



AEROSPACE STANDARD

AS83519**REV. C**Issued 1998-07
Revised 2015-05

Superseding AS83519B

(R) Shield Termination, Solder Style, Insulated, Heat-Shrinkable,
Environment Resistant General Specification For

FSC 5940

RATIONALE

The heat aging temperature update is required to accommodate splices with different continuous operating temperature. The qualifying activity address update. Editorial corrections. Units and abbreviation corrected in accordance with SAE policies.

1. SCOPE

This specification covers environment resistant, heat-shrinkable solder type shield terminations. They may be used on data-bus, RF and shielded cables in applications where the operating temperature does not exceed 150 °C.

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 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.

2.1.1 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.

AMS1424	Deicing/Anti-Icing Fluid, Aircraft, SAE Type I
AS7928	Terminals, Lug, Splices, Conductor: Crimp Style, Copper, General Specification For
AS83519/1*	Shield Termination, Solder Style, Insulated, Heat-Shrinkable, Environment Resistant for Cables having Tin or Silver Plated Shields (Class I)

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AS83519/2* Shield Termination, Solder Style, Insulated, Heat-Shrinkable, Environment Resistant with Pre Installed Lead for Cables having Tin or Silver Plated Shields (Class I)

* AS83519 detail specifications

2.1.2 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/ISO 10012 Quality Assurance Requirements for Measuring Equipment

J-STD-006 Requirements for Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders for Electronic Soldering Applications

2.1.3 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 Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.1.4 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

2.1.5 U.S. Government Publications

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

SD-6 Provision Governing Qualification

MIL-STD-129 Military Marking for Shipment and Storage

MIL-STD-202 Test Method for Electronic and Electrical Component Parts

MIL-HBK-454 Standard General Requirements for Electronic Equipment

MIL-STD-883 Microcircuits

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

MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5

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

MIL-STD-2073-1 Military Packaging, Standard Practice for

MIL-PRF-23699 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

MIL-STD-2000 Standard Requirements for Soldered Electrical & Electronic Assemblies

MIL-PRF-87937 Cleaning Compound, Aerospace Equipment

2.2 Definitions

The following definitions apply to this specification:

DEFECT - A defect is any nonconformance of the unit of product with specified requirements.

MAJOR DEFECT - A major defect is a defect, other than critical, that is likely to result in failure, or to reduce the usability of the unit of product for its intended purpose.

MINOR DEFECT - A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

3. REQUIREMENTS

3.1 Detail Specifications

The requirements for the individual shield terminations shall be as specified herein and in accordance with the applicable detail specifications. In the event of any conflict between requirements of this specification and the detail specification the latter shall govern.

3.2 Qualification

3.3 The components shall be a product that has been tested and has passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable Qualified Products List (see 6.6).

3.4 Materials

The material used shall be as specified herein:

3.4.1 Solder Preform

The solder preform shall be fabricated from solder conforming to J-STD-106. The alloy shall be as specified on the applicable detail specification.

3.4.2 Flux

The flux may be contained within or coated on the surface of the solder preform and shall conform to J-STD-106. The type of flux shall be specified on the applicable detail specification.

3.4.3 Insulation Sleeve

The insulation sleeve shall be a transparent heat shrinkable, cross-linked thermoplastic. The material must be suitable to meet all the performance requirements of this specification, when using a recommended heat source (see 6.2). The specific material shall be as specified on the applicable detail specification.

3.4.4 Sealing Inserts

The sealing material shall be a thermally stabilized thermoplastic. The material shall have a melt viscosity suitable to meet the performance requirements when using a recommended heat source (see 6.2).

3.4.5 Preinstalled Ground Lead

When specified the preinstalled lead shall conform to the requirements of the applicable wire specification.

3.5 Design and Construction

Unless otherwise specified, the termination shall consist of a heat-shrinkable insulation sleeve with an integral solder preform with flux and thermal indicator and two integral rings of sealing material. The termination shall, when specified, contain a preinstalled ground lead. The termination shall conform in all respects to the design, dimension and construction specified herein and on the applicable detail specification.

3.5.1 Insulation

The termination shall exhibit no evidence of splitting as a result of the heating operation.

3.5.2 Squirting

The solder shall not squirt or exude out of the insulation sleeve as a result of the heating operation.

