AEROSPACE STANDARD

AS4847™	REV. B

Issued 1994-11
Revised 2018-03
Reaffirmed 2023-05

Superseding AS4847A

Shank Nuts, Captive Blind Fastener, Mating Retaining Flange, Design Standard for

RATIONALE

Update to include AS6922 part standard, add reference for AS8879 threads, general editorial update.

AS4847B has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This design standard provides information on the use of self-locking shank nuts, thread sizes .1640-36 through .3750-24, together with details of flange hole and abutment shoulder for their installation.

1.1 Purpose

To standardize on the dimensional particulars of the attachment flange hole, abutment shoulder, and length of shank on the nut.

1.2 Application

Primarily for aerospace propulsion system blind bolted applications where high temperature self-locking double hexagon nuts cannot be used.

1.3 Description

A self-locking shank nut is held captive by flaring the shank into a countersink in the flanged component. The nut is prevented from turning during the assembly and removal of the bolt by means of a flat on the nut that abuts a machined shoulder on the flanged component part (see Figure 1).

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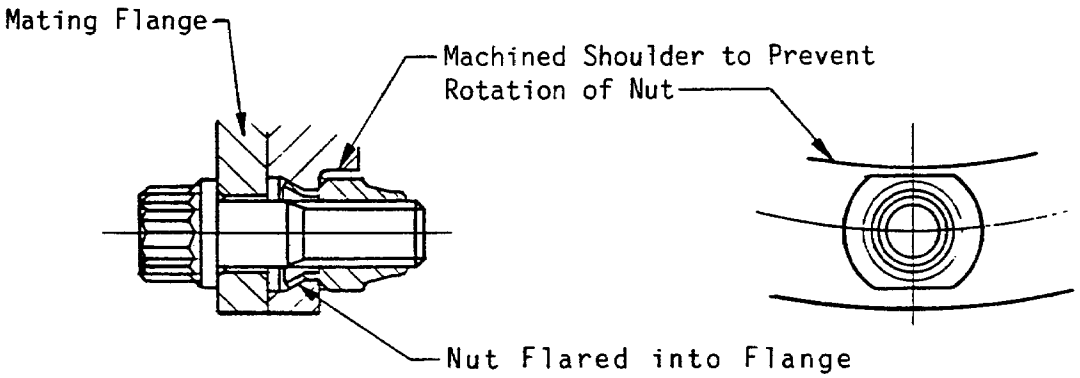

Figure 1 - Shank nut and bolt assembly

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP4848 Flaring (Swaging) and Removal of Shank Nuts

AS3534 Nut, Self-Locking, Shank, UNS S66286, Silver Plated on Thread Only, UNJ Thread

AS3535 Nut, Self-Locking, Shank, UNS N07001, Silver Plated, UNJ Thread

AS6922 Nut, Self-Locking, Shank, 1400°F, 180 KSI, Nickel Alloy (UNS N07001), Silver Plated Threads Only, UNJ Thread

AS7466 Bolt and Screws, Nickel Alloy, UNS N07718 Tensile Strength 185 ksi Fatigue Rated, Procurement Specification

AS7471 Bolt and Screws, Nickel Alloy, UNS N07001 Tensile Strength 165 ksi, Corrosion and Heat Resistant Procurement Specification

AS7477 Bolt and Screws, Steel, UNS S66286 Tensile Strength 130 ksi, Procurement Specification

AS8879 Screw Threads - UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter

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2.1.2 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ANSI Y14.5M-1982 Dimensioning and Tolerancing

2.1.3 Industry Publications

Available from Battelle Headquarters, 505 King Avenue, Columbus, OH 43201, www.mmpds.org or e-mail bcommpds@battelle.org.

DOT/FAA/AR-MMPDS Metallic Materials Properties Development and Standardization (MMPDS)

2.2 Units

Unless otherwise specified herein, linear dimensions are in inches.

2.3 Dimensioning and Tolerancing

Is in accordance with ANSI Y14.5M-1982 (ASME Publication).

2.4 Threads

All threads referenced are UNJ threads in accordance with AS8879.

3. TECHNICAL REQUIREMENTS

3.1 Standard Shank Nuts

Table 1 lists the available SAE standard drawings for UNJ threaded shank nuts, range of sizes, type of material, and maximum operating temperature.

