



AEROSPACE STANDARD

AS1946™**REV. G**

Issued 1990-07
Reaffirmed 1994-04
Revised 2026-07

Superseding AS1946F

Hose Assembly, Polytetrafluoroethylene, Metallic Reinforced,
Up to 1500 psi and 450 °F, Hydraulic and Pneumatic

RATIONALE

Add PTFE outer-diameter inspection requirements and limits (prior to braiding) to 3.3.1 (Inner Tube) and 4.6.1.1 (Inspection Methods, Examination of Product, Inner Tube).

1. SCOPE

1.1 Application

This SAE Aerospace Standard (AS) defines the requirements for polytetrafluoroethylene (PTFE) lined, metallic reinforced, hose assemblies suitable for use in aerospace hydraulic, fuel, and lubricating oil systems at temperatures between -67 and 450 °F for Class I assemblies, -67 and 275 °F for Class II assemblies, and at nominal pressures up to 1500 psi. The hose assemblies are also suitable for use within the same temperature and pressure limitations in aerospace pneumatic systems where some gaseous diffusion through the wall of the PTFE liner can be tolerated.

The use of these hose assemblies in pneumatic storage systems is not recommended. In addition, installations in which the limits specified herein are exceeded, or in which the application is not covered specifically by this standard (for example, oxygen), shall be subject to the approval of the procuring activity.

1.2 Classification

1.2.1 Hose assemblies furnished under this document shall be of the following classes:

- a. Class I: All corrosion resistant steel, or nickel alloy or titanium combination fittings, 450 °F
- b. Class II: Combination aluminum alloy and corrosion resistant steel fittings, 275 °F, size -08 and larger

1.2.2 Hose assemblies furnished under this document may be of the following types. If no type is defined, then Type A shall prevail.

- a. Type A: Permanently attached fittings
- b. Type B: Field attachable (re-usable) fittings, size -04 and larger

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Documents

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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: 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS2486	Conversion Coating of Titanium Alloys, Fluoride-Phosphate Type
AMS4069	Aluminum Alloy, Drawn, Round Seamless Tubing, Close Tolerance, 2.5Mg - 0.25Cr (5052-O) Annealed
AMS4082	Aluminum Alloy, Seamless Drawn Tubing, 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-T6), Solution and Precipitation Heat Treated
AMS4117	Aluminum Alloy, Rolled or Cold-Finished Bars, Rods, and Wire, and Flash-Welded Rings, 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061; -T6, -T651)
AMS4121	Aluminum Alloy Bars, Rods, and Wire, Rolled, Drawn, or Cold-Finished, 4.5Cu - 0.85Si - 0.80Mn - 0.50Mg (2014-T6), Solution and Precipitation Heat Treated
AMS4127	Aluminum Alloy, Forgings and Rolled or Forged Rings, (6061-T6) 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, Flash-Welded Rings, and Drawn Shapes, 6Al - 4V, Annealed
AMS4944	Titanium Alloy Tubing, Seamless, Hydraulic, 3.0Al - 2.5V, Cold Worked, Stress Relieved
AMS4945	Titanium Alloy Tubing, Seamless, Hydraulic, 3Al - 2.5V, Controlled Contractile Strain Ratio, Cold Worked, Stress Relieved
AMS4965	Titanium Alloy, Bars, Wire, Forgings, and Rings, 6.0Al - 4.0V, Solution Heat Treated and Aged
AMS5556	Steel, Corrosion- and Heat-Resistant, Seamless or Welded Hydraulic Tubing, 18Cr - 11Ni - 0.70Cb (347), Solution Heat Treated
AMS5557	Steel, Corrosion- and Heat-Resistant, Seamless or Welded Hydraulic Tubing, 18.5Cr - 10.5Ni - 0.40Ti (SAE 30321), Solution Heat Treated
AMS5561	Steel, Corrosion- and Heat-Resistant, Welded and Drawn or Seamless and Drawn Tubing, 9.0Mn - 20Cr - 6.5Ni - 0.28N, High-Pressure Hydraulic
AMS5565	Steel, Corrosion-Resistant, Welded Tubing, 19Cr - 9.5Ni (304), Solution Heat Treated
AMS5567	Steel, Corrosion-Resistant, Seamless or Welded Hydraulic Tubing, 19Cr - 10Ni (304), Solution Heat Treated
AMS5573	Steel, Corrosion- and Heat-Resistant, Seamless Tubing, 17Cr - 12Ni - 2.5Mo (SAE 30316), Solution Heat Treated

