ Screw-Threads

Military

MIL-STD-2073/1 Standard Practice for Military Packaging

~~MS51833 Stud, Locked In, Key Locked, Lightweight~~

~~MS51834 Stud, Locked In, Key Locked, Heavy Duty~~

MS51835 Insert and Stud, Locked In, Key Locked, Hole Dimensions for and Assembly of

HANDBOOKS

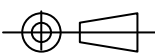
Military

MIL-HDBK-57 Listing of Fastener Manufacturers' Identification Symbols

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

① COMPLETELY REVISED

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-S-45915, REVISION A.

THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE	TITLE STUD, LOCKED IN, KEY LOCKED, GENERAL SPECIFICATION FOR ①	CLASSIFICATION SPECIFICATION NAS 45915 SHEET 1 OF 15

- 2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of DoDISS cited in the solicitation. Unless otherwise specified, the issues not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

ASTM International

ASTM E1444	Inspection, Magnetic Particle
ASTM E1417	Inspection, Liquid Penetrant
ASTM A342/A342M	Indicator, Permeability; Low MU (Go-No Go)
ASTM D3951	Standard Practice for Commercial Packaging
ASTM A580/A580M	Stainless and Heat-Resisting Steel Wire
ASTM A582/A582M	Stainless and Heat-Resisting Steel Bars

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. www.astm.org

Aerospace Industries Association

NASM1312-6	Fastener Test Methods, Method 6, Hardness
NASM1312-8	Fastener Test Methods, Method 8, Tensile Strength
NASM1312-13	Fastener Test Methods, Method 13, Double Shear
NASM51833	Stud, Locked In, Key Locked, Lightweight
NASM51834	Stud, Locked In, Key Locked, Heavy Duty

Copies can be obtained from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209. www.aia-aerospace.org

SAE International

AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AMS2700	Passivation Treatments for CRES
AMS2759	Heat Treatment of Steel Parts
AMS4117	Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire and Flash Welded Rings
AMS6349	Steel Bars, .95Cr - .20Mo (.38 - .43C) (SAE 4140), Normalized
AMS6382	Steel, Bars, Forgings, and Rings, .95Cr - .20Mo (.38 - .43C) (SAE 4140), Annealed
AS8879	Screw Threads, Controlled Radius Root and Increased Minor Diameter
AMS5640	Steel Bars, Wire, and Forgings, Free Machining, Corrosion Resistant
AMS5731	Steel Bars, Forgings, Tubing, and Rings, Corrosion and Heat Resistant
AMS5734	Steel Bars, Forgings, and Tubing, Corrosion and Heat Resistant
AMS5737	Steel Bars, Wire, Forgings, and Tubing, Corrosion and Heat Resistant
AMS5738	Steel Bars, Free Machining, Corrosion Resistant
AMS6322	Steel Bars, Forgings and Rings

Copies can be obtained from SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001. www.sae.org

ASME

ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)

Copies can be obtained from ASME, Three Park Ave., New York, NY 10016-5990. www.asme.org

American Society for Quality

ANSI/ASQ Z1.4	Sampling Procedures and Tables for Inspection by Attributes
---------------	---

Copies can be obtained from the American Society for Quality, 600 North Plankinton Ave., Milwaukee, WI 53203. www.asq.org

① COMPLETELY REVISED

REVISION
1
ASME B46.1
SHEET 2



(Non-Government standards and other publications are normally available from the organizations that prepare or that distribute the documents. These documents may also be available in or through libraries or other information services.)

- 2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets or NAS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

- 3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern (see 6.2).
- 3.2 Material. Recycled and reclaimed materials shall be used to the maximum extent practicable. Studs shall be fabricated of the following material, as specified (see 3.1).
- 3.2.1 Alloy steel. Alloy steel shall be grade 4140 (UNS G41400) in accordance with ~~MIL-S-5626~~ AMS6349 or AMS6382, or grade 8740 (UNS G87400) in accordance with AMS6322.
- 3.2.2 CRES. CRES shall be Type 303 (UNS S30300) in accordance with AMS5640, Type 1 or ASTM A582/A582M, or Type 303SE (UNS S30323) in accordance with AMS5640, Type 2, AMS5738 or ASTM A582/A582M. Type A286 (UNS S66286) shall be in accordance with AMS5731, AMS5734 or AMS5737. Type A286 magnetic permeability shall be less than 2.0 (Air = 1.0) for a field strength H = 200 oersteds using a magnetic permeability indicator per ASTM A342/A342M, Test Method 3.
- 3.2.3 Locking keys. Stud locking keys shall be made from CRES, Type 302, chemical composition of ASTM A580/A580M only.
- 3.3 Heat treatment. Studs made of alloy steel conforming to ~~MIL-S-5626~~ AMS6382, AMS6349 or AMS6322, and CRES conforming to AMS5731 or AMS5734 shall be heat treated in accordance with AMS2759 to develop the mechanical properties specified herein.
- 3.4 Cadmium plating and surface treatment. Studs shall be furnished with a cadmium plating or surface treatment as specified herein and 3.1.
- 3.4.1 Alloy steel. Studs fabricated from alloy steel shall be cadmium plated in accordance with AMS-QQ-P-416, Type II, Class 3, except stress durability test is not required. The entire stud shall be cadmium plated. The locking keys may or may not be cadmium plated.
- 3.4.2 CRES. Studs fabricated from CRES, less the keys, shall be passivated in accordance with AMS2700, Method 1, Class 4. The key wire material shall be passivated in accordance with AMS2700 prior to assembly in the stud.
- 3.5 Design, dimensions and tolerance. Studs and locking keys shall be in accordance with the design, dimensions and tolerances specified in NASM51833 or NASM51834 as applicable (see 3.1). Dimensions and tolerances shall apply after application of the cadmium plating or surface treatment specified in 3.4.
- 3.5.1 Threads. Threads shall be right handed in accordance with the applicable specification sheet (see 3.1).
- 3.5.1.1 Nut end threads. Nut end threads shall conform to AS8879, and shall be of the sizes specified in the applicable specification sheet (see 3.1).
- 3.5.1.2 Stud end threads. Stud end threads shall conform to FED-STD-H28/2. Minor diameters shall be as specified in the applicable specification sheet (see 3.1).