3.5.3 Fillet

A solder fillet shall be clearly visible along at least one side of the ground lead (see Figures 2 and 3).

3.5.4 Transparency of Insulation

The insulation sleeve shall remain sufficiently transparent after the heating operation to permit visual inspection of the solder joint.

3.5.5 Thermal Indicator

The termination shall incorporate a thermochromic material which shall give a visual indication that sufficient heat has been applied to bring the surfaces to be soldered to a temperature sufficient for wetting (see 6.1.2). The color of the material shall be easily distinguished from that of the flux, the sleeve or the flux residue. The material shall be in contact with the surfaces to be soldered during the soldering operation and shall not interfere with the flow of the solder or the visual inspection of the completed termination. The characteristics shall meet the requirement of 3.5.1.5.

3.5.6 Installation Technique

Terminations shall be capable of being installed with either convection or infrared heat sources (see 6.2).

3.6 Performance

The termination shall conform to the following requirements:

3.6.1 Terminations as Received

The terminations, as received, shall conform to the following requirements:

3.6.1.1 Dimensions

The terminations shall conform to all dimensions shown on the detail specification (see 4.6.1).

3.6.1.2 Unrestricted Recovery

The termination shall recover sufficiently to force the sealing inserts to conform to the mandrel (see 4.6.2).

3.6.1.3 Longitudinal Change

The longitudinal change shall be no greater than 10% (see 4.6.3).

3.6.1.4 Copper Mirror Corrosion

When examined against a white background in good light there shall be no evidence of copper removal in excess of 10% from any part of the mirror above the bottom 0.062 inch. Discoloration of the copper film or reduction of its thickness should not be considered corrosion (see 4.6.4).

3.6.1.5 Wetting

3.6.1.5.1 Unacceptable Termination (Insufficient Heat)

Insufficiently heated termination as shown in Figure 1 shall show definite signs of the presence of the thermal indicator (see 4.6.5.1).

