



AEROSPACE STANDARD

AS5620™**REV. C**

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Superseding AS5620B

Titanium Hydraulic Tubing, Ti-3Al-2.5V Cold Worked and Stress Relieved,
Up to 35000 kPa (5080 psi),
Requirements for Qualification Testing and Control

RATIONALE

Define pressure requirements for S-N testing for Type I tubing and revise cycle requirement to reflect the new pressure values. Revise the quantity of tubes that are S-N tested at the specified pressure values. Delete flexure test requirement.

1. SCOPE

This SAE Aerospace Standard (AS) shall be used in conjunction with AMS4946 to provide requirements for qualification testing and for qualified products listing (QPL) and qualified manufacturer listing (QML) for Ti-3Al-2.5V cold worked and stress relieved hydraulic system tubing. The basic tubing shall comply with the requirements of AMS4946.

1.1 Classification

1.1.1 The AMS4946 type designations for this tubing are repeated here for reference:

Type I - Tubing with 105 ksi (724 MPa) minimum yield strength

Type II - Tubing with 95 ksi (655 MPa) minimum yield strength

Type III - Tubing with 70 ksi (483 MPa) minimum yield strength

1.1.2 Tubing furnished under this document shall be of the following classes:

- a. Class A: Tubing with enough data to generate a requirement for 3.3.2. See Table 2 for class designation.
- b. Class B: Tubing without enough data to generate a requirement for 3.3.2. As more data becomes available for certain tube types and sizes, a requirement will be generated and the tubing will be reclassified. See Table 2 for class designation.

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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: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS4946	Titanium Alloy Tubing, Seamless, Hydraulic, 3Al - 2.5V, Texture Controlled, Cold Worked, Stress Relieved
AS603	Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies
AS4265	Impulse Testing of Hydraulic Tubing and Fittings, S-N Curve
AS4444	Fittings, 24 Degree Cone, Flareless, Fluid Connection, 5000 psi
AS18280	Fittings, 24 Degree Cone, Flareless, Fluid Connection, 3000 psi
AS33611	Tube Bend Radii
AS85421	Fittings, Tube, Fluid Systems, Separable, Beam Seal, 3000/4000 psi, General Specification for
AS85720	Fittings, Tube, Fluid Systems, Separable, High Pressure Beam Seal, 5000/8000 psi, General Specification for

2.2 PRI Publications

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

AC7112	Nadcap Audit Criteria for Fluid Systems Component Manufacturers
AC7112/6	Nadcap Titanium 3Al-2.5V Alloy, Seamless Hydraulic Tubing Manufacturing Requirements Audit Checklist
PD1100	Nadcap Program Requirements
PD2001	Manufacturer Request for Product Approval and Qualification Process
PD2101	Aerospace Quality Assurance, Product Standard, Qualification Procedure, Fluid Distribution Systems

2.3 U.S. Government Publications

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

MIL-HDBK-831	Preparation of Test Reports
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3. TECHNICAL REQUIREMENTS

3.1 Qualification

Tubing supplied under this Aerospace Standard shall meet all requirements specified in AMS4946, and the hydraulic qualification test requirements of this specification.

3.1.1 Manufacturer Qualification

A manufacturer producing a product in conformance with this procurement specification shall be accredited in accordance with the requirements of PD2101, PD1100, AC7112, and AC7112/6. The accredited manufacturer shall be listed in a Performance Review Institute (PRI) qualified manufacturer 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 Performance Review Institute (PRI) qualified part list (QPL).

3.1.3 Configuration Control

All products shall conform to the materials and procedures used for fabricating qualification test samples. All changes shall be reported to PRI, major changes require approval by PRI prior to implementation. Examples for major changes:

- a. Source of supply of starting (raw) material
- b. Acceptance criteria and conditioning practice for tube hollows
- c. Reduction schedule, number of reduction steps, and total reduction achieved during cold working

NOTE: Change in reduction of up to 5% of total reduction is considered a minor change.

- d. Heat treatment parameters and pyrometry procedures
- e. Inspection methods - ultrasonic and surface roughness

3.2 Burst Test

The tubing shall meet hydraulic burst test requirements as specified in AS4444, AS18280, AS85720, or AS85421.

NOTE: The AS4444, AS18280, AS85720, and AS85421 refer to different fitting designs. The basic hydraulic qualification test methods are the same for these fittings.

3.3 Hydraulic Impulse Test

3.3.1 Tube Bends, Qualification

Bent tube assemblies as shown in Figures 1 or 2 shall not show leakage after 400000 cycles when tested in accordance with AS603.

3.3.2 Straight Tubing, S-N Testing

Sinusoidal impulse testing shall be conducted to establish impulse fatigue properties and verify impulse fatigue performance. S-N test data is to be reported and approved by user. Such data may be used in periodic control testing (4.2.3) to verify that impulse fatigue properties are the same as of the tubing that was initially qualified.