Table 1 - SAE standard shank nuts

AS Standard Number	Thread Size Range	Material	Plating	Maximum Operating Temperature
AS3534	.1640-36 thru .3750-24	A286	Silver on threads only	1200 °F
AS3535	.1640-36 thru .3750-24	Waspaloy	Silver	1400 °F
AS6922	.1640-36 thru .3750-24	Waspaloy	Silver on threads only	1400 °F

3.1.1 Performance

Shank nuts have a locking feature that is subject to the same reusability performance tests as the standard double hexagon self-locking nuts. Performance test requirements are as follows:

a. Twelve usage cycles at room temperature.

b. Five usage cycles at maximum operating temperature.

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3.2 Dimensions of Flange Hole and Shank Length

Dimensions D, E min, and the 60 degree countersink are design requirements to ensure that the expansion of the nut shank A, on flaring, is held to a maximum of 115% of its shank OD. See Figure 2 and Table 2.

3.2.1 Table 2 and Figure 2 is based on standardizing the use of one shank length for each nut size on all flange thicknesses; thus, rationalizing the number of nuts to be used.

3.2.2 The minimum flange thickness for use with shank nuts is given in Table 2, dimension E min.

3.2.3 The flange thickness should be designed on the basis of the minimum structural requirement.

3.2.4 CAUTION: Use of shank nuts should be avoided on highly stressed flanges because the corner radius in the abutment shoulder is smaller than that normally recommended for highly stressed flanges and could be considered as a stress riser.

3.2.5 Shank nuts listed in Table 1 should not be used on soft materials having a minimum compression yield strength less than 45 ksi due to the small bearing area under the nut.

3.3 Installation

Installation and flaring requirements for shank nuts are given in ARP4848 and should be specified on the engineering drawing.

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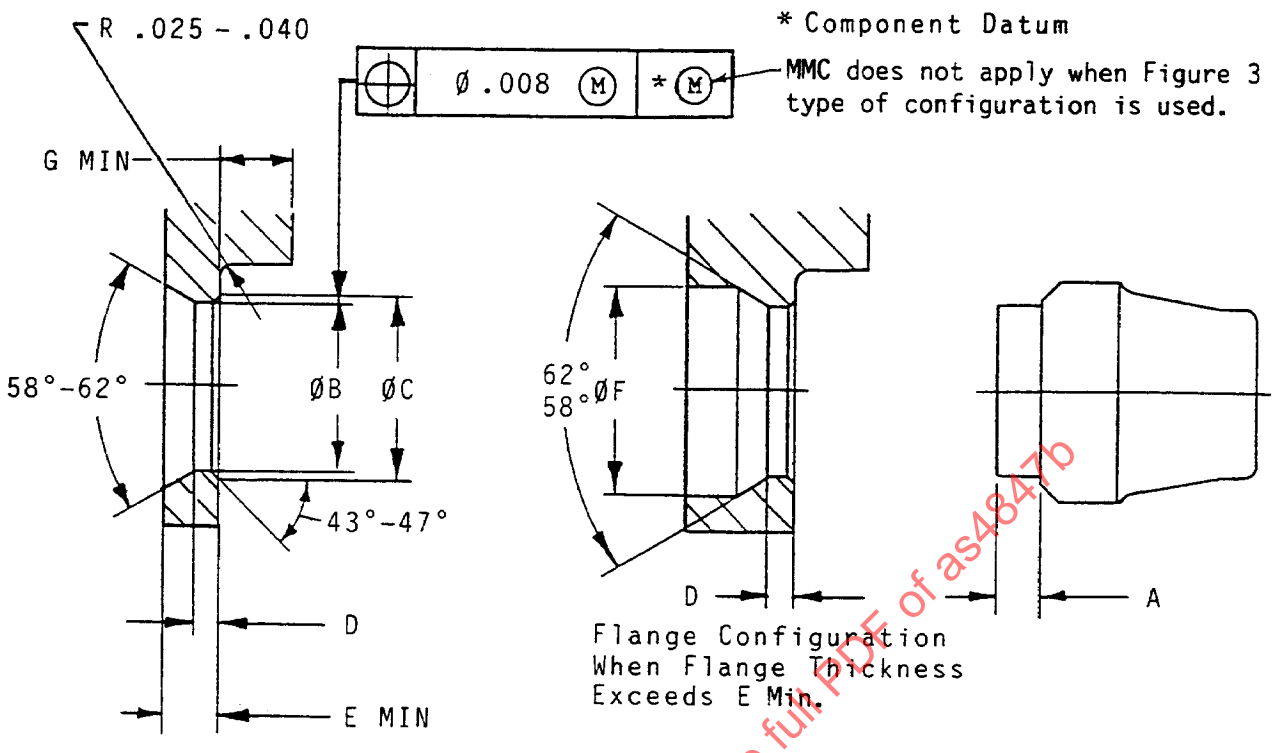