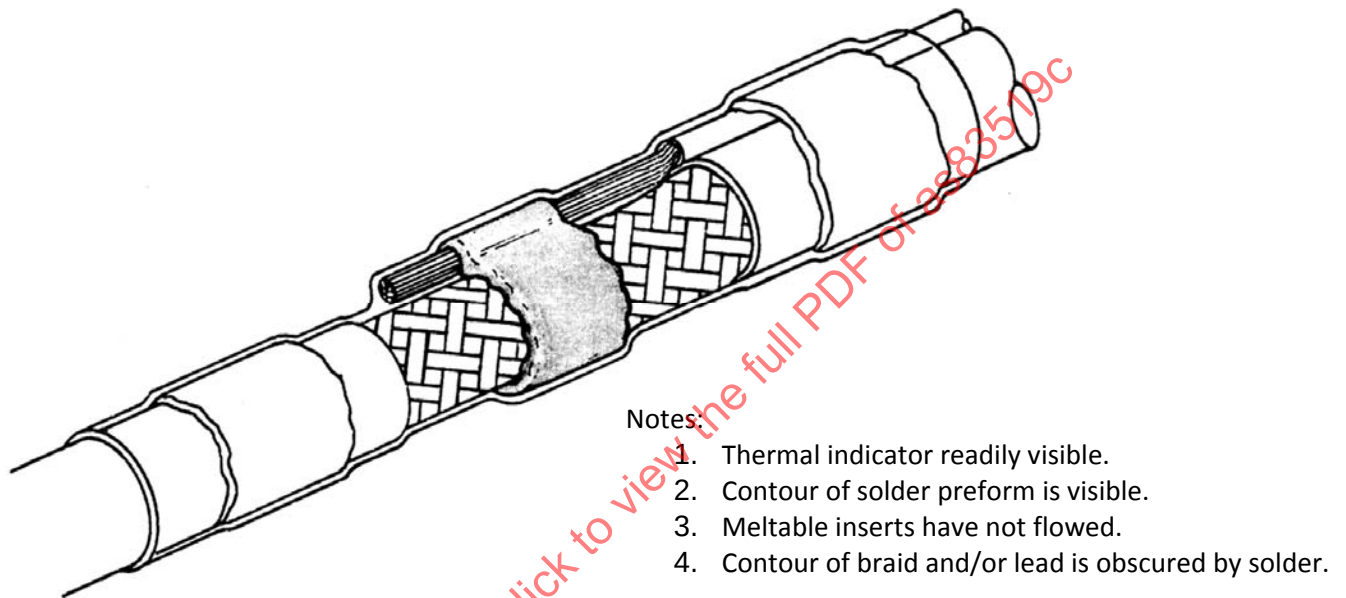


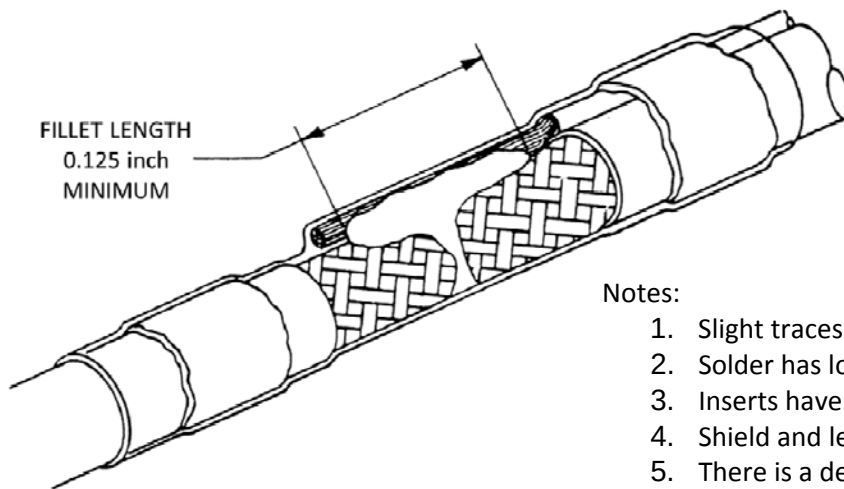
Figure 1 - Unacceptable termination (insufficient heat)

3.6.1.5.2 Acceptable Terminations (Minimum)

Minimum acceptable solder flow termination as shown in Figure 2 shall have traces of the thermal indicators in the fillet area (see 4.6.5.2).

3.6.1.5.3 Acceptable Termination (Maximum)

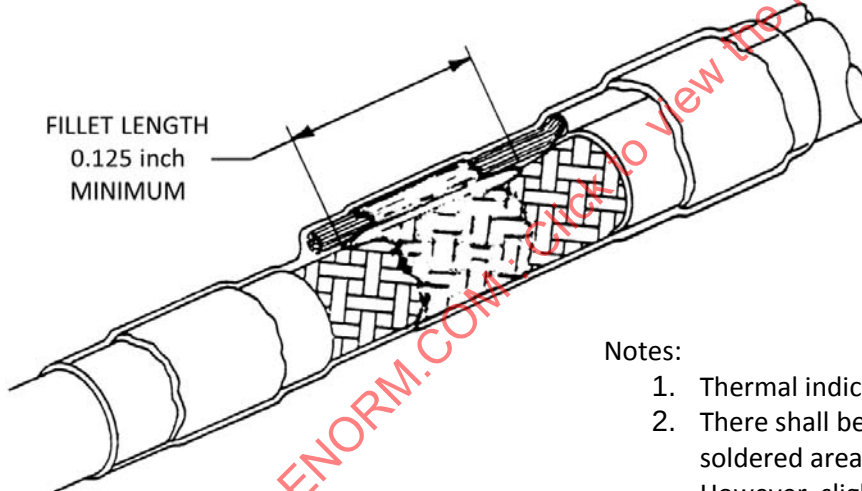
Maximum acceptable solder flow terminations as shown in Figure 3 shall have little or no evidence of the thermal indicator in the fillet area (see 4.6.5.3).



Notes:

1. Slight traces of thermal indicator shall be present
2. Solder has lost all appearance of preform shape.
3. Inserts have melted and flowed along wires.
4. Shield and lead contours are visible.
5. There is a definite fillet visible along the lead and shield interface.

