AEROSPACE STANDARD

AS4296™	REV. A
Issued 2013-08 Revised 2023-06 Superseding AS4296	

Drawing Interpretation and Standard Machining Practices,
Couplings, Fittings, and Hose Ends,
Fluid Systems

RATIONALE

Revise dimensional location of tolerance zone features in Figure 7. Revise “prepared by” statement from G3B to G3.

1. SCOPE

This SAE Aerospace Standard (AS) provides general information for the interpretation and clarification of engineering drawing requirements relating to the manufacture and inspection of fluid system couplings, tube fittings, and hose ends. Because it is impractical to define every minute detail of the part on the face of the drawing, this standard describes interpretations of dimensioning of general machining features and otherwise undefined tolerances that fall under the heading of “good shop practice.” This standard is supplemental to ASME Y14.5M-1994 and explains, defines, and interprets drawing terms or practices that are not addressed by ASME Y14.5M-1994. Unless otherwise specified in this standard, drawing interpretations contained in ASME Y14.5M-1994 shall apply.

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.

AS4266	Hole Contour, Fluid Passage, Tube Fitting
ARP4784	Definitions and Limits, Metal Material Defects and Surface and Edge Features, Fluid Couplings, Fittings and Hose Ends

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 Y14.5M-1994 Dimensioning and Tolerancing

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
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https://www.sae.org/standards/content/AS4296A/

3. REQUIREMENTS

3.1 General

3.1.1 Conflict in Requirements

Where a conflict exists between the requirements of this document and the applicable part drawing, the part drawing shall take precedence.

3.1.2 Material Defects and Surface and Edge Flaws

Unless specified on the drawing surface and edge, defect definitions and limits shall be in accordance with ARP4784.

3.1.3 Sharp Edges

Break edges 0.003 to 0.015, unless otherwise noted.

3.2 Tolerances

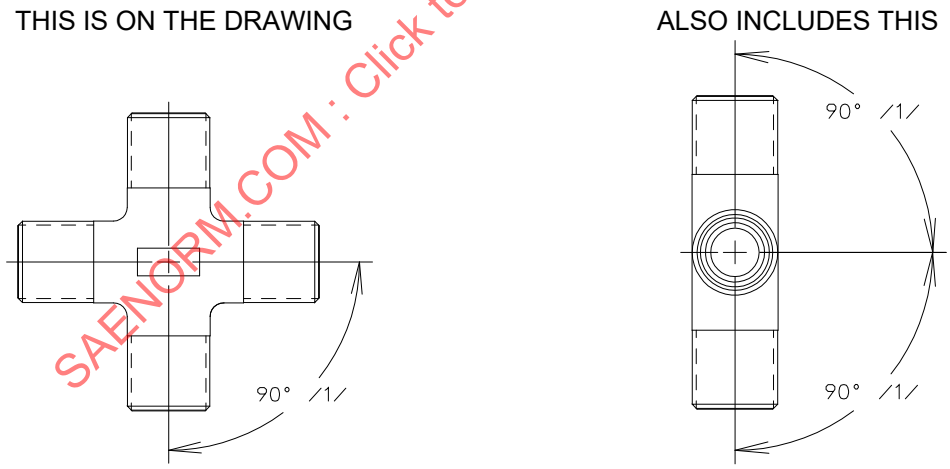
3.2.1 Concentricity

Drawings specifying concentricity in note form modified with TIR, FIR, FIM, etc., are to be interpreted as runout per the applicable drawing interpretation standard specified.

3.2.2 Angularity

3.2.2.1 Shapes

Angularity between the legs of shape fitting such as tees, elbows, and crosses shall be as shown in Figure 1.



/1/ Angle tolerance as specified on the part drawing.

Figure 1 - Angularity of shape fittings

3.2.3 Holes

3.2.3.1 Offset

The allowable fluid passage hole offset, on holes depicted as coaxial on the drawing but machined from opposite directions, shall be 0.015 maximum (see Figure 2).

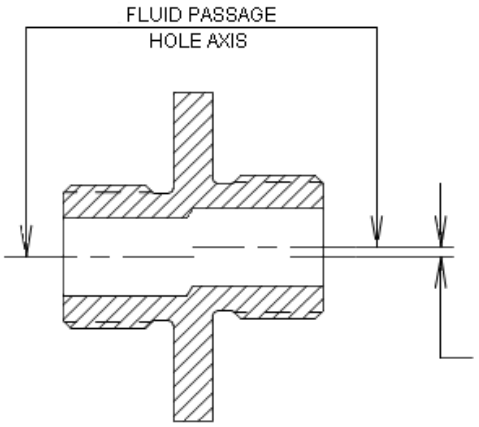


Figure 2 - Offset of fluid passage holes, straight fittings

3.2.4 Circularity Tolerance

The circularity (roundness) tolerance of a machined diameter shall not exceed 0.0005 plus one-quarter of the diametrical tolerance and must fall within the limits of maximum material and minimum material conditions as shown in the example in Table 1.

