



AEROSPACE STANDARD

AS81914™**REV. A**

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Superseding AS81914

Tubing, Plastic, Flexible, Convolute, Conduit,
General Specification for

RATIONALE

Revision required to change ASTM D1924 to ASTM G21 for fungus resistance testing and editing as needed.

1. SCOPE

The tubing described in this document is for use in electrical interconnect systems for the protection and routing of wire bundle installations.

1.1 Purpose

This specification establishes requirements for plastic convoluted tubing that provides mechanical protection and support for electric wire bundles. The continuous operating temperatures range from -67 to 500 °F (-55 to 260 °C) (see 6.1).

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.

AMS2700 Passivation of Corrosion Resistant Steel

AMS-QQ-P-35 Passivation Treatments for Corrosion-Resistant Steel

AS81914/1 Tubing, Plastic, Flexible, Convolute, Helical, Polytetrafluoroethylene (PTFE), Standard Convolutions

AS81914/2 Tubing, Plastic, Extra Flexible, Convolute, Helical, Polytetrafluoroethylene (PTFE), Close Convolutions

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<https://www.sae.org/standards/content/AS81914A/>

Documents
Document Sharing Hub

AS81914/3	Tubing, Plastic, Flexible, Convoluted, Helical, Fluorinated Ethylene Propylene (FEP), Standard Convolution
AS81914/4	Tubing, Plastic, Extra Flexible, Convoluted, Helical, Fluorinated Ethylene Propylene (FEP), Close Convolution
AS81914/5	Tubing, Plastic, Flexible, Convoluted, Helical, Ethylene Tetrafluoroethylene (ETFE), Close Convolution
AS81914/6	Tubing, Plastic, Flexible, Convoluted, Helical, Ethylene Tetrafluoroethylene (ETFE), Standard Convolution
AS81914/7	Tubing, Plastic, Flexible, Convoluted with Integral Braid(s)
AS81914/8	Tubing, Plastic, Flexible, Convoluted, Annular Polyvinylidene Fluoride (PVDF), Thermally Stabilized, Standard Convolution
AS81914/9	Tubing, Plastic, Flexible, Convoluted, Helical, Perfluoroalkoxy (PFA), Standard Convolution
AS81914/10	Tubing, Plastic, Extra Flexible, Convoluted, Helical, Perfluoroalkoxy (PFA), Close Convolution
AS81914/11	Tubing, Plastic, Lightweight, Zero Halogen, Extra Flexible, Convoluted, Helical, Close Convolution, Polyetheretherketone (PEEK)
AS9100	Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations

2.1.2 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 A313	Wire Stainless Steel Spring
ASTM D632	Sodium Chloride, Specification for
ASTM D638	Test for Tensile Properties of Plastics
ASTM D792	Tests for Specific Gravity and Density of Plastics by Displacement
ASTM D876	Testing Nonrigid Vinyl Chloride Polymer Tubing
ASTM D1974	Fiberboard Boxes, Methods of Closing, Sealing, and Reinforcing
ASTM D5168	Containers, Fabrication and Closure of Triple Wall Corrugated Fiberboard
ASTM G21	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

2.1.3 EIA Publications

Available from Electronic Component Association (ECA), 2500 Wilson Boulevard, Arlington, VA 22201-3834, Tel: 703-907-7500, www.eia.org.

EIA-364	Electrical Connector/Socket Test Procedures Including Environmental Classifications
EIA-364-66	EMI Shielding Effectiveness Test Procedure for Electrical Connectors

2.1.4 U.S. Government Publications

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

A-A-59569	Braid, Wire (Copper, Tin Coated, Silver Coated or Nickel Coated, Tubular or Flat)
ANSI/ASQC Z1.4	Sampling procedures and Tables for Inspection by Attributes
ANSI/NCSL Z540-1	Calibration System Requirements
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordinance
MIL-PRF-7808	Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-147	Palletized and Containerized Unit Loads 40 Inch X 48 Inch Pallets, Skids, Runners, or Pallet Type Base
MIL-STD-1916	DOD Preferred Methods for Acceptance of Product
MIL-STD-2073-1	Military Packaging, Standard Practice for
SD-6	Provisions Governing Qualification

2.2 Definitions

The following definitions apply to this specification.

2.2.1 QUALIFICATION INSPECTION

Qualification inspection is a process that demonstrates that a component is capable of fully conforming to all the requirements defined in a standard. Qualification inspection includes the definition of the measurements, tests analysis, and associated data which provides consistent rationale for acceptance of a particular supplier's design as meeting the standard requirements, typically prior to acquisition by the purchaser.

2.2.2 QUALIFIED PRODUCTS LIST

A qualified products list (QPL) is a list of suppliers (manufacturers [MFRs]) whose products have been evaluated to defined processes and who are authorized to provide those products to a purchaser upon request. When a QPL is specified, only approved suppliers (MFRs) are authorized to provide products under the part number defined in the component standard. A QPL is established and maintained by a qualifying activity (QA).

