AEROSPACE STANDARD

MA2005	REV. B

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Reaffirmed 2015-08

Tube Fittings, Aerospace Fluid Systems, Separable, For 24° Cone, General Specification, Metric (ISO 7169)

RATIONALE

MA2005B has been reaffirmed to comply with the SAE five-year review policy.

FOREWORD

This document is equivalent to ISO 7169 with the exception that U.S. materials, test and process specifications are used where ISO standards are not available. The ISO 7169 is based on MIL-F-18280.

This document establishes the basic performance and quality criteria for screw-together tube fitting assemblies and port connectors used in aerospace fluid systems.

The performance test requirements are intended to satisfy the most strenuous demands encountered in high-performance aircraft hydraulic systems. The procurement requirements are intended to ensure that fittings, which are procured in accordance with this specification, are of the same quality as the fittings used during the original qualification testing. Compliance with these test and procurement requirements is necessary for fittings that are used in control systems where a malfunction would affect the safety of flight.

1. SCOPE:

   This document specifies performance and quality requirements for the qualification and manufacture of 24° cone fittings to ensure reliable performance in aircraft hydraulic systems.

   This document specifies baseline criteria for the design and manufacture of system fittings that are qualification tested on engines.

   This document covers fittings of temperature types and pressure classes specified in MA2001.

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http://www.sae.org/technical/standards/MA2005B

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification 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 specification and references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SA E, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2486	Conversion Coating of Titanium Alloys, Fluoride Phosphate Type
AMS 2488	Anodic Treatment, Titanium and Titanium Alloys
AMS 4928	Titanium Alloy Bars and Forgings, 6Al-4V, Annealed, 120,000 psi (827 MPa)
AMS 4952	Titanium Tubing, Seamless, Annealed, 40,000 psi (275 MPa) Yield Strength
AMS 4945	Tubing, Seamless Hydraulic, 3.0Al 2.5V Cold Worked and Stress Relieved, Texture Controlled
AMS 5561	Tubing, Welded and Drawn, 9Mn 20Cr 6.5Ni High Pressure, Hydraulic
AMS 5658	Bars, Forgings and Rings 15Cr 5Ni 4Cu
AMS 5659	Steel Bars, Forgings and Rings, 15Cr 5Ni 0.03(Cb+Ta) 4Cu Cons. El. Melt
AS1055	Fire Resistance, Fire Test and Performance Requirements for Flexible Hose and Rigid Tube Assemblies (ISO 2685)
MA2001	Aerospace Fluid Systems, Pressure and Temperature Classifications, metric (ISO 6771)
MA2016	Tubing Sizes and Wall Thicknesses, Hydraulic, Preferred Standards List, Metric (ISO 8575)
MA2094	Test Methods for Tube-Fitting Assemblies, Metric (ISO 10583)

2.1.2 ASTM Publications: Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 108	Steel Bars, Carbon, Cold Finished, Standard Quality, Specification for
ASTM E 1444	Heat Treatment of Aluminum Alloys

2.1.3 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-S-5002	Surface Treatment and Metallic Coatings for Metal Surfaces of Weapon Systems
MIL-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)

2.1.3 (Continued):

MIL-T-6845	Tubing, Steel, Corrosion Resistant (304) Aerospace Hydraulic Systems, 1/8 Hard Condition
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-T-7081	Tube, Aluminum Alloy, Seamless, Round, Drawn, Aircraft Hydraulic Quality
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloy
MIL-T-9046	Titanium and Titanium Alloy Sheet, Strip, and Plate
MIL-F-18280	Fittings, Flareless Tube, Fluid Connection
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes (ISO 2859)
MIL-STD-810	Environmental Test Methods
QQ-P-35	Passivation Treatment for Corrosion Resistant Steels
QQ-A-225/6	Aluminum Alloy Bar, Rod and Wire; Rolled, Drawn or Cold Finished, 2024
QQ-A-225/9	Aluminum Alloy Bar, Rod, Wire and Special Shapes, Rolled, Drawn or Cold Finished, 7075
QQ-A-367	Aluminum Alloy, Forgings, Heat Treated
QQ-P-416	Plating, Cadmium, Electrodeposited
QQ-S-637	Steel Bar, Carbon, Cold Finished (Standard Quality, Free Machining)
QQ-S-763	Steel Bars, Shapes, and Forgings, Corrosion Resistant (304)
QQ-S-763	Steel Bars, Shapes, and Forgings, Corrosion Resistant (347)
QQ-S-763	Steel Bars, Shapes, and Forgings, Corrosion Resistant (316)

