AEROSPACE STANDARD

AS4875

Issued 1995-05
Reaffirmed 2015-07

Superseding AS4875

Fittings, Straight Threaded Boss of Flanged, Fluid Connection

RATIONALE

AS4875 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Scope:

This SAE Aerospace Standard (AS) establishes the requirements for straight threaded boss or flanged fluid connection fittings (see Section 6) for use in all types of fluid systems.

1.2 Classification:

Fittings shall be furnished in the types and styles designated by the applicable AN, AS, MS, NAS, or other engineering standard drawings. This specification is the same as MIL-F-5509 as applicable to straight threaded boss or flanged fittings except for updated materials and process specifications and industry coordinated general improvements. It is intended to serve as a procurement specification for the fittings described herein and in Section 6.

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.

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2.1.1 SAE Publications: Available from SAE, 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 4112	Aluminum Alloy Bars, Rods, and Wire, Rolled, Drawn, or Cold Finished 4.4Cu - 1.5Mg - 0.60Mn (2024-T6)

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http://www.sae.org/technical/standards/AS4875

2.1.1 (Continued):

AMS 4124	Bars, Rods, and Wire, Rolled, Drawn or Cold Finished, 5.62N 2.5Mg 1.6Cu 0.23Cr
AMS 4134	Aluminum Alloy Die Forgings 4.4Cu - 0.85Si - 0.80Mn - 0.50Mg (2014-T4) Solution Heat Treated
AMS 4141	Forgings, Die, 5.6Zn - 2.6Mg - 7.6Cu - 0.23Cr, Solution and Precipitation Heat Treated
AMS 4928	Titanium Alloy Bars and Forgings, 6Al-4V, Annealed, 120,000 psi (827 MPa) Yield
AMS 5639	Bars, Wire, Forgings, Tubing and Rings, 19Cr 10Ni Solution Heat Treated
AMS 5645	Bars, Forging, Tubing and Rings, 18Cr 10Ni 0.40Ti Solution Heat Treated
AMS 5646	Bars, Forgings, Tubing and Rings, 18Cr 11Ni 0.60 (Cr + Ta), Solution Heat Treated
AMS 5648	Bars, Forgings, Tubing and Rings, 17Cr 12Ni 2.5Mo, Solution Heat Treated
AMS 6370	Steel Bars, Forgings and Rings, 0.95Cr 0.20Mo (0.28-0.30C)
AMS 6382	Steel Bars, Forgings and Rings, 0.95Cr 0.20Mo (0.38-0.43C)
AS478	Identification Marking Methods
AS930	Fitting End - Straight Thread Boss Connection
AS1376	Alternate Dimensions, Center Body Section, Shape Fluid Fitting, Design Standard
AS4395	Fitting End - Flared Tube Connection, Design Standard
AS4396	Fitting End - Bulkhead Flared Tube Connection, Design Standard
ARP4784	Performance and Evaluation Criteria, Surface Defects, Requirements for

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

P-C-437	Cleaning Compound, High Pressure (Steam) Cleaner
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
QQ-P-35	Passivation Treatments for Corrosion-Resisting Steel
QQ-P-416	Plating, Cadmium (Electro-deposited)
QQ-S-763	Steel Bars, Wire, Shapes and Forgings, Corrosion-Resisting
MIL-S-5626	Steel: Chrome Molybdenum (4140) Bars, Rods and Forging Stock (For Aircraft Applications)
MIL-H-6083	Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-H-6088	Heat Treatment of Aluminum Alloys
MIL-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
MIL-H-6875	Heat Treatment of Steels (Aerospace Practice, Process For)
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys

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2.1.2 (Continued):

MIL-S-8879	Screw Threads, Controlled Radius Root With Increased Minor Diameter: General Specification For
MIL-H-46170	Hydraulic Fluid, Rust Inhibited, Fire Resistant Synthetic Hydrocarbon Base
ANA Bulletin No. 431	Air Force-Navy Aeronautical Bulletin Fittings, Flared, Classification of Defects of
FED-STD-595	Colors Used in Government Procurement
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MS21947	Fitting End - Bolt Cluster Fitting Single Port Through - Flare
MS24385	Fitting End, Flared Tube Connection, Precision Type, Standard Dimensions
MS24386	Fitting End, Bulkhead Flared Tube Connection, Precision Type, Standard Dimensions
MS33649	Bosses Fluid Connection, Internal Straight Thread
MS33656	Fitting End, Standard Dimensions for Flared Tube Connection and Gasket Seal
MS33657	Fitting End, Standard Dimensions for Bulkhead Flared Tube Connection

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

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

2.1.4 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 108	Steel Bars, Carbon, Cold-finished, Standard Quality
ASTM A 370	Steel Products, Mechanical Testing of

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Fittings shall be fabricated of materials listed in Table 1 or as specified on the applicable part standard drawing.

