



AEROSPACE RECOMMENDED PRACTICE

ARP7503™

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Reaffirmed 2025-10

Methods of Shield Termination for Two-Piece, Crimp-Style Ferrule on Shielded Cables

RATIONALE

An ARP is required to assist users on how to apply an AS21608 shield terminating, crimp-style ferrule to shielded cables.

ARP7503 has been reaffirmed to comply with the SAE Five-Year Review policy.

TABLE OF CONTENTS

1.	SCOPE.....	3
1.1	Objective	3
1.2	Description	3
2.	APPLICABLE DOCUMENTS	3
2.1.1	SAE Publications.....	3
2.1.2	Military Publications	4
2.1.3	NEMA Publications	4
3.	PROCEDURE	4
3.1	Method 1: Standard Shield to Ground Assembly.....	4
3.2	Method 2: Shield Fold Back on Cable Insulation and Inner Ferrule Assembly.....	6
3.3	Method 3: Fold Back Shield on to Shield and Ferrule Assembly.....	8
3.4	Method 4: One End Grounded Shield (Floating) Assemble.....	10
3.5	Method 5: AS18121 Insulated Outer Ferrule Assembly	10
4.	TABLES	11
5.	APPLICATIONS	13
6.	NOTES.....	14
6.1	Metric Equivalent.....	14
6.2	Revision Indicator.....	14
Figure 1	Typical ground wire insulated shield construction without an insulated cable jacket	3
Figure 2	Installation of the outer ferrule	4
Figure 3	Flaring the shield.....	5
Figure 4	Inner Ferrule under shield position	5
Figure 5	Inserting the conductor ground wire.....	5
Figure 6	Standard shield grounding assembly	6
Figure 7	Installation of the inter ferrule.....	6
Figure 8	Flare and folding the cable shield	7
Figure 9	Inner ferrule under the cable shield	7
Figure 10	Outer ferrule and conductor assembly	7
Figure 11	Fold back for ground shield assembly	8

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Figure 12	Inner ferrule placed over the shield.....	8
Figure 13	Flare and folding the cable shield	9
Figure 14	Shield to shield fold back unassembled.....	9
Figure 15	Outer ferrule over the inner ferrule and shield	9
Figure 16	Fold back shield onto shield and ferrule assembly	10
Figure 17	AS18121 outer insulated ferrule	10
Table 1	AS21980 uninsulated outer ferrules and AS22520/5 or /10 crimping tools	11
Table 2	AS21981 uninsulated inner ferrules	12
Table 3	AS18121 insulated outer ferrule with AS22520/5 or /10 crimping tools	13

1. SCOPE

AS21608 shield terminating, crimp-style ferrule applications on shielded cables require various piece parts in multiple combinations to ground the shield of non-environmental cables. This ARP provides the recommended methods to ensure the shield ground wire is terminated correctly and the shield is protected. Refer to AS83519 for shield grounding when environmental resistance is required.

1.1 Objective

The objective of ARP7503 is to provide a procedure for establishing a ground wire connection to a shielded single conductor, or multi-conductor cable that will meet the performance requirements of AS21608 (voltage drop, temperature cycle, tensile strength, vibration, corrosion resistance, conductor insulation distortion, and axial load).

1.2 Description

ARP7503 describes how to crimp a ground wire to a shielded cable with an AS22520 standard tool using an AS18121 outer ferrule with insulated sleeve or an AS21980 outer ferrule without an insulated sleeve and an AS21981 inner ferrule. A typical construction is shown in Figure 1.

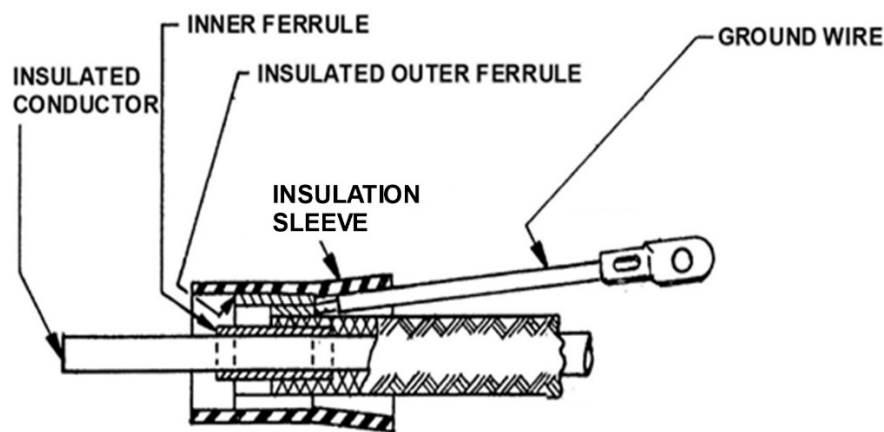


Figure 1 - Typical ground wire insulated shield construction without an insulated cable jacket

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.

2.1.1 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.

AS5768	Tool, Stripper, Electrical Insulation, General Specification for
AS18121	Ferrule, Outer, Insulated, Shield Terminating, Type II, Two Piece, Class I, for Shielded Cable
AS21608	Ferrule, Shield Terminating, Crimp Style
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	Crimping Tools, Wire Termination, General Specification for
AS22520/5	Crimping Tools, Terminal, Hand, Wire Termination, Large for Coaxial, 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
AS23053/4	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Dual-Wall, Outer Wall Crosslinked
AS23053/5	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked
AS83519	Shield Termination, Solder Style, Insulated, Heat-Shrinkable, Environment Resistant General Specification for

2.1.2 Military Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

MIL-DTL-17 Cables, Radio Frequency, Flexible and Semirigid, General Specification for

2.1.3 NEMA Publications

Available from National Electrical Manufacturers Association, 1300 North 17th Street, Suite 900, Arlington, VA 22209, Tel: 703-841-3200, www.nema.org.