2.2 Commonly Referenced Organizations:

2.2.1 ANSI Publications: Available from ASME, 345 E. 47th Street, New York, NY 10017.

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

2.3 Related Publications:

The following publications are provided for information purposes only and are not a required part of this document. The documents are available from International Organization for Standardization, Case Postale 56, CH1211, Geneva 20, Switzerland.

ISO 468:1982	Surface roughness - Parameters, their values and general rules for specifying requirements
ISO 2685:1992	Aircraft - Environmental conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones
ISO 2859-1:1989	Sampling procedures for inspection by attributes - Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection
ISO 6771:1987	Aerospace - Fluid systems and components - Pressure and temperature classifications
ISO 6772:1988	Aerospace - Fluid systems - Impulse testing of hydraulic hose, tubing and fitting assemblies

2.3 (Continued):

ISO 7257:1983	Aircraft - Hydraulic tubing joints and fittings - Rotary flexure test
ISO 8575:1990	Aerospace - Fluid systems - Hydraulic system tubing
ISO 9538	Aerospace - Hydraulic tubing joints and fittings - Planar flexure test
ISO 10583:1993	Aerospace fluid systems - Test methods for tube/fitting assemblies

2.4 Definitions:

2.4.1 For the purposes of this document, the following definitions apply.

2.4.2 Workmanship and Surface Defects:

2.4.2.1 SURFACE IRREGULARITY: Nonconformity with general surface appearance, possible defect.

2.4.2.2 CRACK: Clean (crystalline) fracture passing through or across the grain boundaries that possibly follows inclusions of foreign elements. Cracks are normally caused by overstressing the metal during forging or other forming operations, or during heat treatment. Where parts are subject to significant reheating, cracks are usually discolored by scale.

2.4.2.3 FOLD: Doubling over of metal, which can occur during the forging operation. Folds can occur at or near the intersection of diameter changes and are especially prevalent with noncircular necks, shoulders, and heads.

2.4.2.4 LAP: Fold-like machining defect.

2.4.2.5 SEAM:

a. Usually a surface opening or crack resulting from a defect obtained during casting or forging.
b. Extraneous material, stringer in the material, which is not homogeneous with base metal.

2.4.2.6 PIT: Void or hole in the surface as caused, for example, by corrosion.

2.4.2.7 LEAKAGE:

a. Wetting or formation of a drop or drops of test fluid in pressure testing or of a bubble in pneumatic testing.
b. Spillage of test fluid due to rupture.