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TABLE 1 - Materials

Material	Type of Part	Form /1/	Specification	Alloy and Temper	Material Code
Aluminum alloy	Straight fittings, nuts	Bars, rods	QQ-A-225/6	2024-T6 or T851	D
			AMS 4112	2024-T6	D
			QQ-A-225/9	7075-T73	W
			AMS 4124	7075-T7351	W
	Shape fittings, nuts	Forgings	QQ-A-367	2014-T6	D
			AMS 4134	2014-T6	D
			QQ-A-367	7075-T73	W
			AMS 4141	7075-T73	W
	Shape fittings	Bars	QQ-A-225/6	2024-T6 or T851	D
			AMS 4112	2024-T6	D
			QQ-A-225/9	7075-T73	W
			AMS 4124	7075-T7351	W
Carbon steel /2/	Fittings, nuts, sleeves	Bars, rods	ASTM A 108	1137	None
			MIL-S-6758	4130	None
			AMS 6370	4130	None
			MIL-S-5626	4140	None
			AMS 6382	4140	None
	Shape fittings	Forgings	ASTM A 108 /3/	1137	None
			MIL-S-6758 /3/	4130	None
			AMS 6370	4130 Cold Finished	None
			MIL-S-5626 /3/	4140	None
			AMS 6382	4140 Cold Finished	None
Corrosion-resistant steel	Fittings, nuts, sleeves	Bars	QQ-S-763	Class 304, Cond A	J
			AMS 5639	Class 304, Cond A	J
			QQ-S-763	Class 316, Cond A	K
			AMS 5648	Class 316, Cond A	K
			QQ-S-763	Class 321, Cond A	R
			AMS 5645	Class 321, Cond A	R
			QQ-S-763 /4/	Class 347, Cond A	S
			AMS 5646 /4/	Class 347, Cond A	S
	Shape fittings	Forgings	QQ-S-763	Class 304, Cond A	J
			AMS 5639	Class 304, Cond A	J
			QQ-S-763	Class 316, Cond A	K
			AMS 5648	Class 316, Cond A	K
			QQ-S-763	Class 321, Cond A	R
			AMS 5645	Class 321, Cond A	R
			QQ-S-763 /4/	Class 347, Cond A	S
			AMS 5646 /4/	Class 347, Cond A	S
Titanium alloy	Fittings, nuts	Bars	AMS 4928	6Al-4V annealed	T
	Shape fittings	Forgings	AMS 4928	6Al-4V annealed	T

/1/ The center body section of shape fittings machined from bar or oversized forgings shall conform to AS1376.

/2/ The hardness of finished carbon steel parts shall be 90 HRB to 31 HRC per 3.1.4. If the materials are procured with this requirement as a supplement to the specification, the purchase order shall specify that any heat treatment applied shall be per MIL-H-6875 (see 3.1.2.2).

/3/ This document is for bar from which forgings shall be made and only the chemical composition applies.

/4/ Type 347 corrosion-resistant steel shall not be used for new manufacture but type code "S" parts may be used until existing stocks are depleted.

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3.1.2 Heat Treatment:

3.1.2.1 Aluminum Alloy: Aluminum alloy fittings and nuts shall be supplied in the final temper as shown in Table 1. When fitting material is purchased in other than the final temper, the heat treatment shall be in accordance with MIL-H-6088.

3.1.2.2 Steel: When additional processing is required to comply with the hardness requirements of 3.1.4, the heat treatment shall be in accordance with MIL-H-6875.

3.1.3 Additional Physical Properties: Unless otherwise specified on the applicable drawings, the hardness of the finished carbon steel parts with plating removed shall be 92 HRB to 31 HRC. For carbon steel fittings below a hardness of 20 HRC, hardness tests shall be made using the Rockwell B scale, in which case the hardness shall be within the range of 92 to 99 HRB.

3.2 Design and Fabrication:

The design and fabrication of the fittings shall be in accordance with the applicable drawings. The fitting ends and boss connections shall be in accordance with AS930, AS4395, AS4396, MS21947, MS24385, MS24386, MS33583, MS33649, or MS33657 as applicable. Dimensional requirements are applicable after heat treatment and protective finishing. The center body section of shape fittings machined from bar or oversized forgings shall conform to AS1376.

3.2.1 Shape and Form Restrictions: Abrupt reductions of section shall be avoided. Small external sections adjoining relatively heavy body sections shall transition into the heavier sections by means of ample fillets.

