



AEROSPACE STANDARD	AS21608™	REV. B
	Issued 1999-06 Revised 2021-10	
	Superseding AS21608A	
Ferrule, Shield Terminating, Crimp Style		
FSC 5940		

RATIONALE

Update references and add note referring to ARP7503 for installation instructions.

1. SCOPE

1.1 Scope

This specification covers crimp style, insulated and uninsulated, shield terminating ferrules for RF cable and shielded cable.

1.2 Classification

Shield terminating ferrules covered by this specification shall be of the following classes and types, as specified (see 6.2):

Type I - Ferrule, uninsulated, two-piece.

Type II - Ferrule, insulated, two-piece.

Class 1 - Ferrules that conform to all the requirements of this specification when installed with the applicable crimping tool conforming to AS22520.

Class 2 - Ferrules that conform to the material requirements of this specification, are replaceable by Class 1 ferrules, and conform to the performance requirements of this specification when crimped with a tool having crimping dies and motion conforming to the ferrule manufacturer's control drawing required by 3.6.

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 the 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 Issues of Documents

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.

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Full document details: SAE AS21608B

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Documents

Document Sharing Hub

AIR1351	Manufacturers' Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories
ARP7503	Methods of Shield Termination for Two-Piece, Crimp Style Ferrule on Shielded Cables
AS18121*	Ferrule, Outer, Insulated, Shield Terminating, Type II, Two Piece, Class I, for Shielded Cable
AS21980*	Ferrule, Outer, Uninsulated, Shield Terminating, Type I, Two Piece, Class I, for Shielded Cable
AS21981*	Ferrule, Inner, Uninsulated, Shield Terminating, Type I, Two-Piece, Class I, for Shielded Cable
AS22520/5	Crimping Tools, Type 2, Terminal, Hand, Wire Termination, for Coaxial, Twinaxial, Triaxial, Shielded Contacts and Ferrules, Terminal Lugs, Splices and End Caps
AS22520/10	Crimping Tools, Terminal, Hand, Wire Termination, Small for Coaxial, Shielded Contacts, Ferrules, Terminal Lugs, Splices, and End Caps.
AS25036	Terminal, Lug, Crimp Style, Copper, Insulated, Ring Tongue, Bell Mouth, Type II, Class 1
AS50861	Wire, Electric, Polyvinyl Chloride Insulated, Copper or Copper Alloy

*AS21608 detail specifications.

2.1.2 U.S. Government Publications

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

MIL-DTL-17	Cable, Radio Frequency, Flexible and Semirigid, General Specification for
MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-2073-1	Military Packaging, Standard Practice for
MIL-STD-31000	Technical Data Packages
SD-6	Provisions Governing Qualification

2.1.3 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 B339	Pig Tin
ASTM B545	Tin, Electrodeposited Coatings of

2.1.4 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada), 001-800-514-1564 (Mexico), or +1-414-272-8575 (all other locations), www.asq.org.

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

2.1.5 National Conference of Standards Laboratories (NCSL) Publications

Available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301, Tel: 303-440-3339, www.ncsli.org.

NCSL Z540-3 General Requirements for Calibration Laboratories and Measuring and Test Equipment Calibration of Measuring and Test Equipment, Requirements for

3. REQUIREMENTS

3.1 Qualification

The ferrules furnished under this specification shall be products which are qualified for listing on the applicable Qualified Products List (see 4.3 and 6.3).

3.2 Detail Specification Requirements

The components requirements shall be as specified herein and in accordance with the applicable detail specification. In the event of any conflict between the requirements of this specification and the detail specification, the latter shall govern (see 2.1).

3.3 Materials

The ferrules shall be fabricated from the materials specified on the applicable detail specification.

3.4 Design and Construction

Class 1 ferrules shall be constructed in accordance with the applicable detail specification and shall be designed for attachment to appropriate size shielded cable by having the ferrule reshaped around the conductor shield. The reshaping operation shall be accomplished by means of a tool conforming to the applicable AS22520 detail specification. The reshaping operation for the Class 2 ferrule shall be accomplished by means of tooling recommended by the ferrule manufacturer. The ferrule shall exhibit no evidence of fracturing or spalling as a result of being crimped to a suitable cable.

3.4.1 Insulation

Type II ferrules shall be insulated over their outer surfaces. The insulation shall remain in its original position on the ferrule before and after crimping.

3.4.2 Finish

Ferrule conductor parts shall be tin plated over their entire surface in accordance with ASTM B545 OR ASTM B339, Type I.

3.5 Performance Requirements

The ferrules shall be designed to meet the following requirements when crimped to each of the specified cable sizes with the applicable tool.