This requirement is not applicable to diameters on thin wall cylinders where the wall thickness is less than 2.5% of the ID.

Table 1 - Circularity tolerance

Maximum limit	= 0.880
Minimum limit	= 0.870
Diametrical tolerance	= 0.010
1/4 tolerance	= 0.0025
Additional tolerance	= 0.0005
Total tolerance	= 0.003

3.2.5 Circular Runout, Diameters on Common Axis (see Tables 2 and 3)

The maximum full indicator movement (FIM) between two machined diameters on a common axis shall be one-half the sum of the tolerances of the two diameters. If the resultant value from the calculation is less than 0.003, the maximum allowable FIM shall be held to 0.003.

Table 2 - Circular runout, example a

Diameter A is 0.490/0.510 tolerance	= 0.020
Diameter B is 0.621/0.629 tolerance	= 0.008
Tolerance sum	= 0.028
1/2 tolerance sum	= 0.014
Runout	= 0.014 (FIM)

Table 3 - Circular runout, example b

Diameter A is 1.2119/1.2125 tolerance	= 0.0015
Diameter B is 0.7225/0.7250 tolerance	= 0.0025
Tolerance sum	= 0.004
1/2 tolerance sum	= 0.002

Since the resultant value is less than 0.003, the maximum allowable FIM shall be held to 0.003.

This requirement is not applicable to diameters on thin wall cylinders where the wall thickness is less than 2.5% of the ID.

3.2.6 Machining

3.2.6.1 Threads

Unless otherwise specified on the engineering drawing, threads shall conform to requirements noted below.

3.2.6.1.1 Chamfers and Countersinks

Threads shall be chamfered or countersunk as shown in Figure 3 unless otherwise specified on the engineering drawing.

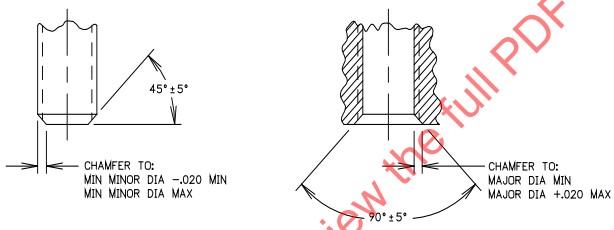


Figure 3 - Thread chamfer

3.2.6.1.2 Thread Lengths

Thread length as specified on an engineering drawing shall be understood to mean that the part must comply with the thread specification requirements to the dimension noted.

3.2.6.2 Holes

Holes shown on engineering drawings normally do not define the method to be used in producing the hole. While the drawing may, in some instances, imply that a hole is drilled by showing a drill point or by specifying a drill depth, the manufacturer has the option to use other machining methods provided the finished hole conforms to the dimensions shown on the drawing. Unless otherwise specified, the bottom of the hole may have curved or conical contour. Elbows, qualified to 5000 psi or higher procurement specifications, shall have a spherical radius at the intersection of the two holes, as required in AS4266. An undefined conical contour in the bottom of a hole shall have a minimum included angle of 110 degrees.

3.2.6.2.1 Depths

Unless otherwise specified, the specified depth of a hole is to be interpreted as follows:

When a fillet radius is specified between the surfaces forming the hole wall and the hole bottom, the specified depth applies to the depth of the full diameter. See Figure 4.

