



AEROSPACE STANDARD

AS18280™**REV. H**

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Superseding AS18280G

Fittings, 24 Degree Cone Flareless, Fluid Connection, 3000 psi

RATIONALE

Note 3.3.2, sub-note 4 added to address acceptance of excessive roughness of thread crests due to thread rolling process.
NAS1760 added to note 3.7.5. Specification number typo corrected in Table 12.

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1. SCOPE

1.1 Scope

This SAE Aerospace Standard (AS) establishes the requirements for 24 degree cone flareless fluid connection fittings and nuts, internally or externally swaged, preset, or welded sleeves for use in aircraft fluid systems at nominal operating pressures up to and including 3000 psi.

1.2 Classification

Fittings shall be furnished in the types and styles designated by the applicable AS, MS, NAS standard drawings. This specification includes the requirements for flareless fittings used with externally preset bite type sleeves and also for machined acorn fitting ends such as NAS1760, AS4458, and AS4703. It is intended to serve as a procurement specification for the fittings described herein and in Section 6. The requirements for externally preset bite type sleeves are given in AS18280/1. The requirements for swaged or welded sleeves and tube ends are given in AS18280/2.

2. REFERENCES

2.1 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.

2.1.1 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.

AMS2472	Anodic Treatment of Aluminum Alloys Sulfuric Acid Process, Dyed Coatings
AMS2486	Conversion Coating of Titanium Alloys Fluoride-Phosphate Type
AMS2488	Anodic Treatment - Titanium and Titanium Alloys Solution pH 13 or Higher
AMS2658	Hardness and Conductivity Inspection of Wrought Aluminum Alloy Parts
AMS2700	Passivation of Corrosion Resistant Steels
AMS2759/3	Heat Treatment Precipitation-Hardening Corrosion-Resistant, Maraging, and Secondary Hardening Steel Parts
AMS2770	Heat Treatment of Wrought Aluminum Alloy Parts
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
AMS4083	Aluminum Alloy Tubing, Hydraulic, Seamless, Drawn, Round 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-T6) Solution and Precipitation Heat Treated
AMS4124	Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73, T7351) Solution Heat Treated, Stress Relieved by Stretching, and Overaged
AMS4133	Aluminum Alloy Forgings and Rolled Rings 4.4Cu - 0.85Si - 0.80Mn - 0.50Mg (2014-T6) Solution and Precipitation Heat Treated
AMS4141	Aluminum Alloy Die Forgings 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73) Solution and Precipitation Heat Treated

AMS4339	Aluminum Alloy, Rolled or Cold Finished Bars and Rods 4.4Cu - 1.5Mg - 0.60Mn (2024-T851) Solution Heat Treated, Cold Worked, and Artificially Aged
AMS4928	Titanium Alloy Bars, Wire, Forgings, Rings, and Drawn Shapes 6Al - 4V Annealed
AMS4946	Titanium Alloy Tubing, Seamless, Hydraulic 3Al - 2.5V, Texture Controlled Cold Worked, Stress Relieved
AMS5561	Steel, Corrosion and Heat-Resistant, Welded and Drawn or Seamless and Drawn Tubing 9.0Mn - 20Cr - 6.5Ni - 0.28N High-Pressure Hydraulic
AMS5564	Steel, Corrosion Resistant, Tubing 19Cr - 10Ni (SAE 30304) High-Pressure Hydraulic, Welded Plus Ultrasonically Tested or Seamless Cold Drawn, One Eighth - Hard Temper
AMS5566	Steel, Corrosion Resistant, Seamless or Welded Hydraulic Tubing 19Cr - 10Ni (304) High Pressure, Cold Drawn
AMS5639	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, and Rings 19Cr - 10Ni Solution Heat Treated
AMS5645	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings 18Cr - 10Ni - 0.40Ti (321) Solution Heat Treated
AMS5648	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 17Cr - 12Ni - 2.5Mo (316) Solution Heat Treated
AMS5659	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Rings, and Extrusions 15Cr - 4.5Ni - 0.30Cb (Nb) - 3.5Cu
AMS6370	Steel, Bars, Forgings, and Rings 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)
AMS-H-6875	Heat Treatment of Steel Raw Materials
AMS-QQ-A-225/6	Aluminum Alloy, 2024, Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished
AMS-QQ-A-225/9	Aluminum Alloy 7075, Bar, Rod, Wire, and Special Shapes; Rolled, Drawn, or Cold Finished
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AMS-STD-595	Colors Used in Government Procurement
AMS-T-6845	Tubing, Steel, Corrosion-Resistant (S30400), Aerospace Vehicle Hydraulic System 1/8 Hard Condition
AMS-T-7081	Tube, Aluminum Alloy, Seamless, Round, Drawn, 6061, Aircraft Hydraulic Quality
ARP1176	Oxygen System and Component Cleaning
ARP1185	Flexure Testing of Hydraulic Tubing Joints and Fittings
ARP4784	Definitions and Limits, Metal Material Defects and Surface and Edge Features, Fluid Couplings, Fittings and Hose Ends
ARP9013	Statistical Product Acceptance Requirements
AS478	Identification Marking Methods
AS611	Hose Assembly and Tubing, Polytetrafluoroethylene, Cleaning Methods for
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft



AS1376	Alternate Dimensions, Center Body Section, Shape Fluid Fitting, Design Standard
AS1581	Fitting, Sleeve, Flareless Acorn to Integral Weld Ring, 3000 psi
AS2094	Test Methods for Tube-Fitting Assemblies
AS4375	Fitting End, Flareless, Design Standard
AS4377	Fitting End, Bulkhead, Flareless, Design Standard
AS4444	Fittings, 24° Cone Flareless, Fluid Connection, 5000 psi
AS4458	Fitting End, Flareless, Blunt Nose, Design Standard
AS4658	Fitting End, External Thread, Short Flareless, Design Standard
AS4659	Fitting End, External Thread, Short Flareless, Design Standard
AS4703	Fitting End, Acorn, Short Flareless, Design Standard
AS5148	Assembly, Installation, and Torque for Flareless and Straight Thread Fluid Fittings and Tube Assemblies
AS5272	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, Procurement Specification
AS5620	Titanium Hydraulic Tubing, Ti-3Al-2.5V Cold Worked and Stress Relieved, Up to 35000 kPa (5080 psi), Requirements for Qualification Testing and Control
AS5863	Fitting End, 24° Cone, Flareless, Fluid Connection, Design Standard
AS5864	Fitting End, Bulkhead, 24° Cone, Flareless, Fluid Connection, Design Standard
AS7003	Nadcap Program Requirements
AS8879	Screw Threads - UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter
AS18280/1	Sleeve, Bite Type, 24° Cone Flareless Fitting, 3000 psi
AS18280/2	Sleeves, Internally or Externally Swaged or Welded, 24° Cone Flareless Fitting, 3000 psi
AS18280SUP1A	Fittings, 24° Cone Flareless, Fluid Connection, 3000 psi (Supplement 1)
AS21914	Cap, Pressure Seal, Flareless Tube Fitting
AS21922	Sleeve, Coupling, Flareless
AS33514	Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal
AS33515	Fitting End, Standard Dimensions for Bulkhead Flareless Tube Connections

SAE DICTIONARY OF AEROSPACE ENGINEERING

2.1.2 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-HDBK-1655	Classification of Defects of Flareless and Beam Seal Fittings

MIL-DTL-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-DTL-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-DTL-83488	Coating, Aluminum, High Purity
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft Metric
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant, Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

2.1.3 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS1760 Fitting End, Flareless Acorn, Standard Dimensions for

2.1.4 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 B46.1 Surface Texture (Surface Roughness, Waviness, and Lay)

ASME Y14.38 Abbreviation and Acronyms for Use in Product and Related Documents

2.1.5 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

ANSI Z540.1 Calibration Laboratories in Measuring Test Equipment General Requirements

2.1.6 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

AC7102 Nadcap Audit Criteria for Heat Treating

AC7102/2 Nadcap Audit Criteria for Aluminum Heat Treating

AC7108 Nadcap Audit Criteria for Chemical Processing

AC7112 Nadcap Audit Criteria for Fluid Systems Component Manufacturers

AC7112/2 Nadcap Audit Criteria for Fittings and Other Machined Components

AC7114 Nadcap Audit Criteria for Nondestructive Testing (NDT) Suppliers Accreditation Program

AC7114/1 Nadcap Audit Criteria for Nondestructive Testing (NDT) Facility Penetrant Survey

