SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS3063 | REV. B

Issued 1970-03
Revised 1996-08
Reaffirmed 2012-11

Superseding AS3063A

Bolts, Screws, and Studs, Geometric Control Requirements

RATIONALE

AS3063B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This SAE Aerospace Standard (AS) establishes the geometric control requirements for bolts, screws, and studs where worded notes and symbolized notes are used for straightness, concentricity, squareness, and runout.

2. REFERENCES:

2.1 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI Y14.5-1973 Dimensioning and Tolerancing

3. TECHNICAL REQUIREMENTS:

For purposes of the inspections in this specification, shank and threads shall be included but shall be considered as separate elements of the part.

3.1 Bolts and Screws (Worded Notes):

3.1.1 Straightness of Shank and Threads: The axis of the shank and threads shall be straight within the limits specified on the drawing for the total length (L) of the part under the head (see Figure 1). Visible abrupt changes in diameter or shape of the shank and threads which might cause stress concentrations are not permissible.

3.1.2 Concentricity of Thread Pitch Diameter: The concentricity of thread pitch diameter in relation to shank diameter shall be the circular runout within the limits specified on the drawing for a distance of not less than 1.5 times the nominal part diameter away from the last full thread along the shank (see Figure 2). For parts having a shank length less than 1.5 times the nominal part diameter, the concentricity of the shank diameter over its full length in relation to the thread pitch diameter shall be the circular runout within the limits specified on the drawing.

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3.1.3 Concentricity of Head: The concentricity of the head in relation to the shank diameter shall be the circular runout within the limits specified on the drawing for a distance of not less than 1.5 times the nominal part diameter away from the washer face along the shank (see Figure 3). For parts threaded to the head and for parts having shank length less than 1.5 times the nominal part diameter, concentricity of head shall be the circular runout measured in relation to thread pitch diameter in lieu of shank diameter.

3.1.4 Squareness of Washer Face: The squareness of the washer face with the shank diameter shall be within the limits specified on the drawing for a distance of not less than 1.5 times the nominal part diameter away from the washer face along the shank (see Figure 3). For parts threaded to the head and for parts having a shank length less than 1.5 times the nominal part diameter, squareness of washer face shall be measured in relation to thread pitch diameter in lieu of shank diameter.

3.2 Studs (Worded Notes):

3.2.1 Concentricity of Shank: The concentricity of shank in relation to thread pitch diameter of both threaded ends shall be the circular runout within the limits specified on the drawing for a distance of not less than 1.5 times the nominal thread diameter away from the last full thread involved in the measurement along the shank. For parts having a shank length less than 1.5 times the applicable nominal thread diameter, concentricity of the shank diameter over its full length in relation to either thread pitch diameter shall be the circular runout within the limits specified on the drawing.

3.2.2 Concentricity of Threaded Ends: The concentricity of thread pitch diameter of one end in relation to thread pitch diameter of the other end shall be the runout within the limits specified on the drawing. Visible abrupt changes in diameter or shape of the shank and threads which might cause stress concentrations are not permissible.