Figure 2 - Acceptable termination (minimum solder flow)



Notes:

1. Thermal indicator as disappeared.
2. There shall be no traces of thermal indicator in the soldered area.
However, slight traces of the thermal indicator in the insert area are acceptable.
3. Fillet is clearly visible between lead and shield.
4. Joint area is visible despite browning of sleeve

Figure 3 - Acceptable termination (maximum solder flow)

3.6.2 Assemblies

The terminations shall conform to the following requirements when attached to each of the specified cable/ground lead sizes with the applicable tooling.

3.6.2.1 Voltage Drop

The millivolt drop across the termination shall not exceed 4.0 mV (see 4.7.1).

3.6.2.2 Insulation Resistance

The insulation resistance shall be no less than 1000 MΩ (see 4.7.2).

3.6.2.3 Dielectric withstanding Voltage

The termination shall show no evidence of damage, arcing or breakdown and the leakage current shall be less than 2 mA (see 4.7.3).

3.6.2.4 Tensile Strength

The solder joint shall not break below 15 pounds. Breakage of the ground lead or cable below this value shall constitute meeting this requirement (see 4.7.4).

3.6.2.5 Environmental Conditioning

Terminations shall meet the performance requirements listed, when tested in groups and sequences. Discoloration of the materials during these tests shall not be cause for rejection (see 4.7.5). The marking code (3.6) shall be legible after non-destructive tests.

3.6.2.6 Flammability

The termination shall be self-extinguishing within 5 seconds after removal from the flame (see 4.7.6).

3.6.2.7 Vibration

Terminations shall meet the performance requirements listed, when tested in groups and sequences (see 4.7.7).

3.7 Marking Code

The termination shall be permanently marked with six (6) alpha-numeric characters in contrasting ink in accordance with Figure 4. Marking shall be legible by normal vision after fluid immersion and heat aging.

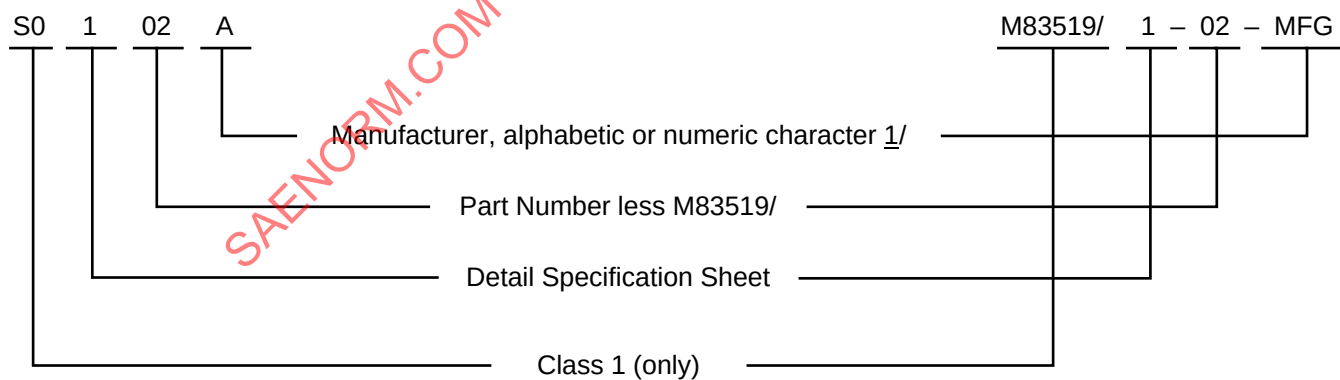


Figure 4 - Marking code

Example:

S0102X - Standard configuration without ground lead 0.145 I.D. 1/

S0215X - Standard configuration with preinstalled ground lead - 0.300 I.D. 1/

1/ Manufacturer designation (X) shall be assigned by the qualifying activity and listed on the Qualified Products List (see 6.6)

3.8 Marking

Marking shall be in accordance with the requirements of MIL-STD-129 and other applicable DOD documents as well as appropriate federal statutes and regulations, e.g., Federal Hazardous Substance Labeling Act, etc., unless otherwise prescribed by the contracting agency upon advice and recommendation of the departmental medical services.

3.9 Workmanship

The integral components shall be held within the termination with sufficient force to withstand dislodging during normal installation. The termination shall be free of defects which could be detrimental to performance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified in the contract the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract the supplier may use his/her own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection Equipment and Facilities

Inspection equipment and facilities shall be established and maintained in accordance with ANSI/NCSL Z540-1 or ISO 10012-1.