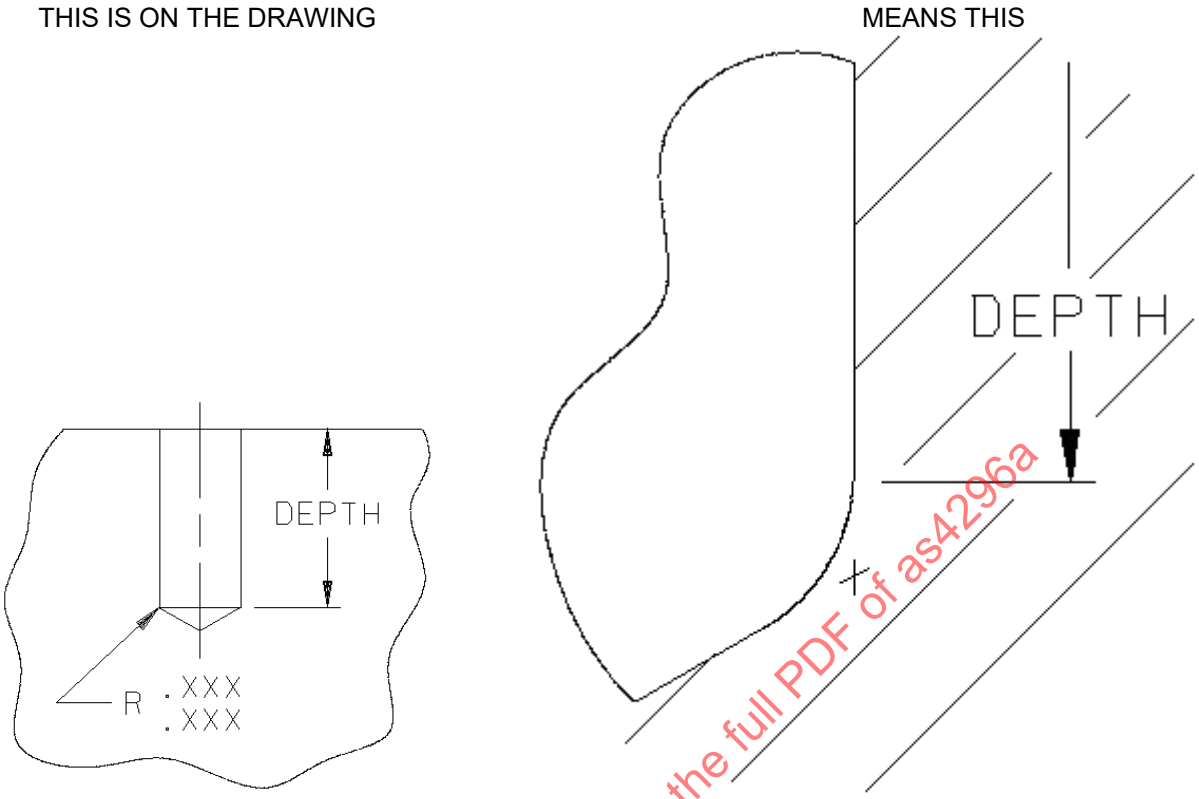


Figure 4 - Hole depth

3.2.6.3 Spotfacing

Shall be interpreted as noted below.

3.2.6.3.1 Machined Faces

On machining faces, the depth of the spotface shall not be greater than 0.030.

3.2.6.3.2 Forged Faces

On forged faces, the depth of the spotface shall not be greater than 0.060.

3.2.6.3.3 Hole and Thread Depth

When a spotface callout is used in conjunction with drilled or threaded holes, the depths are to be measured from the spotface surface.

3.2.6.4 Fillet Radii Interpretation

The designation “R .XXX-.XXX” shall be interpreted to mean the fillet contour shall be a faired curve that lies within the crescent shaped tolerance zone defined by the minimum and maximum limit. The contour shall be tangent at both ends and may have reversals. The radius at any point along the contour shall not be smaller than the minimum specified limit. See Figure 5. Fillet radii for spotface machining shall be 0.010 to 0.020.