2.4.3 Fitting Components: Fitting components are designated as illustrated in Figure 1.

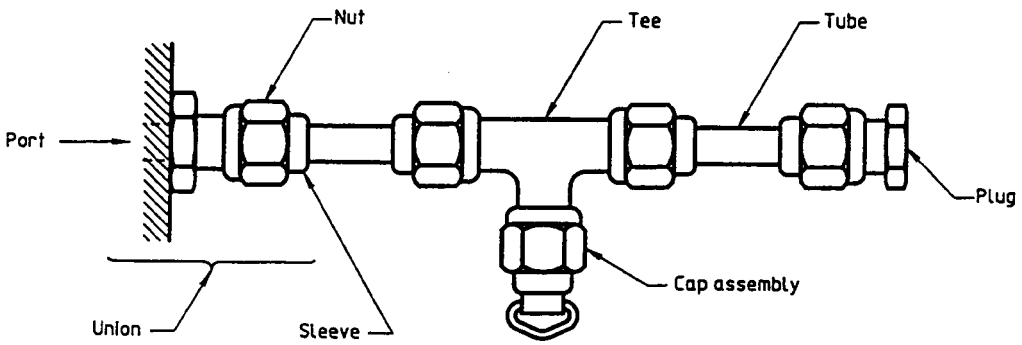

FIGURE 1 - Fitting Assembly Part Designations

2.4.4 Quality Assurance:

2.4.4.1 LOT: Manufacturer's run of a given part number from the same batch of material, processed at the same time and in the same manner.

2.4.4.2 QUALIFICATION TEST: Performance testing required to demonstrate successful performance of the fitting in simulated service, using overload, destructive and accelerated tests.

3. REQUIREMENTS:

3.1 Qualification:

Fittings claiming conformity with this document shall be representative of products which have successfully met the requirements and have passed the tests specified in this document.

3.2 Materials:

3.2.1 Fittings: The fitting parts shall be manufactured from materials as given in Table 1 or equivalents passing the specified qualification tests. The various materials shall be used according to the pressure and temperature requirements of the system (see Table 1).

3.2.2 Tubing: The tubing used with the fittings shall be in accordance with MA2016 or equivalent tubing passing the specified qualification tests.

3.3 Design and Manufacture:

3.3.1 Threads: Threads may be cut, rolled or, except for titanium, ground. The external threads of fittings should be rolled and, if machined, shall have a roughness average, R_a, of 3.2 μm or smoother.

TABLE 1 - Materials, Fittings

Part	Material	Type[1]	Material Code[2]	Starting Stock	Materials	Description
Straight fittings and nuts	Aluminum alloy	I	D	Bar, rod	QQ-A-225/6 (2024 T6, T851)	Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn or Cold Finished, 2024
Straight fittings and nuts	Aluminum alloy	I	W	Bar, rod	QQ-A-225/9 (7075 T73)	Aluminum Alloy Bar, Rod, Wire and Special Shapes, Rolled, Drawn or Cold Finished, 7075
Shape fittings	Aluminum alloy	I	D	Bar and forgings	QQ-A-367 (2014 T6)	Aluminum Alloy, Forgings, Heat Treated
Shape fittings	Aluminum alloy	I	W	Bar and forgings	QQ-A-225/9 (7075 T73)	Aluminum Alloy Bar, Rod, Wire and Special Shapes, Rolled, Drawn or Cold Finished, 7075
Straight and shape parts	Carbon steel	II	F	Bar rod, forgings	MIL-S-6758 (4130)	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
Straight and shape parts	Corrosion-resistant steel, stabilized	I	J	Bar and forgings	QQ-S-763 (304)	Steel Bars, Wire Shapes and Forgings, Corrosion Resisting
Straight and shape parts	Corrosion-resistant steel, stabilized	II	J	Bar and forgings	QQ-S-763 (304)	Steel Bars, Wire Shapes and Forgings, Corrosion Resisting
Straight and shape parts	Corrosion-resistant steel, stabilized	III	R	Bar and forgings	QQ-S-763 (321)	Steel Bars, Wire Shapes and Forgings, Corrosion Resisting
Straight and shape parts	Corrosion-resistant steel, stabilized	III	S	Bar and forgings	QQ-S-763 (347)	Steel Bars, Wire Shapes and Forgings, Corrosion Resisting
Straight and shape parts	Corrosion-resistant steel, stabilized	IV	K	Bar and forgings	QQ-S-763 (316)	Steel Bars, Wire Shapes and Forgings, Corrosion Resisting
Straight and shape parts	Titanium alloy	IV	T	Bar and forgings	MIL-T-9046 (6Al-4V)	Titanium and Titanium Alloy Sheet, Strip and Plate
Sleeves (bite type)	Carbon steel	II	—	Bar	ASTM A 106 (1213, 12L14)	Steel Bars, Carbon, Cold-Finished, Standard Quality Specification For
Sleeves (swaged and brazed)	Corrosion-resistant steel	IV	P	Bar	AMS 5643 (17-4 PH)	Bars, Wire, Forgings, Tubing, and Rings 16Cr-4.0Ni-0.30 [Cb+Ta] 4.0Cu Solution Heat Treated, Precipitation Hardenable
Sleeves (swaged and brazed)	Corrosion-resistant steel	IV	V	Bar	AMS 5659 (15-5 PH)	Steel Bars, Forgings, and Rings 15Cr5Ni0.30 (Cb+Ta) 4Cu Cons. Elect. Melted
Sleeves (welded)	Corrosion-resistant steel	I, II, III, IV	V	Bar	AMS 5659 (15-5 PH)	Steel Bars, Forgings and Rings 15Cr5Ni0.03(Cb+Ta) 4Cu Cons. Elect. Melted
Sleeves (welded)	Titanium alloy	I, II, III, IV	T	Bar	AMS 4928 (6Al-4V)	Titanium Alloy Bars and Forgings, 6Al-4V, Annealed, 120 000 psi (825 MPa) Yield