3.2.2 Passages:

3.2.2.1 Drill Offset: On straight fittings where the fluid passage is drilled from each end, the offset between the drilled holes at the meeting point of the drills shall not exceed .015 in. It shall be possible to pass through the fluid passage a ball whose diameter is .020 less than the minimum diameter specified for the passage. This does not mean that the drilled passage may be smaller than that required by the detail drawings.

3.2.2.2 Cross Section at Fluid Path Junction: On shape fittings, the cross-sectional area at the junction of fluid passages shall be such that it shall be possible to pass through the fitting from end to end, a ball whose diameter is not less than .7 times the minimum diameter specified for the smaller passage.

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3.2.3 Threads: Straight threads shall be of unified form and shall conform to MIL-S-8879 unless otherwise specified. Steel, corrosion-resistant steel, and aluminum alloy threads may be cut, ground, or rolled (see 3.2.3.1). Copper alloy threads shall be cut or ground only.

3.2.3.1 Rolled External Threads: 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. Laps and seams are not acceptable on any part of the pressure thread flank, in the thread root, or on the nonpressure thread flank extending from above to below the pitch diameter (see Figure 1). Stress cracks are unacceptable.

3.3 Finish:

3.3.1 Aluminum Alloy Fittings: Aluminum alloy fittings, sleeves, and nuts shall be anodized in accordance with MIL-A-8625, Type II, Class 2, dyed blue or brown as applicable (see 3.4.4) and shall be duplex sealed.

TABLE 2 - Depth of Laps, Seams, Surface Irregularities, and Discontinuities in Rolled Threads

Size Code	Depth, Inch, Max
02	.006
03	.006
04	.007
05	.007
06	.008
08	.009
10 through 32	.010

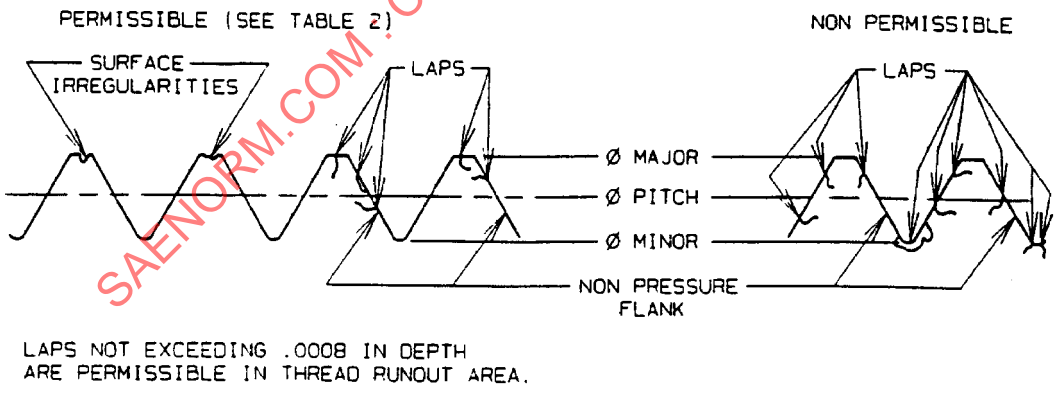

FIGURE 1 - Laps and Surface Irregularities in Threads

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3.3.2 Carbon Steel Fittings: Carbon steel fittings, sleeves, and nuts shall be cadmium plated in accordance with QQ-P-416, Type II, Class 2, dyed black (see 3.4.4). All such carbon steel fittings, sleeves, and nuts shall be dipped in oil conforming to MIL-H-6083 or MIL-H-46170. Fluid passage holes, other openings, and internal threads shall not be subject to a plating thickness requirement and may exhibit bare areas provided that they are protected with a light film of oil.

3.3.3 Corrosion-Resistant Steel Fittings: Corrosion-resistant steel fittings, nuts, and sleeves shall be passivated per QQ-P-35, Type VI or VII.

3.3.4 Titanium Alloy Fittings: Titanium alloy fittings and nuts shall be anodized per AMS 2488 Type 2 or shall be fluoride phosphated coated per AMS 2486, except that a pretreatment, a modification of the fluoride treatment, or a post treatment shall be applied so that the final color of the fittings shall be similar to colors 36076 through 36176 per FED-STD-595 (see 3.4.4).

3.4 Identification of Product:

All fittings, nuts, and sleeves shall be marked in accordance with the following instructions. The marking shall be applied per AS478 as specified on the applicable drawing in a location not detrimental to the performance of the fitting and not detrimental to the corrosion protection of the fitting. When items cannot be physically marked because of lack of space or because marking would have a deleterious effect, the package shall provide the identification per 5.4.