4.2 Classification of Inspection

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

- a. Qualification inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

4.3 Inspection Conditions

All measurements and tests shall be made at temperatures of 15 to 35 °C (59 to 95 °F) and at ambient air pressure and relative humidity. Whenever these conditions must be closely controlled in order to obtain reproducible results, for referee purposes, a temperature of 25 °C, +0 °C, -2 °C (77 °F, +0 °F, -3.6 °F), relative humidity of 50% ± 2%, and atmospheric pressure of 650 to 800 mm of mercury shall be specified. Reference conditions as a base for calculations shall be 25 °C (77 °F) for temperature, or an alternate temperature of 20 °C (68 °F), 760 mm of mercury for air pressure, and a relative humidity of 50%.

4.3.1 Temperature Stabilization

All tests performed after exposure to high or low temperature shall be conducted after terminations have been conditioned for at least 1 hour at the inspection conditions specified (see 4.3).

4.3.2 Water Bath

Unless otherwise specified in the applicable test method, a water bath containing 0.5% of an anionic wetting agent and 5.0% sodium chloride shall be used whenever immersion is specified. Free ends of cable and lead shall be a minimum of 2 inches from the top surface of water.

4.4 Qualification Inspection

Qualification inspection shall consist of all the tests of this specification. The qualifying activity (see 6.4) shall perform the initial qualification inspection tests designated in Table 2A and the retention of qualification inspection tests designated for Group C inspection (see 4.5.3.2). The qualifying activity shall provide a certified data package to the manufacturer for inclusion in the final test report.

4.4.1 Sample Size

Sample size: Forty-three (43) terminations of each size for each detail specification (see 3.1) for which qualification is sought shall be submitted to qualification inspection testing (see 4.4.7).

4.4.2 Assembly to Cables

The terminations shall be attached to the specified cables by the testing activity using the specified tooling. The attachment shall be made in the center of an 8-inch length of cable specified in the detail specification, the ground lead shall be at least 4.5 inches total. The specified number of sample units shall be divided into four sets of equal size. The four sets shall be installed on the test cables in accordance with Table 1. The termination shall extend at least 0.125 inch beyond stripped section of cable after installation.

Table 1 - Cable terminations

Sample Sets	Cable Size	Heat Source Type
A	Maximum	Infrared
B		Convection
C	Minimum	Infrared
D		Convection

4.4.3 Forwarding of Qualification Samples

Samples shall be forwarded to the testing laboratory designated by the activity responsible for qualification (see 6.6) plainly identified by securely attached, durable labels marked with the following information:

Sample for qualification test

SHIELD TERMINATION, SOLDER STYLE INSULATED,
HEAT-SHRINKABLE, ENVIRONMENT RESISTANT

Detail specification part number

Manufacturer's name and code number (Publications H4-1 and H4-2)

Manufacturer's part number

Place and date of manufacture of sample

Submitted by (name) (date) for qualification tests in accordance with the requirements of AS83519 under authorization (reference authorizing letter).

4.4.4 Test Routine

Sample units shall be subjected to the qualification inspection specified in Table 2. All sample units shall be subjected to the inspection of Group I. The sample shall then be divided into Groups II through XI as shown in Table 2 and subjected to the inspection for their particular group. Visual and dimensional examination shall not be repeated for qualification testing in Group II through XI.

4.4.5 Failures

Any failure shall be cause for refusal to grant qualification.

4.4.6 Retention of Qualification

Retention of qualification: The qualifying activity shall perform the Group C tests (see 4.4). To retain qualification, the supplier shall forward the activity responsible for qualification a summary of Group A and B tests, indicating as a minimum the number of lots which passed and number of lots which failed. Upon request the qualifying activity shall provide the Group C tests results (see 4.4). If the test results indicates nonconformance with specification requirements and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from Qualified Product List (see 4.5.3.3). Failure to submit the Group C samples may result in loss of qualification for the product.

4.4.7 Extent of Qualification

Each size termination listed on an individual detail specification shall be qualified separately. However, for those styles incorporating preinstalled leads, qualification of the minimum and maximum wire gauge listed in all termination sizes shall qualify all lead gauges on the applicable detail specification.