[1] Temperature types and system pressure classes are defined in MA2001.
[2] See Table 3.

NOTES: R_m min = Minimum ultimate tensile strength.
$R_{p0.2}$ min = Minimum yield strength (0.2% proof stress).

3.3.1.1 Rolled Threads: Laps, cracks, surface irregularities, and seams (see 2.4.2.5) are not acceptable on any part the pressure thread flank, in the threadroot or on the nonpressure thread flank. Laps and seams, whose depths are within the limits of Table 2, are acceptable on the crest and the nonpressure thread flank above the pitch diameter.

3.3.2 Fluid Passages: On fittings where the fluid passage is drilled from each end, the offset between the drilled holes at the meeting point shall not exceed 0.4 mm. It shall be possible to pass through the fitting passage a ball whose diameter is 0.5 mm less than the minimum diameter specified for the passage.

TABLE 2 - Maximum Depth of Laps and Surface Irregularities in Rolled Threads

Size DN	Depth
05	0.15
06	0.18
08	0.18
10	0.2
12	0.23
14 to 40	0.25

NOTE: Dimensions in millimeters

3.4 Surface Protection and Color Identification:

3.4.1 Surface Protection: The surfaces of fitting parts shall be protected in the following manner:

a. Aluminum Alloy Fittings: By sulfuric acid anodizing, then dying and dichromate or nickel acetate sealing per MIL-A-8625 Type II, Class 2.
b. Carbon Steel Fittings and Sleeves: By cadmium plating 0.007 to 0.012 mm thick, followed by a chromate postplate treatment per QQ-P-416.
c. Corrosion-Resistant Steel Fittings: By passivation treatment per QQ-P-35 Type IV or VII for 300 series CRES and Type II or VIII for 17-4 PH and 15-5 PH CRES. Sleeves may be cadmium plated.
d. Titanium Fittings: By a fluoride conversion coating per AMS 2486 or anodizing process per AMS 2488.

3.4.2 Color Identification: As a reference, the material of the finished fitting may be distinguished by the colors as shown in Table 3.

3.5 Marking:

Unless specified otherwise, parts shall be permanently identified with the complete part number and the manufacturer's trademark. The method of marking shall be laser marking, impression stamping, or electro-etching, in that order of preference. When the complete part number cannot be used in DN08 size and under because of the size of the part, the marking may be limited to the basic part number, without size designation. The marking shall not be in a location detrimental to the part or its surface protection and should preferably be visible when the part is assembled. When material code letters are used, the code letter (see Table 3) shall also be laser marked, electro-etched, or impression stamped on the part.

WARNING: Laser marking of thin wall titanium fittings may cause embrittlement and fatigue cracking.