2.2.3 QUALIFYING ACTIVITY

A QA is a function established by a purchaser or group of purchases (e.g., government, etc.) that has a defined process used to consistently evaluate all suppliers' (MFRs) products in accordance with the component standard.

2.2.4 QUALITY CONFORMANCE INSPECTION

Quality conformance inspection is a process which includes measurements, nondestructive tests, analysis, and associated data that will provide verification that a particular individual component continually conforms to the requirements defined in the standard.

2.2.5 QUALIFICATIONS BY SIMILARITY

An alternative qualification inspection process accomplished without completing all measurements, tests, and analysis requirements is defined in the standard. Acceptance and the extent of similarity are determined by the QA. Similarity is established through a rationale that certain designs, materials, and/or processes are identical to those already approved through the qualification of the components. Verification testing for the new product is not required for designs, materials, and/or processes already approved. When a QPL is being established, the qualification by similarity rationale shall be approved by the QA prior to initiation of the remaining portions of the qualification process.

2.2.6 PURCHASER

A purchaser is an activity that can issue a purchase order or contract (e.g., government, etc.).

2.2.7 SUPPLIER (MANUFACTURER)

A supplier (MFR) is an original component MFR or a value-added component MFR which has design and production control of the processes used to produce the final component in accordance with the standard.

2.2.8 ASSEMBLY PLANT

A plant established by the supplier (MFR) or operated by a distributor authorized by the supplier (MFR) to perform specific functions pertaining to the supplier's (MFR's) identified qualified products in accordance with supplier's (MFR's) specified assembly procedures, test methods, processes, controls, storage, handling, and packaging techniques.

2.3 Abbreviations and Acronyms

The following abbreviations and acronyms apply to this specification.

ASTM	American Society for Testing and Materials
AQL	accepted quality level
DOD	Department of Defense
DODISS	Department of Defense Index of Specifications and Standards
MS	Military Standard
QPL	qualified products list
ANSI	American National Standards Institute

3. REQUIREMENTS

3.1 Specification Sheets

The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification

The tubing furnished under this specification shall be products which is authorized by the QA for listing on the applicable QPL at the time set for opening of bids (see 4.3 and 6.5).

3.2.1 Plant Site

Each site or MFR's plant site or MFRs authorized distribution site from which a qualified product is processed, manufactured, finalized, and/or shipped shall be listed on the qualified product list (see 3.2).

3.2.2 Provisions Governing Qualification

The provisions governing qualification are specified in SD-6 (see 2.1).

3.2.3 Reliability

The MFR's reliability assurance program for connector accessories and assembly procedures shall comply with AS9100 requirements. Other established and industry-recognized quality assurance standards that assure all products produced conform to the contract requirements are acceptable. However, if used, it is the responsibility of the MFR to provide evidence of compliance with AS9100. The QA authority reserves the right to monitor, measure, and validate compliance at their discretion.

3.3 Material

3.3.1 Tubing

The material used to fabricate the tubing shall be of the polymer type specified in the applicable detail specification sheet and shall be formulated to meet the requirements of this specification.

3.3.2 Braid

If braid is specified in the detailed specification for electromagnetic shielding, it shall be constructed to provide optical coverage in accordance with A-A-59569 and be applied with sufficient tension so there will be no looseness or bunching of the braid on the tubing.

3.3.3 Helix Wire

Stainless steel per ASTM A313, passivated per AMS2700, Method I, Type 6, or AMS-QQ-P-35.

3.4 Design and Construction

3.4.1 Convolution Type

The tubing supplied under this specification shall have a right-hand helical thread or annular-type convolution (see Figure 1). Type 1 = Helical and Type 2 = Annular. The availability of each is noted on the applicable detail specification sheet.

3.4.2 Classes

Class "0" designates a tubing shape having close convolutions with higher flexibility and bend radius characteristics than the standard convolution tubing shape. The availability of each is noted on the applicable detail specification sheet and forms a part of the part-identifying part number.

Class "1" designates a tubing shape having standard convolutions with less flexibility and bend radius characteristics than the close convolution tubing shape. The availability of each is noted on the applicable detail specification sheet and forms a part of the part-identifying part number.

3.4.3 Drain Holes

Drain holes shall be 0.110/0.05 inch (2.8/1.3 mm) in diameter and be in a pattern such as helical or spiral at 60 degrees radial spacing on every other convolute. The drain hole shall penetrate the major diameter of the convoluted form. The drain holes shall not penetrate the overbraid if applicable (see Figure 1).

3.4.4 Helix Reinforcement

When helix reinforcement wire is specified, the wire shall be retained in each of the valleys of the convolute tube form and shall meet the performance requirements specified in 4.7.13. The diameter of the wire shall not exceed the maximum outer diameter of the tubing and the minimum inside diameter of the tubing may be decreased 0.015 inch (0.38 mm) maximum from the minimum inside diameter specified on the applicable detail specification sheet (see Figure 1).