AMS5581	Nickel Alloy, Corrosion- and Heat-Resistant, Seamless or Welded Tubing, 62Ni - 21.5Cr - 9.0Mo - 3.7Cb (Nb), Annealed
AMS5639	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings and Forging and Ring Stock, 19Cr - 10Ni, Solution Heat Treated
AMS5643	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, and Rings, 16Cr - 4.0Ni - 0.30Cb (Nb) - 4.0Cu, Solution Heat Treated, Precipitation Hardenable
AMS5644	Steel, Bars and Forgings, Corrosion-Resistant, 17Cr - 7Ni - 1Al
AMS5645	Steel, Corrosion- and Heat Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings and Forging Stock, 18Cr - 10Ni - 0.40Ti (321), Solution Heat Treated
AMS5646	Steel, Corrosion- and Heat-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings and Forging Stock, 18Cr - 11Ni - 0.60Cb(Nb) (347), Solution Heat Treated
AMS5647	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings, and Forging Stock, 19Cr - 9.5Ni, Solution Heat Treated
AMS5648	Steel, Corrosion- and Heat-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings, and Stock for Forgings and Rings, 17Cr - 12Ni - 2.5Mo (316), Solution Heat Treated
AMS5653	Steel, Corrosion- and Heat-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings, and Stock for Forging and Rings, 17Cr - 12Ni - 2.5Mo (0.030 Max C) (316L), Solution Heat Treated
AMS5656	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Extrusions, Rings and Forging Stock, 9.0Mn - 20Cr - 6.5Ni - 0.27N Solution Heat Treated
AMS5659	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Rings, and Extrusions, 15Cr - 4.5Ni - 0.30Cb (Nb) - 3.5Cu Consumable Remelted, Solution Heat Treated, Precipitation Hardenable
AMS5666	Nickel Alloy, Corrosion- and Heat-Resistant, Bars, Forgings, Extrusions, Rings, and Stock for Forgings, Extrusions, and Rings, 62Ni - 21.5Cr - 9.0Mo - 3.65Cb (Nb) Annealed
AMS5689	Steel, Corrosion- and Heat-Resistant, Wire, 18Cr - 10.5Ni - 0.40Ti (321), Solution Heat Treated
AMS5690	Steel, Corrosion- and Heat Resistant, Wire, 17Cr - 12Ni - 2.5Mo (316), Solution Heat Treated
AMS5697	Steel, Corrosion-Resistant, Wire, 19Cr - 9.5Ni (304), Solution Heat Treated
AMS5743	Steel, Corrosion- and Heat-Resistant, Bars, Forgings and Forging Stock, 15.5Cr - 4.5Ni - 2.9Mo - 0.10N (AM 355®), Consumable Electrode Remelted, Solution Heat Treated, Subzero Cooled, Equalized, and Over-Tempered
AMS-QQ-P-35	Passivation Treatments for Corrosion-Resistant Steel
ARP908	Torque Requirements, Installation and Qualification Test, Hose and Tube Fitting
ARP1835	Preparation for Delivery, General Requirements for Hose Assemblies
AS150	Hose Assembly, Type Classifications of, Basic Performance and Fire Resistance
AS611	Hose Assembly and Tubing, Polytetrafluoroethylene, Cleaning Methods for
AS639	Hose, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Hydraulic, 450 °F
AS1055	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings, and Similar Systems