3.4.1 Manufacturer's Identification: Unless otherwise specified, all fittings and nuts shall be marked with the manufacturer's name, CAGE code or trademark and the letters AN, MS, AS, or NAS as applicable.

3.4.2 Material Identification: Fittings and nuts shall be marked with the material code letter as shown in Table 1.

3.4.3 Marking for Part Number and Size: A numerical size code equivalent to the nominal tube size in .062 in increments is optional. All fittings and nuts larger than 06 fitting size code except cap assemblies, shall be marked with the basic part number, exclusive of size. Marking of part numbers on sleeves is optional. Fitting assemblies with assembled nuts shall be marked as above on the fitting body, but assembled nuts that have their own part number identification are acceptable. Fittings previously manufactured to AN, AS, MS, or NAS standards that meet all other requirements of this document and the applicable part standards may retain their identification in addition to the previous requirements.

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3.4.4 Color Identification: In addition to the markings specified, the fittings, nuts, and sleeves shall be identified by the following colors:

a. Aluminum alloys 2014 and 2024: Blue (see 3.3.1)
b. Aluminum alloy 7075: Brown (see 3.3.1)
c. Steel: Black (see 3.3.2)
d. Corrosion-resistant steel: None
e. Titanium alloy: Gray (see 3.3.5)

3.5 Workmanship:

Machined surfaces of fittings, sleeves, and nuts shall be as specified on the applicable drawings. Unmachined surfaces, such as forged surfaces and bar stock flats, shall be free from blisters, fins, folds, seams, laps, cracks, segregations, spongy areas, or other defects as specified in ARP4784. Surface defects may be explored by suitable etching and if they can be removed so that they do not appear on re-etching and the required section thickness can be maintained, they shall not be cause for rejection. The surface texture of unmachined surfaces, except forging parting lines, shall be 250 µin Ra per ANSI/ASME B46.1. The surface texture of forging parting planes shall be 500 µin Ra per ANSI/ASME B46.1.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection and test requirements as specified herein. Except as otherwise specified, the supplier may utilize their own facilities or any commercial laboratory acceptable to the purchaser for the performance of the inspection and test requirement. The purchaser reserves the right to perform any of the inspections and tests set forth in this document, whenever such inspections and tests are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Inspection Lot:

A lot shall consist of all the fittings of a given part number, made from the same batch of material and processed at the same time.

4.2.1 Material Certification: Records of the chemical composition analysis and mechanical property tests showing conformance to the material requirements of this document shall be available to the procuring activity upon request for each lot of fittings, except that chemical analysis tests are not required for aluminum alloys.

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4.3 Quality Conformance Inspection:

4.3.1 Sampling:

4.3.1.1 Sampling for Nondestructive Tests: Samples for heat treatment, threads, finish, dimensions, marking, surface defects, durability of finish, and workmanship shall be taken at random in accordance with MIL-STD-105, Inspection Level S-3 with an AQL of 4.0%, unless otherwise specified in ANA Bulletin No. 431. ANA Bulletin No. 431 will not be used for government purposes. Government acceptance will be based upon a sampling plan which accepts on zero defects.

4.3.1.2 Sampling for Destructive Tests: Sampling for hardness (4.4.1), shall be performed in accordance with MIL-STD-105, Inspection Level S-3, with an AQL of 4.0%. Government acceptance will be based upon a sampling plan which accepts on zero defects.

4.3.2 Examination and Inspection Methods: Each lot of fittings shall be examined and inspected as specified in Table 3.

TABLE 3 - Quality Conformance Inspection

Examination or Inspection	Requirement Paragraph	Examination or Inspection Paragraph
Material requirements	3.1	4.2.1
Hardness of carbon steel fittings	3.1.3	4.4.1
Design and dimensions	3.2	4.3.2.1
Finish	3.3	4.3.2.1, 4.4.2
Identification of product	3.4	4.3.2.1
Workmanship	3.5	4.3.2.1

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

4.4 Tests:

4.4.1 Hardness of Steel Fittings: The hardness of steel fittings shall be determined by hardness tests of the fittings. Rockwell hardness readings shall be taken on a smooth flat surface of any unthreaded portion of the fitting from which the plating has been removed. Hardness tensile strength relationships are specified in ASTM A 370. For this document, the hardness scale to scale conversions and hardness to tensile strength conversions of Tables 2A, 2B, 2C, and 2D of ASTM A 370 may be considered as equivalent.

4.4.2 Durability of Finish: Dyed fittings shall withstand immersion in a cleaning solution containing 5 to 6 oz of a cleaner conforming to P-C-437 per gallon of solution at a temperature of 160 to 170 °F for 5 min. The color shall not rub off when wiped lightly with a clean cloth.