Figure 2 - Dimensions of flange hole and shank length

Table 2 - Dimensions of flange hole and shank length

Thread Size	Part Number	A ±0.003	B ±0.002	ØC ±0.006	D	E Min	ØF ±0.003	G Min
.1640-36	AS3534-02 AS3535-02 AS6922-02	0.063	0.216	0.239	0.032-0.040	0.098	0.290	0.065
.1900-32	AS3534-03 AS3535-03 AS6922-03	0.066	0.242	0.266	0.032-0.040	0.098	0.318	0.100
.2500-28	AS3534-04 AS3535-04 AS6922-04	0.080	0.336	0.360	0.032-0.040	0.102	0.436	0.153
.3125-24	AS3534-05 AS3535-05 AS6922-05	0.108	0.399	0.423	0.051-0.059	0.150	0.515	0.185
.3750-24	AS3534-06 AS3535-06 AS6922-06	0.119	0.473	0.496	0.051-0.059	0.146	0.594	0.207

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3.4 Mating Flanges

Thickness of the mating flange (see Figure 1) bolted to the flange in which the nut is retained must not be less than the thickness shown in Table 3 for the materials shown to prevent coining of flange into shank recess. Other factors may influence the desired flange thickness.

3.4.1 The minimum flange thickness given in Table 3 are based on the use of standard double hexagon head bolts, of the same alloy as the flange, bearing on the flange and torqued to its minimum ultimate tensile load with the flange stressed in bending to 80% of the flange minimum tensile yield strength.

Table 3 - Mating flange minimum thickness

Nom Bolt Size	Minimum Flange Thickness A286	Minimum Flange Thickness Inconel 718	Minimum Flange Thickness Waspaloy
.1640-36	0.057	0.051	0.055
.1900-32	0.071	0.064	0.069
.2500-28	0.089	0.080	0.086
.3125-24	0.107	0.097	0.104
.3750-24	0.129	0.117	0.126

Flange Alloy /1/:		Bolt Alloy /2/:
A286,	Ftu = 130 ksi Fty = 85 ksi	A286, AS7477, Ftu = 130 ksi
Inco 718,	Ftu = 180 ksi Fty = 148 ksi	Inco 718, AS7466, Ftu = 185 ksi
Waspaloy,	Ftu = 175 ksi Fty = 115 ksi	Waspaloy, AS7471, Ftu = 165 ksi

/1/ Properties of flange materials are at room temperature per DOT/FAA/AR-MMPDS.
/2/ Properties of bolt materials are at room temperature per applicable procurement specification noted.

3.5 Dimensional Requirements of Machined Shoulders (Trapped Nuts)

3.5.1 Straight Trapped Nuts (see Figure 3 and Table 4)

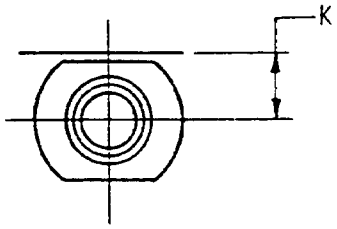

Figure 3 -Straight trapped nuts

Table 4 - Location of nut from shoulder

Thread Size	K
.1640-36UNJF-3B	0.195-0.203
.1900-32UNJF-3B	0.209-0.217
.2500-28UNJF-3B	0.236-0.244
.3125-24UNJF-3B	0.252-0.260
.3750-24UNJF-3B	0.311-0.319

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