3.5.1 Voltage Drop

The voltage drop through the ferrules, when carrying test current, shall not exceed 6 mV for "initial" voltage drop and 9 mV for "after test" voltage drop, except for vibration testing. Before vibration testing, initial voltage drop shall not exceed 11 mV and after tests, 11 mV.

3.5.2 Temperature Cycling

The ferrules shall be subjected to the temperature cycling tests (4.5.2.2) after which they shall meet the “after test” voltage drop (3.5.1) and tensile strength (3.5.3) requirements.

3.5.3 Tensile Strength

The mechanical connection between the ground wire and the ferrules shall have a tensile strength of not less than 15 pounds for size M5086/1-22-9 ground wire (refer to AS50861) and not less than 19 pounds for size M5086/1-20-9 ground wire. After being subjected to the tensile strength test (4.5.2.3), the mechanical connection shall not break or become distorted at tensile stresses less than the minimum values specified above.

3.5.4 Vibration

After being subjected to the vibration test (4.5.2.4), the ferrules shall meet the “after test” voltage drop (3.5.1) and tensile strength (3.5.3) requirements.

3.5.5 Corrosion Resistance

The ferrules shall meet the “after test” voltage drop (3.5.1) and tensile strength (3.5.3) requirements after being subjected to the corrosion resistance test (4.5.2.5). At the completion of this test, the basic metal of the ferrule shall not be exposed.

3.5.6 Ferrule Insulation (Dielectric Strength - Type II)

The insulation on the Type II ferrule shall have a minimum dielectric strength of 500 Vrms at 60 Hz for 1 minute (see 4.5.2.6).

3.5.7 Conductor Insulation Distortion

The completed crimped termination shall not scratch, mar, or distort the inner conductor insulation. When subjected to the conductor distortion test (4.5.2.7), the force necessary to remove the basic conductor from the crimped ferrule shall not exceed 9 pounds. Inner ferrules up to 0.134 inch ID shall have only one ground wire attached for this test.

3.5.8 Axial Load (Type II)

The insulation sleeve of Type II ferrules shall withstand a minimum axial force of 8 pounds in either direction without moving more than 1/32 inch on the barrel of the ferrule. This requirement applies to ferrules before and after installation (see 4.5.2.8).

3.6 Manufacturer's Control Drawing

The ferrule manufacturer shall prepare a control drawing for the crimping dies used to crimp his Class 2 ferrules for the applicable tests. The control drawing shall specify the critical dimensions and motion of the dies and shall also specify the acceptance and in-service gaging requirements. The ferrule manufacturer shall certify to the ferrule user that the user's dies are in accordance with the control drawing and shall furnish to the user the acceptance and in-service gaging requirements (see 4.3.3).

3.7 Identification of Product (Class 1)

The manufacturer's identification and the part number, including the dash number, shall be included in the marking for shipment and shall be in accordance with MIL-STD-129 (see 5.2). If a symbol or abbreviation is used, it shall be listed in AIR1351.

3.8 Interchangeability

All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other and with respect to installation and performance. The drawing number requirements of MIL-STD-31000 shall govern changes in the manufacturer's part numbers.

3.9 Workmanship

Ferrules shall be uniform in quality and free from all defects which may affect their serviceability and appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified herein, the contract or purchase order, the supplier is responsible for the performance of all contract inspection requirements. Except as otherwise specified herein, the contract or purchase order, the supplier may use any facilities suitable for the performance of the inspection requirements. The Qualifying Activity has the right to perform any of the inspections set forth in the standard where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for Compliance

All items must meet all technical requirements of the product standard. The inspection set forth in this standard shall become a part of the supplier's overall inspection system or quality program. The absence of any inspection requirements in the standard shall not relieve the supplier of the responsibility of assuring that all products comply with all requirements of the contract or purchase order. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the purchaser to acceptance of defective material

4.1.2 Test Equipment and Inspection Facility

Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-3 or equivalent standards.

4.1.3 Inspection Conditions

The conditions for the inspections are specified as applicable and all test data shall be compiled in accordance with an acceptable method, such as chapter 4 of SD-6.

4.2 Classification of Inspection

The examination and testing of ferrules shall be classified as follows:

- a. Initial Qualification Inspection (4.3)
- b. Retention of Qualification (4.3.6)
- c. Quality Conformance Inspection (4.4)

4.3 Initial Qualification Inspection

Initial qualification inspection shall be performed or witnessed by the qualifying activity (see 6.3) for Class 1 ferrules (see 4.3.1) and in-plant by the supplier for Class 2 units (see 4.3.2). Sample units shall be subjected to the qualification inspection specified in Table 3. All sample units shall be subjected to the inspection of Group I. The sample units shall then be divided into Groups II through VIII as shown in Table 3 and subjected to the inspection in sequence for their particular group.