AC7108/7 Nadcap Audit Criteria for Vacuum Cadmium Deposition and Ion Vapor Deposition Aluminum

PD2001 Tasks & Procedures of the Qualified Product Management Council

PD2101 Aerospace Quality Assurance, Product Standards, Qualification Procedure, Fluid Distribution Systems

PRI-QPL-AS18280 Fittings, Flareless, Tube, Fluid Connection

2.1.7 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 3161 Aerospace - UNJ Threads - General Requirements and Limit Dimensions

ISO 10012-1 Quality Assurance Requirements for Measuring Equipment

ISO 17025 General Requirements for the Competence of Calibration and Testing Laboratories

2.1.8 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A370 Steel Products, Mechanical Testing of

ASTM E1417 Practice for Liquid Penetrant Examination

2.2 Abbreviations and Acronyms

Standard abbreviations used in this document and frequently used in aerospace technical documents may be found in ASME Y14.38.

2.3 Definitions

Definitions of terms used in this document and frequently used in aerospace technical documents may be found in the SAE Dictionary of Aerospace Engineering.

3. TECHNICAL REQUIREMENTS

3.1 Qualification

3.1.1 Product Qualification

Fittings, nuts, and sleeves furnished under this specification shall be representative of products which have been qualified to the requirements of 4.4. All products shall conform to the requirements of this procurement specification and shall be approved in accordance with the requirements of PD2001 and PD2101 for listing in the Performance Review Institute (PRI) Qualified Products List (QPL) PRI-QPL-AS18280.

NOTE: In accordance with PRI-QPL-AS18280, original component manufacturers (OCMs) qualified for product code "J" (304) Corrosion Resistant Steel are also qualified for equivalent product codes "K" (316) and "R" (321), and OCMs qualified for product code "W" (7075) are also qualified for equivalent product code "D" (2014/2024).

3.1.2 Manufacturer Qualification

A manufacturer producing a product in conformance to this procurement specification shall be accredited in accordance with the requirements of PD2101, AS7003, and AC7112 and shall be listed in a Performance Review Institute (PRI) Qualified Manufacturers List (QML).

3.1.2.1 Accreditation of Special Processes

Special processes as listed in AC7112 require Nadcap Accreditation of the following processes by the manufacturer and/or his subtier:

- a. Heat treatment of aluminum forged fittings to AC7102 and AC7102/2 (see 3.2.1)
- b. Fluorescent penetrant inspection of aluminum forged fittings to AC7114 and AC7114/1 (see 4.6.3)
- c. Fabrication of fittings seal and internally threaded and solid film lubricated areas to AC7112/2 (see 3.4.5)
- d. Chemical processing for ion vapor deposition (IVD) coating of high purity aluminum to AC7108/7 (see 3.4.1)

3.1.3 Retention of Qualification

The manufacturer shall certify in intervals not exceeding 2 years that the products listed in PRI-QPL-AS18280 are still available from the listed plant. The manufacturer shall forward his certification letter to PRI for approval. PRI shall confirm retention of qualification.

3.2 Material

Fittings shall be fabricated of materials listed in Table 1 and in compliance with requirements in this specification or as specified on the applicable part standard drawing.

3.2.1 Heat Treatment

3.2.1.1 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 of the raw material and of semi-finished or finished parts shall be in accordance with AMS2770 or AMS2772 as applicable.

3.2.1.1.1 Electrical Conductivity and Hardness

Aluminum alloy fittings and nuts shall meet the electrical conductivity and hardness requirements of AMS2658. The material may have to be heat treated before or after fabrication of parts in order to meet the requirement.

NOTE: In the event of conflict of hardness or electrical conductivity between AMS2658 and the fitting forging specifications AMS4141 (7075-T73) and AMS4133 (2014-T6) the hardness requirement of AMS2658 may be considered a reference if in conflict with AMS4141, and the electrical conductivity requirement may be considered reference if it is in conflict with AMS4133.

3.2.1.2 Steel

When additional processing is required to comply with hardness requirements of 3.2.2.1, the heat treatment shall be in accordance with AMS-H-6875 or AMS2759/3.

