



AEROSPACE STANDARD

AS3063™**REV. C**

Issued 1970-03
Revised 2019-02
Reaffirmed 2024-04

Superseding AS3063B

Bolts, Screws, and Studs, Geometric Control Requirements

RATIONALE

Update to ASME Y14.5-2009, change from runout to position requirement for concentricity of studs threads, add AS1132 for reference to tolerance values, reidentify datum letters, general editorial and technical revisions throughout.

AS3063C 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. 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 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.

AS1132 Bolts, Screws and Nuts - External Wrenching, UNJ Thread, Inch - Design Standard

AS3062 Bolts, Screws and Studs, Screw Thread Requirements

2.2 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 Y14.5-2009 Dimensioning and Tolerancing

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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

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.

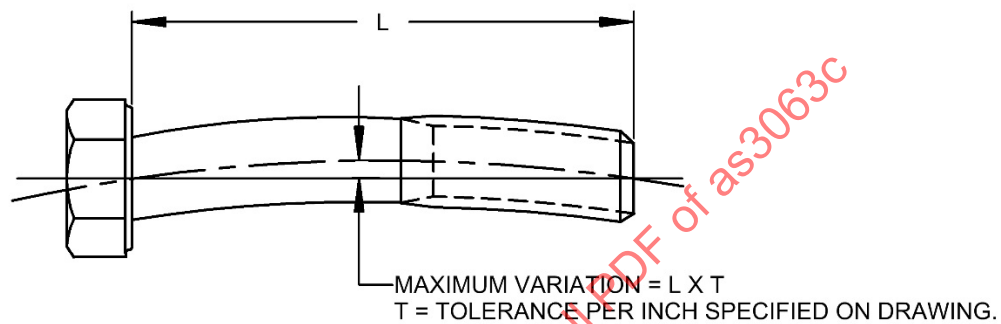


Figure 1 - Straightness of shank and threads

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.

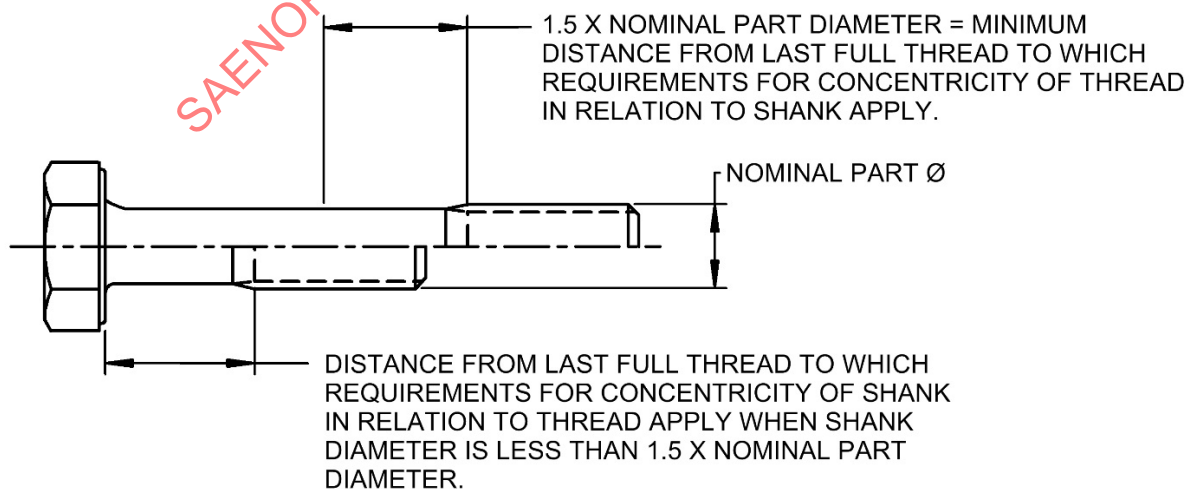


Figure 2 - Concentricity of thread pitch diameter

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.