TABLE 3 - Material Codes and Colors

Material	Code	Color
Aluminum	D	Green
Aluminum	W	Brown
Carbon steel (except sleeves)	F	Gold brown
Corrosion-resistant steel	J	Bright metallic
Corrosion- and acid-resistant steel	K	Bright metallic
Heat-stabilized corrosion-resistant steel	S	Bright metallic
Corrosion-resistant stabilized steel	R	Bright metallic
Heat-treatable corrosion-resistant steel	P, V	Metallic
Titanium	T	Dull gray

3.6 Performance:

The tubing/fitting assembly shall be capable of the performance specified in 3.6.1 to 3.6.9.

3.6.1 Proof Pressure: When tested in accordance with MA2094, the test assembly shall withstand pressure equal to twice the nominal pressure[1] without leakage, evidence of permanent deformation, or other malfunction that might affect the ability to disconnect or connect using the specified range of torque values. All specimens, except tensile specimens, shall be proof tested.

3.6.2 Pneumatic Pressure Tightness: When tested in accordance with MA2094, assemblies shall pass the gaseous pressure test to the specified nominal pressure without leakage or other failure. Six specimens shall be tested.

3.6.3 Hydraulic Impulse Resistance: When tested in accordance with MA2002 and MA2094, the test assembly shall withstand 200 000 impulse pressure cycles without leakage. Six specimens shall be tested.

[1] In accordance with ISO 8574:1990.

3.6.4 Minimum Hydrostatic Pressure Capability: When tested in accordance with MA2094, there shall be no leakage or burst at less than the specified minimum burst pressure. Tubing expansion is permissible. Six specimens shall be tested to failure.

3.6.5 Flexure Resistance:

3.6.5.1 Standard Rotary Flexure Test, Temperature Type II, Pressure Class D: When tested in accordance with MA2003 and MA2094, test assemblies shall not fail. Six specimens with straight unions shall be tested. Bulkhead tee fitting connections shall match the flexure fatigue life of straight unions. Two specimens with bulkhead tees shall be tested.

3.6.5.1.1 Basic Qualification Requirements for Testing to 10^7 Cycles: Steel 24° cone fittings shall be used with type II, class D, cold-worked corrosion-resistant steel tubing per MIL-T-6845 and flexure fatigue tested to 135 MPa bending stress in sizes DN16 and under, and 108 MPa in sizes DN20 and over to a tolerance of $^{0}_{-10}$ %.

NOTE: Under pressure and with dynamic load due to rotation, these stresses may be 172 MPa and 137 MPa respectively.

3.6.5.1.2 Alternative Qualification Test Requirement: Modifications of 24° cone fittings, other fitting designs, new tubing materials, or other attachment methods are to be qualified by comparing their fatigue life against that of the basic 24° cone fitting by testing to 10^7 cycles, to the same fatigue life measured in deflection as the basic fitting. The performance of such other designs, materials, or joining methods shall meet or exceed that of the standard 24° cone type II, class D fitting and cold-worked corrosion-resistant steel tubing, that is, all six specimens shall withstand 10^7 flexure cycles without failure.

3.6.5.1.3 Alternative Qualification Test Requirement Using S-N Curve: The S-N test method per MA2003 (ISO 7257) may be used as an alternate to testing six specimens to 10^7 cycles at the same bending stress or deflection level, by testing with two specimens minimum at each specified level to produce a S-N curve per MA2003 (ISO 7257).

3.6.5.2 Rotary Flexure Test for Other Temperature Types and Pressure Classes: Fitting assemblies of other temperature types and pressure classes per MA2001 shall be qualified by testing to the same deflection levels as obtained for testing in accordance with 3.6.5.1. The performance shall meet or exceed that of the type II, class D fitting.

