RATIONALE

This revision corrects typographical errors in Table 1A (dimensions ØV and T) and in Table 10 (AC runout tolerance for double hexagon across points) and corrects "minimum" "maximum" in 3.2.3.8. General editorial revisions and clarifications throughout.

1. SCOPE

The scope of this SAE Aerospace Standard (AS) is to define the following dimensional requirements for double hexagon, hexagon head and tee headed bolts, and nuts with AS8879 UNJ inch series threads primarily for use in propulsion systems. Design requirements are based on UNJC threads for sizes 0.1640 and smaller and UNJF threads for sizes 0.1900 and larger.

1.1   Bolts

a.   Head configurations and dimensions (see 3.1)

b.   Shank configurations and dimensions (see 3.2)

c.   Geometric control (see 3.3)

d.   Surface texture (see 3.4)

1.2   Nuts

a.   Configurations and dimensions (see 4.1)

b.   Geometric control (see 4.2)

c.   Surface texture (see 4.3)

1.3   Strength Classes

Double hexagon bolt heads are shown in two configurations for up to 220 ksi minimum ultimate tensile strength and up to 260 ksi minimum ultimate tensile strength. Nuts configurations are for up to 260 ksi minimum. However, the ability of a design to achieve a given strength class will ultimately depend on the selected material, associated processing, and the specific geometry.

1.4   Dimensions

1.4.1   Dimensional Units

Dimensions and tolerances in this document are in inches, unless otherwise specified.

1.4.2   Plating and Coatings

Dimensions specified in this document apply after plating and before coating (e.g., dry film lubrication).

1.5   Nomenclature

As defined by the Federal Cataloging System, thread sizes less than 0.1900 are referred to as screws and larger sizes are referred to as bolts. For the purpose of this document, the term bolt will be used for all sizes.

1.6   Templates

Appendices A and B contain basic part drawing templates for a double hexagon bolt and a double hexagon nut based on the recommendations of this standard. They are shown in SAE AS Part Standard formats but can be adapted for use in any drawing format.

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.

AS870   Wrenching Configuration, Bi-Hexagonal (12 Point) Drive, Design Standard For

AS3062   Bolts, Screws and Studs, Screw Thread Requirements

AS3063   Bolts, Screws, and Studs, Geometric Control Requirements

AS5443   Wrenching Element, Spline Drive - Dimensions for

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

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.

ASME B46.1   Surface Texture (Surface Roughness, Waviness, Lay)

ASME Y14.5M-1994   Dimensioning and Tolerancing

ASME Y14.36M   Surface Texture Symbols

3.   GENERAL REQUIREMENTS

3.1   Head Dimensions

3.1.1   Double hexagon headed bolts up to a strength level of 220 ksi minimum fasteners shall have head configuration in accordance with Figure 1A and Table 1A.

3.1.1.1   Where heads are required to be drilled for lockwire or safety wire, the particulars in Figure 1B and Table 1B shall apply.

3.1.2   Double hexagon headed bolts for 260 ksi minimum fasteners shall have head configuration in accordance with Figure 2A and Table 2A.

3.1.2.1   Where heads are required to be drilled for lockwire or safety wire, the particulars in Figure 2B and Table 2B shall apply.

3.1.3   Hexagon headed bolts shall have a head configuration in accordance with Figure 3A and Table 3A.

3.1.3.1   Where heads are required to be drilled for lockwire or safety wire, the particulars in Figure 3B and Table 3B (one hole) and Figure 3C and Table 3C (six holes) shall apply.

3.1.3.2   In the case of hexagon heads, it is necessary to increase the head height to accommodate the holes.

3.1.4   Formulae used for calculating hexagon across flats and the across corner dimensions are as follows:

3.1.4.1   Minimum Width Across Flats

$$AF\ min = AF\ nom - [0.010\ (AF\ nom)^{0.25}] \tag{Eq. 1}$$

where:

   AF nom = nominal width across hexagon flats

3.1.4.2   Maximum Width Across Flats

$$AF\ max = AF\ nom + 0.001 \tag{Eq. 2}$$

where:

   AF nom = nominal width across hexagon flats less than 0.500

$$AF\ max = AF\ nom + 0.002 \tag{Eq. 3}$$

where:

   AF nom = nominal width across hexagon flats equal to or greater than 0.500

3.1.4.3   Minimum Distance Across Corners

$$E\ min = 1.141\,(AF\ min) - 0.009 \tag{Eq. 4}$$

where:

   AF min = minimum width across hexagon flats