WC27500 Standard for Aerospace and Industrial Electric Cable

3. PROCEDURE

ARP7503 provides different methods for attaching a ground wire to a shielded cable for electromagnetic or radio frequency interference cable protection. The insulated ground wire is size 20 with a conductor outer diameter 0.0365 to 0.0384 inch (0.93 to 0.98 mm). Ferrules are color-coded to assist the user in picking the correct dash number (see Tables 1, 2, and 3). Select an insulated ground wire construction which can withstand the application temperature range and is compatible with the shield material (e.g., use nickel-plated wire for a nickel-plated shielded cable construction).

3.1 Method 1: Standard Shield to Ground Assembly

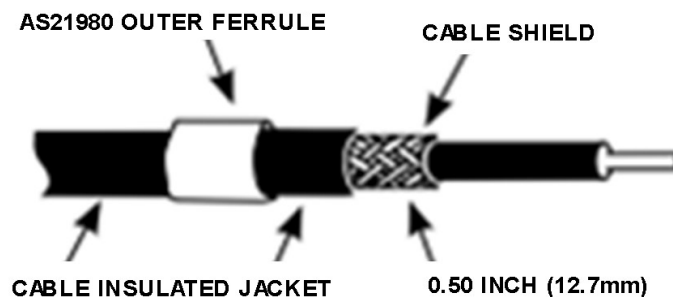


Figure 2 - Installation of the outer ferrule

- Strip off the outer jacket (if present) and cut the metallic shield braid to the required length. For concentric cable, use an Ideal Tool and Manufacturing Company coaxial cable strip tool part numbers 45-162 to 45-165 or equivalent, depending on cable diameter. For non-concentric cable (e.g., NEMA WC27500 multi-conductor twisted cable), strip outer jacket with a sharp blade/hand tool or equivalent. The braid length exposed should be approximately 0.50 inch (12.7 mm), which is needed to permit the inter ferrule to be covered by the braid. Make sure that the shield strands are flat and smooth. Comb out the shield, if necessary.

- b. Measure the outer diameter (OD) of the conductor. Pick from Table 1 the AS21981 inner ferrule dash number with an inner diameter (ID) that closely matches the conductor OD plus 0.010 inch (0.254 mm). Following steps d and e in the proceeding instructions, install the inner ferrule beneath the shield. Measure the maximum diameter with the shield over the inner ferrule. Add 0.03 inch (0.76 mm) to the measured value for the ground conductor. The sum will give the ID of the AS21980 outer ferrule (i.e., an OD of 0.210 inch [5.33 mm] plus the 0.030 inch [76.2 mm] conductor OD requires a -261 (yellow) with an ID of 0.258 to 0.264 inch [6.55 to 6.71 mm]). If the cable OD exceeds the inner diameter of the AS21980 outer ferrule, terminate the cable in accordance with Method 3.
- c. Slide the chosen AS21980 outer ferrule over the outer jacket of the cable as shown in Figure 2.



Figure 3 - Flaring the shield

- d. Slide the inner ferrule onto the conductor insulation. Grasp the inner ferrule and gently rotate the conductor to flare the shield as shown in Figure 3 to a diameter which will permit the inner ferrule to slide under the shield.

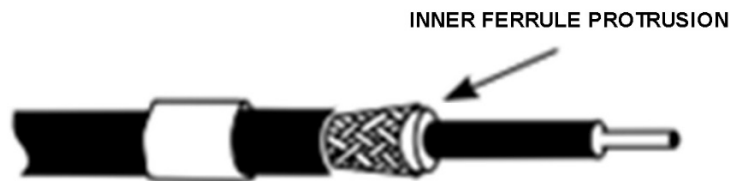


Figure 4 - Inner Ferrule under shield position

- e. Slide the inner ferrule under the shield as shown in Figure 4 with a maximum of 0.06 inch (1.5 mm) protruding out from under the shield.

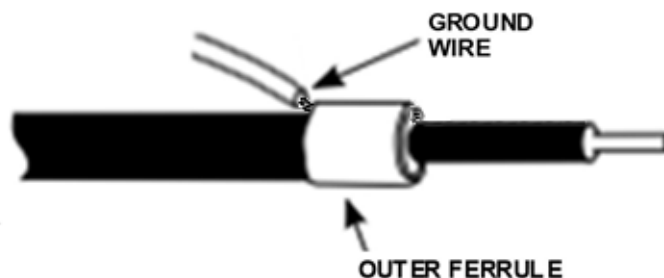


Figure 5 - Inserting the conductor ground wire

- f. Cut the size 20 insulated ground wire to length required for termination to a ground plane and strip the insulation from the conductor with an AS5768 wire insulation strip tool. Expose the conductor length beyond the shield termination to approximately 0.40 inch (10.2 mm). Slide the outer ferrule over the shield and insert the ground wire conductor under the outer ferrule in front or behind the outer ferrule as shown in Figure 5. Inserting the ground wire behind the termination is the preferred way when the cable is being connected to a contact to prevent the ground wire from interfering with the insertion and extraction of the contact from the connector.