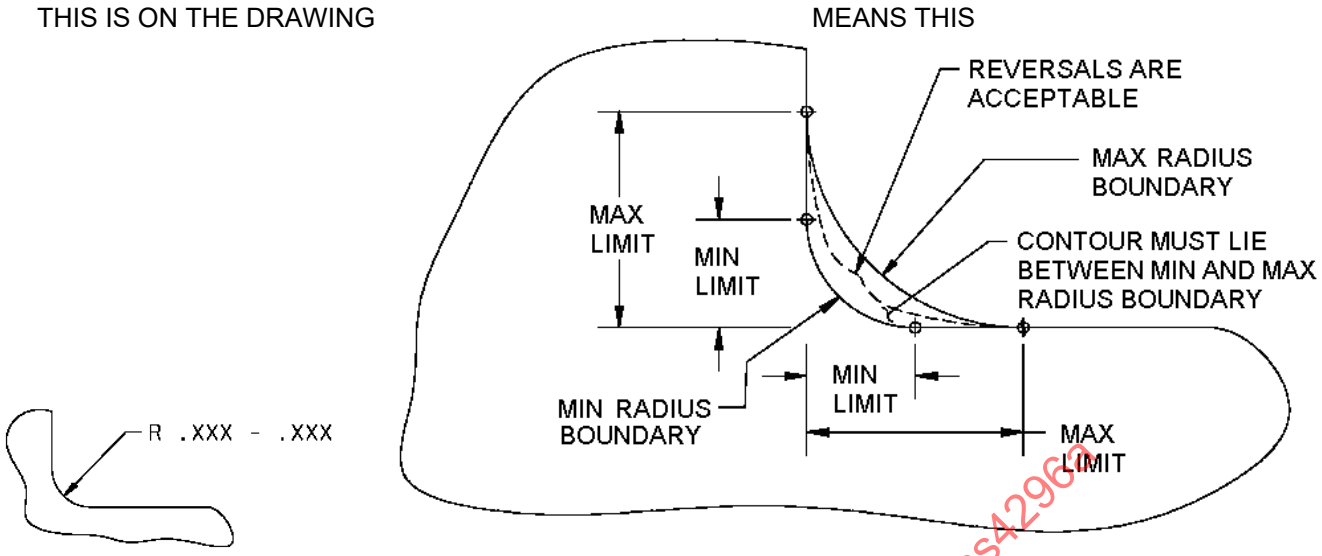


Figure 5 - Fillet radius interpretation

3.2.6.5 Edge Radius (R) Interpretation

The designation “R .XXX-.XXX” shall be interpreted to mean the edge contour shall be a faired curve that lies within the crescent shaped tolerance zone defined by the minimum and maximum limit. The contour shall be tangent at both ends and may have reversals. The radius at any point along the contour shall not be smaller than the minimum specified limit. See Figure 6.

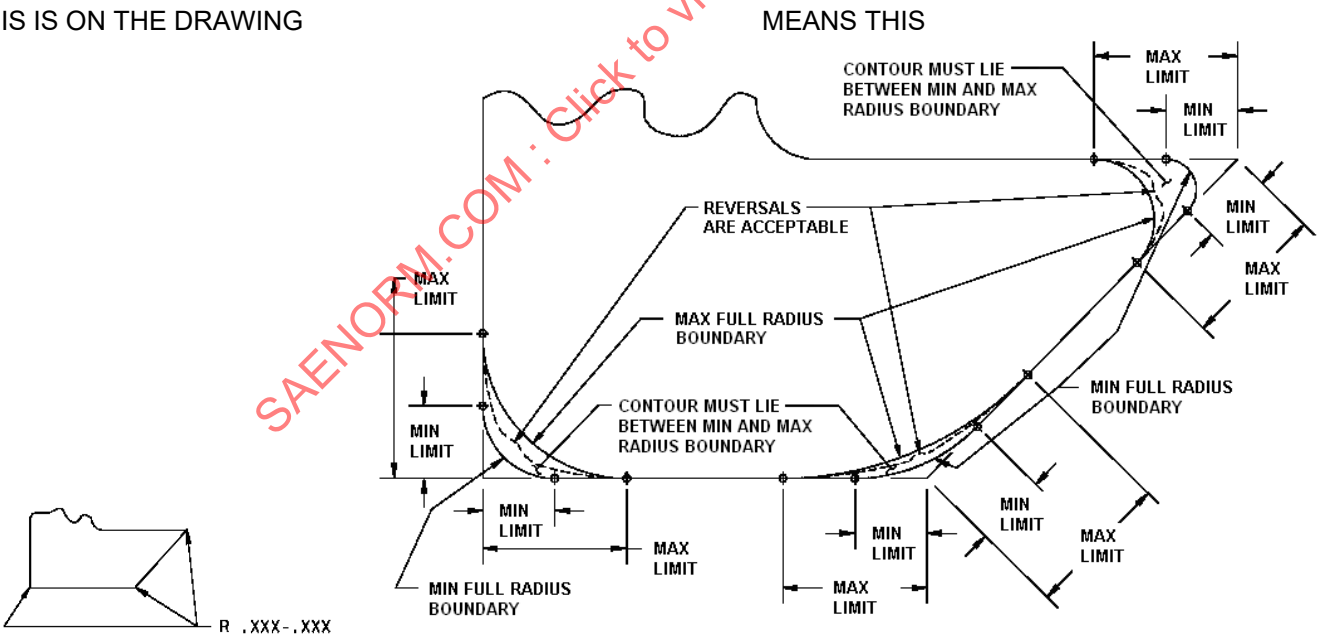


Figure 6 - Edge radius interpretation