AS1072	Sleeve, Hose Assembly, Fire Protection
AS2078	Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE)
AS4207	Fitting End, External Thread, Beam Seal, Design Standard
AS4209	Fitting End Assembly, Internal Thread, Retained Nut, Beam Seal, Design Standard
AS4375	Fitting End, Flareless, Design Standard
AS4395	Fitting End, Flared, Tube Connection, Design Standard
AS7003	Nadcap Program Requirements
AS7112	National Aerospace and Defense Contractors Accreditation Program Requirements for Fluid System Components
AS8879	Screw Threads - UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter
AS33514	Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal
AS85421	Fittings, Tube, Fluid Systems, Separable, Beam Seal, 3000/4000 psi, General Specification For
AS85421/1	Fitting End, Standard Dimensions for Dynamic Beam Seal, Male

2.2 ASME Publications

Available from ASME, Two Park Avenue, New York, NY 10016-5990, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 646-616-3100 (outside North America), www.asme.org.

ASME B46.1	Surface Texture
ASME Y14.24	Types and Applications of Engineering Drawings
ASME Y14.34M	Parts Lists, Data Lists, and Index Lists: Associated Lists
ASME Y14.35M	Revision of Engineering Drawings and Associated Documents
ASME Y14.100	Engineering Drawing Practices

2.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9500, www.astm.org.

ASTM A262	Standard Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steel
ASTM A313	Standard Specification for Stainless Steel Spring Wire
ASTM D471	Standard Test Method for Rubber Property - Effect of Liquids
ASTM A580	Specification for Stainless and Heat Resisting Steel Wire

2.4 NAS Publications

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

NAS847 Caps and Plugs, Protective, Dust and Moisture Seal

NAS1760 Fitting End, Flareless Acorn, Standard Dimensions for

2.5 PRI Publications

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

PD2001 Qualified Product Management Council Procedures for Qualified Products Group

PD2101 Aerospace Quality Assurance, Product Standard, Qualification Procedures, Fluid Systems

2.6 U.S. Government Publications

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

MIL-HDBK-831 Preparation of Test Reports

MIL-PRF-680 Degreasing Solvent

MIL-PRF-5606 Hydraulic Fluid, Petroleum Base; Aircraft; Missile and Ordnance

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

MIL-PRF-83282 Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

MIL-PRF-8625 Anodic Coatings for Aluminum and Aluminum Alloy

MIL-PRF-87257 Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

MIL-STD-130 Identification Marking of U.S. Military Property

2.7 Order of Precedence

In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

2.8 Hose Assembly Parts Standards

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada), www.sae.org. The hose assembly standards applicable to this procurement standard include:

AS640 Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, Straight to Straight

AS641 Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, Straight to 45°

AS642 Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, Straight to 90°

AS643 Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, 45° to 45°

AS644 Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, 45° to 90°

AS645	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flared, 90° to 90°
AS647	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, Straight to Straight
AS648	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, Straight to 45°
AS649	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, Straight to 90°
AS650	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, 45° to 45°
AS651	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, 45° to 90°
AS652	Hose Assembly, Polytetrafluoroethylene, Metal Braid, Medium Pressure, Flareless, 90° to 90°
AS4006	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, Straight to Straight
AS4007	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, Straight to 45°
AS4008	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, Straight to 90°
AS4009	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, 45° to 45°
AS4010	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, 45° to 90°
AS4011	Hose Assembly, Polytetrafluoroethylene, PTFE, Metal Braid, Medium Pressure, Beam Seal, 90° to 90°

3. TECHNICAL REQUIREMENTS

3.1 Qualification

Hose assemblies supplied in accordance with this document shall be representative of products which have been subjected to and which have successfully passed the qualification tests specified in this standard.