3.6.6 Re-use Capability: When tested in accordance with MA2094 there shall be none of the following defects:

a. Leakage during any of the proof pressure tests
b. Inability to assemble the fitting to the interface point by hand
c. Nut deformation preventing engagement of the nut hexagon with an open-end wrench
d. Gaseous leakage following final assembly, when tested in accordance with 3.6.2

3.6.7 Tensile Load Capability: When tested in accordance with MA2094 steel fitting assemblies of temperature type II, pressure class D shall withstand the axial loads specified in Table 4 without rupture. Two specimens shall be tested.

TABLE 4 - Joint Strength, Steel 24° Cone Fitting on Cold Worked Corrosion-Resistant Steel Tubing

Size DN	Minimum Axial Load
05	[1]
06	4.6
08	7.5
10	11
12	19
14	20
16	31
20	40
25	44
32	[1]
40	[1]

[1] Values to be added when available.

NOTE: Values in kilonewtons.

3.7 Workmanship:

Fitting parts shall conform with the requirements specified on the drawing and in this document and shall be free of burrs and slivers. Sealing surfaces shall be machined smooth to a finish with an R_a value of 1.6 μm in accordance with ANSI B46.1. All other machined surfaces shall have a roughness value, R_a, of 3.2 μm maximum. Unmachined surfaces of forgings or bar stock flats shall be of uniform quality and condition and shall be free of cracks, folds, fixtures, pits or defects, as visible to the unaided eye or by magnetic or dye-penetrant inspection, that could affect the serviceability of the part (see 3.3.1.1). Defects in the shear area along forging parting planes of aluminum alloy fittings may be explored by grinding (to a maximum roughness, R_a, of 6.5 μm) and etching. If the defects can be removed so that they do not reappear on re-etching and the required section thickness can be maintained, they shall not be considered as grounds for rejection.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspection requirements as specified in this document. Unless otherwise specified, the manufacturer may use their own facilities or any commercial laboratory acceptable to the purchaser. The purchaser has the right to perform any inspection specified in this document, whenever such inspections are deemed necessary to ensure that supplies and services conform to the prescribed requirements.

4.2 Classification of Inspections and Tests:

The inspection and testing of fittings, nuts, and sleeves shall be classified as follows:

a. Qualification inspection (see 4.2.1)
b. Quality conformance inspection (see 4.2.2)

4.2.1 Qualification Inspection: Test assemblies shall consist of the parts specified in 4.5.2. Tests shall be conducted in accordance with 4.6 for each size and material for which qualification is required.

4.2.2 Quality Conformance Inspection:

4.2.2.1 Nondestructive Tests: Inspection for material, threads, finish, dimensions, marking, surface defects, and workmanship shall be conducted on a sampling basis in accordance with MIL-STD-105.

4.2.2.1.1 Classification of Defects: Fitting defects are classified in Figure 2 according to the effect they have on safety and usability. Definition of classes is as follows:

a. Major: will cause malfunction or will make the part unusable
b. Minor A: may have a slight effect on usability
c. Minor B: has no effect on usability

4.2.2.1.2 Acceptable Quality Level: The following acceptable quality levels (AQLs) apply to the defect classifications (see 4.2.2.1.1) shown in Figure 2.

a. Major: AQL 0.015
b. Minor A: AQL 0.040
c. Minor B: AQL 0.065

All defects not identified in Figure 2 shall be inspected in accordance with the Minor B classification (AQL 0.065).

Fitting end — design standard	
Class	**Defects** [1]
Major	Depth, seal diameter to the tube stop
	Finish of seal area (cone and O-ring)
	Squareness, thread to hexagon face
	Concentricity, thread to conical seal
Minor A	Thread fit
	Seal angle
	Fluid bore diameter
	O-ring seal diameter
	Machining finish
	Diameters
	Thread, length, size and form
	Marking

Fitting — union	
Class	**Defects** [1]
Major	Incomplete holes, internal burrs
	Perpendicularity, thread to hexagon face
Minor A	Thread size and form
	Concentricity of threads, seat and face
	Hexagon dimension
	Marking
Minor B	Overall length
	Surface finish, radii, chamfer, colour and identification
	Bore diameter
	O-ring seal diameter