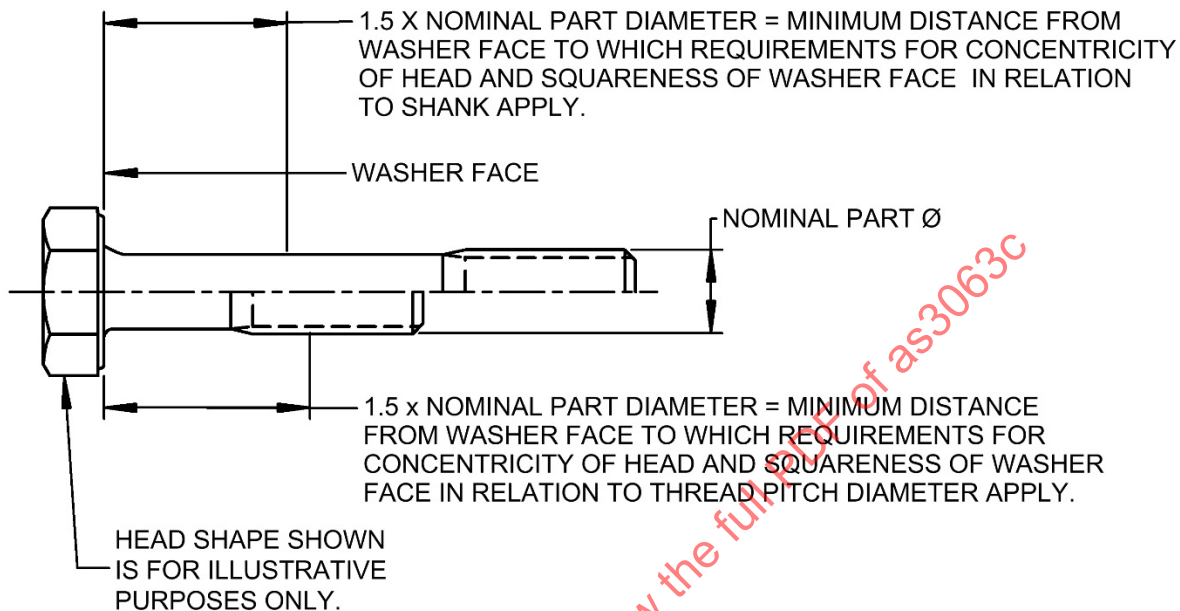


Figure 3 - Concentricity of head

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

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.

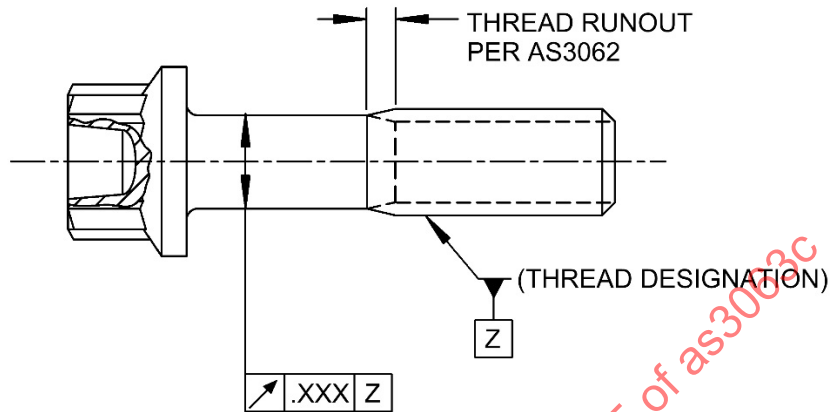
3.2.2 Concentricity of Threaded Ends

The concentricity of thread pitch diameter of one end in relation to thread pitch diameter of the other end shall be the position 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 (Drawing Requirements)

3.3.1 Runout of Shank

Shank runout requirements are specified on the part drawing in accordance with Figure 4. Tolerance values for standard bolt designs are shown in AS1132.