3.3 Bolts and Screws (Symbolized Notes):

3.3.1 Runout of Shank: See Figure 4.

3.3.2 Runout of Head: See Figure 5.

3.3.3 Squareness of Bearing Surface: See Figure 6.

3.3.4 Straightness of Shank: See Figure 7.

3.4 Studs (Symbolized Notes):

3.4.1 Runout of Shank: See Figure 8.

3.4.2 Runout of Nut Thread OD: See Figure 9.

PREPARED BY SAE COMMITTEE E-25,
GENERAL STANDARDS FOR AEROSPACE PROPULSION SYSTEMS

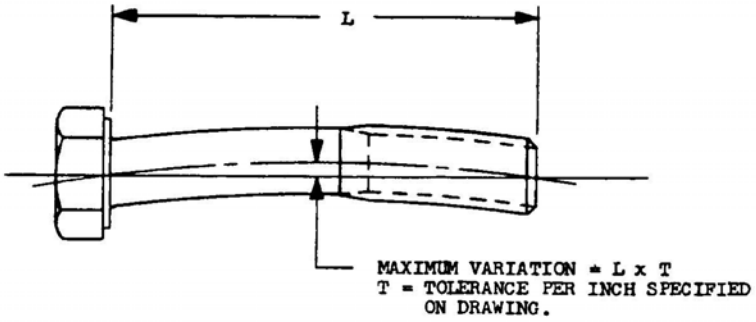


FIGURE 1

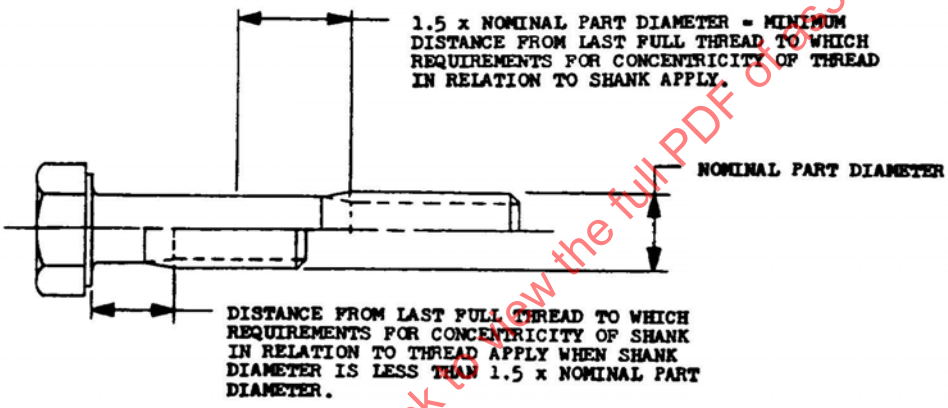
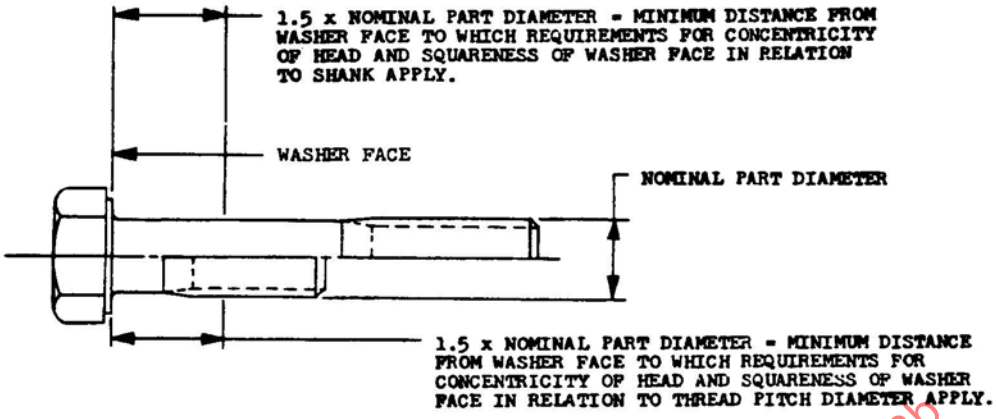


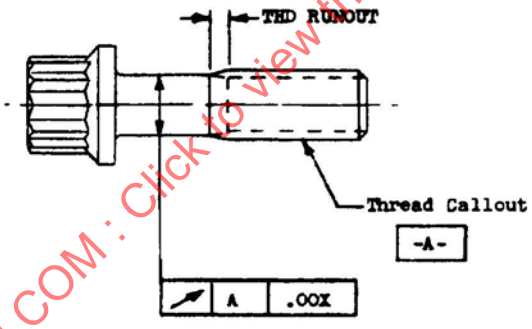
FIGURE 2



HEAD SHAPE SHOWN IS FOR ILLUSTRATIVE PURPOSES ONLY.

FIGURE 3

Specified on Drawing:



DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.

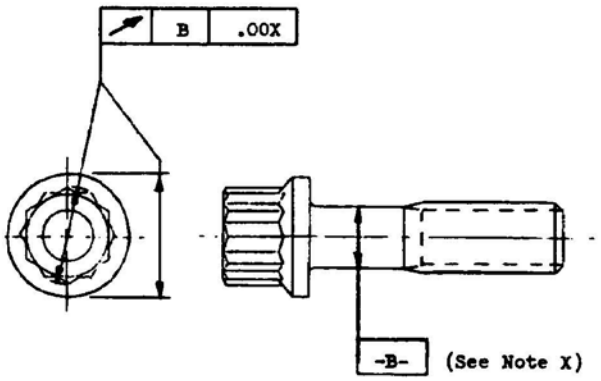
Requirement: The rules, principles, and methods of ANSI Y14.5-1973 apply modified as follows:

1. Datum A applies to the thread pitch diameter for a distance from the thread runout equivalent to one nominal bolt thread size.

2. The circular runout tolerance is applicable to any point along the feature for a distance from the thread runout equivalent to one nominal bolt thread size.

FIGURE 4 - Runout of Shank

Specified on Drawing:



X. FOR PART NUMBERS MSXXXX-XX THROUGH MSXXXX-XX THE THREAD PD SHALL REPLACE DATUM B.

DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.

Requirement: The rules, principles, and methods of ANSI Y14.5-1973 apply modified as follows:

1. Datum B applies to the unthreaded shank for a distance from the head bearing surface equivalent to 1.5 nominal bolt thread size. Where the unthreaded shank is less than a length equivalent to 1.5 nominal bolt thread size, then the thread pitch diameter for a length of one nominal bolt thread size nearest to the head shall become datum in lieu of the unthreaded shank.

FIGURE 5 - Runout of Head

Specified on Drawing:

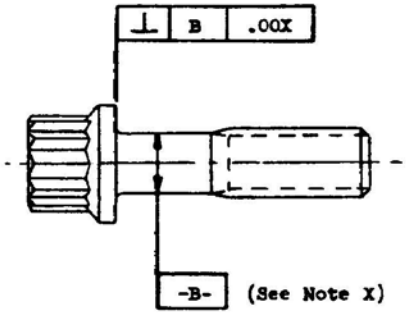


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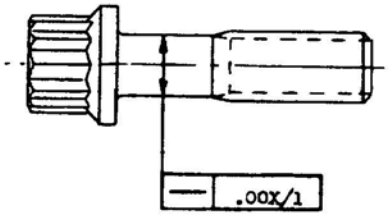
FIGURE 6 - Squareness of Bearing Surface

Specified on Drawing:



DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.

Requirement: The rules, principles, and methods of ANSI Y14.5-1973 apply modified as follows:

1. The specified straightness tolerance applies where the unthreaded shank length exceeds a length equivalent to one nominal bolt thread size.
2. The total straightness tolerance also applies where the unthreaded shank or threads are at maximum size.
3. The total tolerance is the rate specified multiplied by the length of the total shank (unthreaded shank plus threads)

FIGURE 7 - Straightness of Shank