3.1.1 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 AS7112, and shall be listed in a Performance Review Institute (PRI) Qualified Manufacturers List (QML).

3.1.2 Product Qualification

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 a PRI Qualified Products List (QPL).

3.2 Material

The hose assemblies shall be uniform in quality and free from defects in material as is consistent with good manufacturing practice and shall conform to the applicable specifications and requirements specified in this standard. All materials not specifically described herein shall be of the highest quality and suitable for the purposes intended.

3.2.1 Metals

Metals used in the hose shall be corrosion-resistant steel, and fittings shall be aluminum alloy, corrosion-resistant steel, titanium, or nickel alloy suitably treated to resist corrosion when in storage or during normal service use. Metals used in the hose and fittings shall be as listed below:

a. Bars and Forgings:

Corrosion-resistant steel, austenitic, annealed, or as rolled

- | | |
|------------|------|
| 1. AMS5639 | 304 |
| 2. AMS5647 | 304L |

Heat stabilized corrosion-resistant steel, austenitic, annealed, or as rolled

- | | |
|------------|--------|
| 3. AMS5645 | 321 |
| 4. AMS5646 | 347 |
| 5. AMS5648 | 316 |
| 6. AMS5653 | 316L |
| 7. AMS5656 | 21-6-9 |

Precipitation hardening corrosion-resistant steel - resolution heat treated and artificially aged condition

- | | |
|-------------|--------|
| 8. AMS5659 | 15-5PH |
| 9. AMS5643 | 17-4PH |
| 10. AMS5644 | 17-7PH |
| 11. AMS5743 | AM-355 |

Titanium

- | | |
|-------------|---------------------------------------|
| 12. AMS4928 | 6Al-4V Annealed |
| 13. AMS4965 | 6Al-4V Solution Heat Treated and Aged |

Nickel Alloy

- | | |
|-------------|----------|
| 14. AMS5666 | Type 625 |
|-------------|----------|

Aluminum Alloy

- | | |
|-------------|----------------|
| 15. AMS4121 | 2014-T6 |
| 16. AMS4339 | 2024-T851 |
| 17. AMS4117 | 6061-T6, -T651 |
| 18. AMS4127 | 6061-T6 |

b. Tubing:

Aluminum Alloy

1. AMS4069 Seamless, 5052-0
2. AMS4082 Seamless, 6061-T6

Corrosion-resistant steel, austenitic, seamless or welded, annealed

3. AMS5565 Welded, 304
4. AMS5567 Type 1 or Type 2, 304

Heat stabilized corrosion-resistant steel, austenitic, seamless or welded

5. AMS5557 Type 1 or Type 2, 321
6. AMS5556 Type 1 or Type 2, 347
7. AMS5561 21-6-9
8. AMS5573 Seamless, 316

Titanium

9. AMS4944 3Al-2.5V
10. AMS4945 3Al-2.5V Texture Controlled

Nickel Alloy

11. AMS5581 Type 625

c. Wire:

Corrosion-resistant steel, austenitic, cold drawn

1. ASTM A580/A313 Comp. 304 (AMS5697)
2. ASTM A580/A313 Comp. 316 (AMS5690)
3. ASTM A580/A313 Comp. 321 (AMS5689)

3.3 Design and Construction

The hose assembly shall consist of a seamless PTFE inner tube, corrosion-resistant steel-wire reinforcement, and aluminum, corrosion-resistant steel, titanium, or nickel alloy end fittings as required to meet the construction and performance requirements of this document, and as required for its intended use.

3.3.1 Inner Tube

The inner tube shall be of a seamless construction of virgin PTFE resin of uniform gage. It shall have a smooth bore and shall be free from pitting or projections on the inner surface. The outer surface of the tube shall be visually free of continuous linear indications or defects (e.g., scratches, grooves, linear discolorations) resulting from the extrusion process when inspected with the unaided eye. Additives may be included in the compound from which the tube is extruded.