Sleeve	
Class	**Defects** [1]
Major	Finish, seal area
	Cutting edge, sharpness
Minor A	Bore diameter
	Outside diameters
	Concentricity of ID and OD
	Surface finish, marking
Minor B	Turn length
	Overall length
	Width of shoulder
	Surface finish and colour

Fitting — tee, elbow	
Class	**Defects** [1]
Major	Holes — incomplete or missing, internal burrs
	Wall thickness and depth of bore
Minor A	Fluid passage diameter
	Leg length, overall length, angle between legs
	Wrench pad dimension
	Marking
Minor B	Diameter of seat, leg angularity

Nut	
Class	**Defects** [1]
Major	Thread, concentricity, thread to tube bore, distance across hexagon
Minor A	Thread length, size and form
	Small bore diameter
	Hexagon dimension
	Concentricity of threads, minor diameter and small ID
	Marking
Minor B	Minor diameter and depth
	Countersink dimension
	Turned diameter and length
	Overall length
	Surface finish, radii, chamfer, colour

Preparation for delivery	
Class	**Defects** [1]
Minor B	Marking: missing, incorrect, incomplete, illegible, of improper size, location, sequence or method of application
	Any nonconforming components: component missing, damaged or otherwise defective
	Inadequate assembly of components
	Number per container is more or less than stipulated
	Gross or net weight exceeds the requirement (as specified by the part standard)

1) Refer to design standards and part standards for the 24° cone fitting for explanations of the terms used in this column.

FIGURE 2 - Classification of Defects

4.2.2.2 Destructive Tests: Sampling for all destructive tests [that is, burst pressure, grain flow, intergranular corrosion resistance of nonstabilized corrosion-resistant steel, tube cut (sleeves only) and tensile load capability (sleeves only)] shall be performed in accordance with MIL-STD-105, inspection level S-1, acceptance number 0.

4.2.2.3 Inspection: Each individual lot of fittings, nuts, and sleeves shall be subjected to the following examinations and tests, as specified in Sections 3 and 4:

a. Examination of product
b. Material certification (chemical composition and mechanical properties) for raw material as long as the product is not subjected to thermal treatment
c. Internal fluid passages

4.2.2.4 Rejection and Retest: Rejected lots shall be resubmitted for retest and acceptance in accordance with MIL-STD-105. Parts subjected to nondestructive tests and failing to conform to the requirements of these tests shall be rejected. Parts subjected to destructive tests shall be discarded.

4.3 Quality Control Records:

The supplier shall maintain a record of inspection applied to each lot for a minimum of 5 years. Records of chemical composition analysis, mechanical property tests showing conformance with the applicable material specifications, and metallurgical tests should be made available to the purchaser of each lot of fittings upon request.

4.4 Quality Conformance Inspection Procedures:

4.4.1 Examination of Product: Each lot of fittings shall be examined to determine conformance with this document and the applicable standards with respect to material, dimensions, threads, wall thickness, surface defects, finish, marking, and workmanship.

4.4.2 Material Certification: The manufacturer shall ensure that all materials meet the requirements for chemical composition and mechanical properties, as specified in the applicable material and heat treatment specifications (see 4.3).

4.4.3 Rolled Threads: Thread flanks in rolled threads shall be examined by macro-examination. Specimens shall be taken from the finished part by sectioning on a longitudinal plane across the threaded area to inspect for conformance with 3.3.1.1. The specimens shall be polished and etched to reveal the surface defects adequately.

4.4.4 Fluid Passages: Each lot of fittings shall be inspected to determine conformance with 3.3.2. The offset between drill holes at intersections shall be inspected by rolling a steel ball with a diameter as specified in 3.3.2 through the fitting.

4.4.5 Sampling Instructions: Sampling shall be as specified in 4.2.2.1 for nondestructive tests and 4.2.2.2 for destructive tests.