



AEROSPACE RECOMMENDED PRACTICE

ARP4296**REV. A**

Issued 1990-08
Revised 1999-01
Reaffirmed 2014-10

Superseding ARP4296

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

RATIONALE

ARP4296A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) is intended to interpret and clarify 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 document describes interpretations of dimensioning of general machining features and otherwise undefined tolerances that fall under the heading of "good shop practice". This document serves as a supplement to engineering drawings when referenced on applicable documents.

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, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP4266 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 ANSI/ASME Publications:

Available from ASME, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900.

ASME Y14.5M Dimensioning and Tolerancing

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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. All requirements herein are meant to apply only if not specified on the drawing.
- 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: Unless there is a definite need for the control of a feature's median points, it is recommended in ANSI Y14.5M-1982 or ASME Y14.5M-1994 that a control be specified in terms of a runout tolerance (see 3.2.6) or a positional tolerance.
- 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.

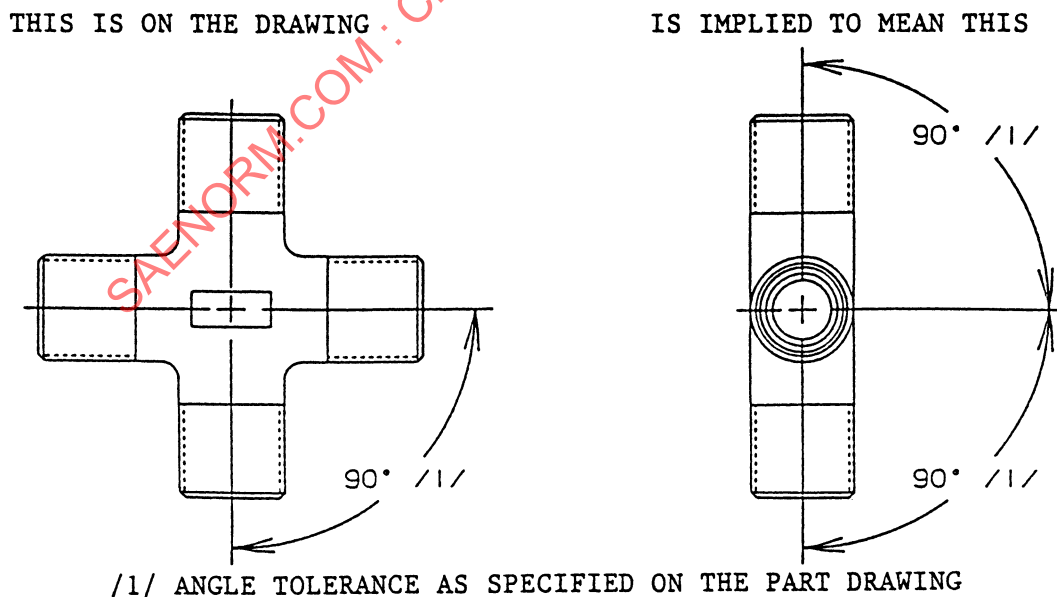


FIGURE 1 - Angularity of Shape Fittings

3.2.3 Holes:

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

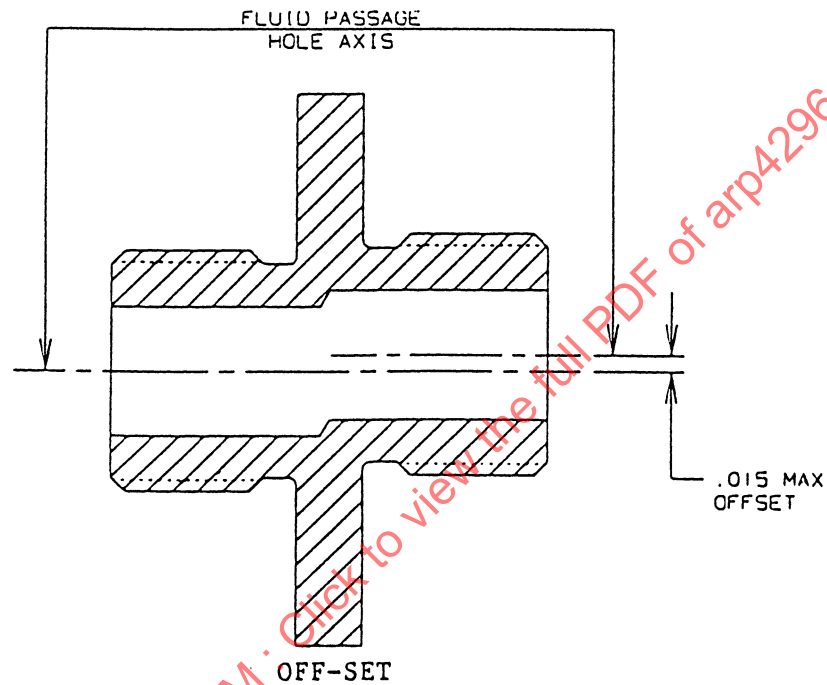


FIGURE 2—Runout of Fluid Passage Holes, Straight Fittings

- 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 Centerline (see Tables 2 and 3): The maximum FIM between two machined diameters on a common centerline 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.

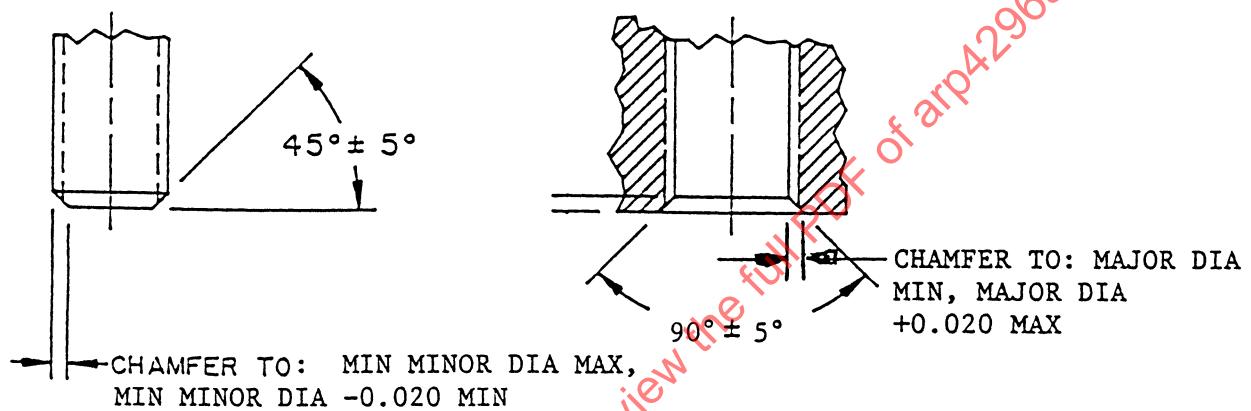


FIGURE 3 - Thread Chamfer

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. Other than elbow fittings, the bottom of the hole may have a curved or conical contour. Elbows shall have a spherical radius at the intersection of the two holes, as required in ARP4266. An undefined conical contour in the bottom of a hole shall have a minimum included angle of 110°.

3.2.6.2.1 Depths: The specified depth of a hole is to be interpreted as the depth of the full diameter of that hole.