3.2.2 Additional Physical Properties of Steel

3.2.2.1 Low Alloy Steel

Unless otherwise specified on the applicable drawings, the hardness of the finished low alloy steel fittings and nuts with plating removed shall be 92 HRB to 40 HRC. For low alloy steel fittings and nuts below a hardness of 20 HRC, hardness tests shall be made using the B scale, in which case the hardness shall be within the range of 92 to 99 HRB (see 4.6.2).

3.2.2.2 Class 300 Series Corrosion Resistant Steel

Unless otherwise specified on the applicable drawings, the finished Class 300 series condition A corrosion resistant steel yield strength shall be 30000 psi minimum (80 HRB minimum) (see 4.6.2).

3.2.2.3 Type 15-5PH Corrosion Resistant Steel

Unless otherwise specified on the applicable drawings, type 15-5PH corrosion resistant steel material shall be heat treated to condition H-1075 per AMS-H-6875 or AMS2759/3 before machining. Hardness shall be 32 to 40.5 HRC.

Table 1 - Materials

Material	Type of Part	Form	Specification	Alloy & Temper	Material Code
Aluminum alloy	Straight fittings and nuts	Bars, rods	AMS-QQ-A-225/6	2024-T6 or T851	D /7/
			AMS4339	2024-T6	D /7/
			AMS4339	2024-T851	D /7/
			AMS-QQ-A-225/9	7075-T73	W
			AMS4124	7075-T7351	W
			Notes: /1/ /2/ /3/ all		
	Shape fittings and nuts	Forgings	AMS4133	2014-T6	D /7/
			AMS4141	7075-T73	W
			Notes: /1/ /2/ /3/ all		
	Shape fittings	Bars	AMS-QQ-A-225/6 /1/	2024-T6 or T851	D /7/
			AMS4339	2024-T6	D /7/
			AMS-QQ-A-225/9 /1/	7075-T73	W
			AMS4124	7075-T7351	W
			Notes: /1/ /2/ /3/ all		
Low alloy steel	Straight and shape fittings and nuts	Bars, rods	AMS6370	4130	F /8/
		Forgings	AMS6370	4130	F /8/
	Shape fittings		Notes: /4/ all		
Corrosion resistant steel	Straight and shape fittings, nuts and non-bite type sleeves	Bars	AMS5639 /5/	Class 304, Cond A	J
			AMS5648 /5/	Class 316, Cond A	K
			AMS5645 /5/	Class 321, Cond A	R
			AMS5659	Type 15-5PH	V
	Shape fittings	Forgings	AMS5639 /5/	Class 304, Cond A	J
			AMS5648 /5/	Class 316, Cond A	K
			AMS5645 /5/	Class 321, Cond A	R
			AMS5659	Type 15-5PH	V
Titanium alloy	Straight and shape fittings, nuts, and non-bite type sleeves	Bars	AMS4928	6Al-4V annealed	T
	Shape fittings	Forgings	AMS4928	6Al-4V annealed	T

/1/ 2014, 2024, and 7075 aluminum alloy fittings, D Code and W Code, are qualified with 304 1/8 hard tubing to pressures as listed under Table 2, and with 6061-T6 tubing to pressures as listed under Table 3, depending on application.

/2/ The electrical conductivity and hardness of aluminum alloys shall be per 3.2.1.1.1. This requirement shall be added as a supplement to the specification when materials are procured or the material may have to be heat treated before or after fabrication in order to meet the requirement.

/3/ The parting lines in aluminum forgings shall meet the requirements of 3.2.3. This requirement and inspection per 4.6.3 may be added as a supplement to the specification when forgings are procured.

/4/ The hardness of finished low alloy steel parts shall be per 3.2.2.1. 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 AMS-H-6875 or AMS2759/3 (see 3.2.1.2).

/5/ The hardness of finished class 300 series corrosion resistant steel parts shall be per 3.2.2.2. This requirement shall be added as a supplement to the specification when materials are procured.

/6/ This specification is for bar from which forgings shall be made and only the chemical composition applies.

/7/ The W Code 7075 aluminum is preferred replacement for D Code 2014 and 2024 aluminum because of superior corrosion and stress corrosion resistance.

/8/ Material code “-” is an old material code that is being sunset. It is still a valid material code on certain part standards for 4130 Steel. However, it is not to be used for new designs. Material Code “F” is to be used for 4130 Steel on new part standards.