① COMPLETELY REVISED

REVISION
1
NASM45915
SHEET 3



- 3.5.1.3 Thread forming. Threads for the nut end shall be fully formed by a single rolling process subsequent to heat treatment and prior to plating or surface treatment. Threads for the stud end may be produced either by machining, grinding, or fully formed by a single rolling process prior to plating or surface treatment.
- 3.5.1.4 Incomplete threads. The runout threads shall beaired into the shank within a minimum of one and a maximum of two pitches without an abrupt change in cross sectional area. Lead threads, including chamfer, shall not exceed two pitches. The root and flanks of the runout thread may deviate from true thread form but shall be smooth and free of tool marks.
- 3.5.1.5 Grain flow. The grain flow in rolled threads shall be continuous and shall follow the general thread contour with the maximum density at the bottom of the root radius as shown in Figure 1.

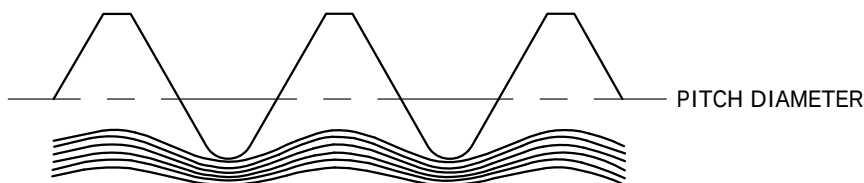


FIGURE 1 – THREAD GRAIN FLOW

- 3.5.2 Surface texture. The surface texture of the stud prior to plating, shall not exceed the values specified in the applicable specification sheet (see 3.1) and shall be in accordance with ASME B46.1 when tested in conformance with 4.3.2.6.
- 3.5.3 Straightness. The straightness of the stud shall be within the values specified in Table I when tested in conformance with 4.3.2.5.

TABLE I – ALLOWABLE DEVIATION OF THE STUD

Basic Stud Size (Nut End)	Deviation of Stud – Maximum (Inches per Inch of Nut End Length)
.1900 and smaller	.0040
.2500-.3125	.0030
.3750-.4375	.0025
.5000 and larger	.0020

- 3.6 Mechanical properties. Studs conforming to the design and dimensions specified in the applicable specification sheet (see 3.1) and having load ratings as specified in Tables IIa and IIb shall be capable of developing for an ultimate tensile strength and a minimum proof strength the values for ultimate tensile stress specified in Tables IIa and IIb.
- 3.6.1 Tensile strength. The stud shall be capable of withstanding proof loads as specified in Tables IIa and IIb when tested in conformance with 4.3.3.1.

① COMPLETELY REVISED

REVISION
1
ASM45915
SHEET 4



TABLE II (a) – MINIMUM TENSILE STRENGTH OF STUDS – COARSE THREADS (UNJC)

Basic Size (Nut End)	Stress Area in ² /a/ UNJC	Tensile Load – lbf		
		80 KSI (303/303SE) /b/	140 KSI (A286) /b/	160 KSI (4140/8740) /b/
.1640	.0140	1,120	1,960	2,240
.1900	.0175	1,400	2,450	2,800
.2500	.0318	2,544	4,452	5,088
.3125	.0524	4,192	7,336	8,384
.3750	.0775	6,200	10,850	12,400
.4375	.1063	8,504	14,882	17,008
.5000	.1419	11,352	19,866	22,704
.5625	.1820	14,560	25,480	29,120
.6250	.2260	18,080	31,640	36,160
.7500	.3340	26,720	46,760	53,440
.8750	.4620	36,960	64,680	73,920
1.0000	.6060	48,480	84,840	96,960

/a/ Tensile stress areas per ASME B1.1

/b/ Stud material minimum ultimate tensile strength.

TABLE II (b) – MINIMUM TENSILE STRENGTH OF STUDS – FINE THREADS (UNJF)

Basic Size (Nut End)	Stress Area in ² /c/ UNJF	Tensile Load – lbf		
		80 KSI (303/303SE) /d/	140 KSI (A286) /d/	160 KSI (4140/8740) /d/
.1640	.01474	1,179	2,063	2,358
.1900	.0200	1,600	2,800	3,200
.2500	.0364	2,912	5,096	5,824
.3125	.0580	4,640	8,120	9,280
.3750	.0878	7,024	12,292	14,048
.4375	.1187	9,496	16,618	18,992
.5000	.1599	12,792	22,386	25,584
.5625	.2030	16,240	28,420	32,480
.6250	.2560	20,480	35,840	40,960
.7500	.3730	29,840	52,220	59,680
.8750	.5090	40,720	71,260	81,440
1.0000	.6630	53,040	92,820	106,080

/c/ Tensile stress areas per ASME B1.1

/d/ Stud material minimum ultimate tensile strength.

3.6.2 Resistance to pullout. The installed stud (with or without locking keys installed) shall have a minimum resistance to pullout as specified in Table III when installed in a test block and tested in conformance with 4.3.3.2.

① COMPLETELY REVISED

REVISION

1

NAS Documents

SHEET 5

Document Sharing Hub