DIMENSIONING AND TOLERANCING: ASME Y14.5 - 2009

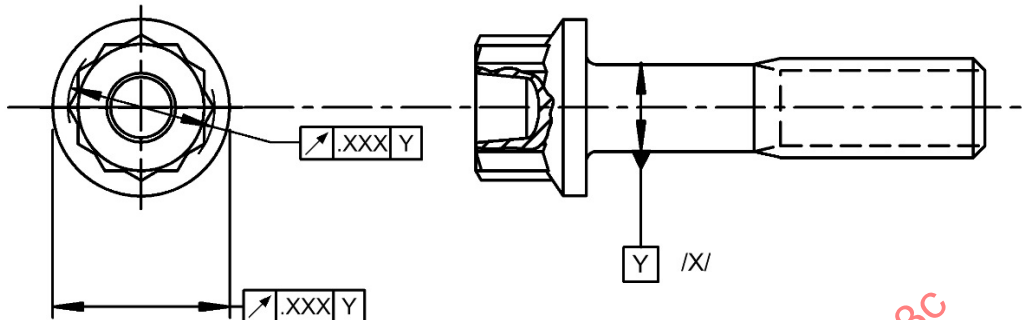
Note: The rules, principles and methods of ASME Y14.5-2009 apply modified as follows:

1. Datum Z 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

3.3.2 Runout of Head

Head runout requirements are specified on the part drawing in accordance with Figure 5. Tolerance values for standard bolt designs are shown in AS1132



DIMENSIONING AND TOLERANCING: ASME Y14.5 - 2009

DRAWING NOTE:

/X/ FOR PART NUMBERS ASXXXX-XX THROUGH ASXXXX-XX DATUM Z (THREAD PD) SHALL REPLACE DATUM Y

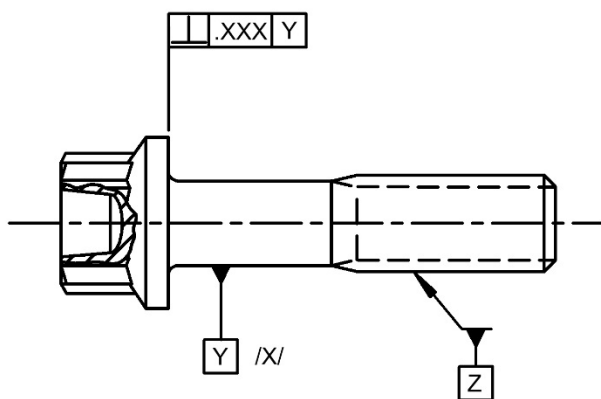
Note: The rules, principles, and methods of ASME Y14.5-2009 apply modified as follows:

1. Datum Y 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

3.3.3 Perpendicularity of Bearing Surface

Requirements for perpendicularity of the bearing surface are specified on the part drawing in accordance with Figure 6. Tolerance values for standard bolt designs are shown in AS1132.



DIMENSIONING AND TOLERANCING: ASME Y14.5 - 2009

DRAWING NOTE:

/X/ FOR PART NUMBERS ASXXXX-XX THROUGH ASXXXX-XX THE DATUM Z (THREAD PD) SHALL REPLACE DATUM Y.

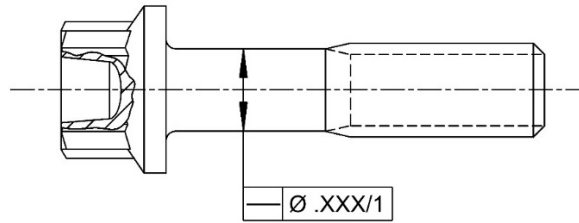
Note: The rules, principles, and methods of ASME Y14.5-2009 apply modified as follows:

1. Datum Y 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 6 – Perpendicularity of bearing surface

3.3.4 Straightness of Shank

Requirements for straightness of the shank are specified on the part drawing in accordance with Figure 7. Tolerance values for standard bolt designs are shown in AS1132.



DIMENSIONING AND TOLERANCING: ASME Y14.5 - 2009

Note: The rules, principles, and methods of ASME Y14.5-2009 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