Table 2A - Qualifying activity qualification inspection

Examination or Test	Requirement Paragraph	Test Method Paragraph
Group I (12 uninstalled terminations)		
Visual and dimensional examination	3.3, 3.5.1.1, 3.6 & 3.7	4.6.1
Group V (4 cable assemblies) 1 of each set		
Visual and Dimensional	3.4 & 3.7	4.6.1
Insulation Resistance	3.5.2.2	4.7.2
Altitude immersion (1 cycle)	3.5.2.5	4.7.5.1
Insulation Resistance	3.5.2.2	4.7.2
Altitude Immersion (2 cycles)	3.5.2.5	4.7.5.1
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1
Tensile Strength	3.5.2.4	4.7.4
Group IX (4 cable assemblies) 1 of each set		
Visual and Dimensional	3.4 & 3.7	4.6.1
Vibration	3.5.2.7	4.7.7
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1
Group X (4 cable assemblies) 1 of each set		
Visual and Dimensional	3.4 & 3.7	4.6.1
Heat Aging	3.5.2.5	4.7.5.5
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1

Table 2B - Supplier qualification inspections

Examination or Test	Requirement Paragraph	Test Method Paragraph
Group I (31 uninstalled terminations)		
Visual and dimensional examination	3.3, 3.5.1.1, 3.6 & 3.7	4.6.1
Group II (6 uninstalled terminations)		
Unrestricted Recovery (3 terminations)	3.5.1.2	4.6.2
Longitudinal change (3 terminations)	3.5.1.3	4.6.3
Group III (1 uninstalled termination)		
Copper mirror corrosion	3.5.1.4	4.6.4
Group IV (8 uninstalled terminations)		
Wetting	3.5.1.5	4.6.5
Group VI (4 cable assemblies) 1 of each set		
Visual and Dimensional	3.4 & 3.7	4.6.1
Temperature Cycling	3.5.2.5	4.7.5.2
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1
Group VII (4 cable assemblies) 1 of each set		
Visual and Dimensional	3.4 & 3.7	4.6.1
Moisture Resistance	3.5.2.5	4.7.5.3
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1
Group VIII (6 cable assemblies) 3 Type C and 3 Type D assembly sets		
Visual and Dimensional	3.4 & 3.7	4.6.1
Fluid Immersion	3.5.2.5	4.7.5.4
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Group XI (2 cable assemblies) any sets		
Visual and Dimensional	3.4 & 3.7	4.6.1
Heat Aging	3.5.2.6	4.7.6

4.5 Quality Conformance Inspection

4.5.1 Inspection of Product for Delivery

Inspection of product for delivery shall consist of Group A inspection. A manufacturer's normal quality control tests and production tests may be used to fulfill Group A inspection, provided they at least equal the quality required by Table 3. Delivery of products which have passed Group A inspection shall not be delayed pending the results of Groups B and C inspection.

Table 3 - Group A inspection

Examination or Test	Requirement Paragraph	Test Paragraph	AQL (% defective)		Sampling Plan
			Major	Minor	
Visual and dimensional examination	3.1	4.6.1	1.0	4.0	S-4
Marking code	3.6				
Workmanship	3.7				

4.5.1.1 Inspection Lot

An inspection lot, as far as practicable, shall consist of all terminations of a single size and composition, manufactured under essentially the same conditions and offered for inspection at one time.

4.5.2 Group A Inspection

Group A inspection shall consist of the examination and test specified in Table 3.

4.5.2.1 Sampling Plan

The procedure for continuous production sampling is to select a sampling plan from ANSI/ASQC Z1.4 based on the specified Acceptance Quality Level (AQL) in Table 3.

4.5.2.2 Rejected Lots

If an inspection lot is rejected, the supplier shall withdraw the lot and may then rework it to correct the defects or screen out the defective units. Such lots shall be kept separate from new lots and shall be reinspected. Such lots shall be reinspected using tightened inspection.

4.5.2.3 Classification of Defects

Classification of defects for visual and dimensional examination shall be as specified in Table 4.

Table 4 - Classification of defects

Examination of Products	Major	Minor
Dimensions		
Overall length	X	
Inside diameter of termination	X	
Location of components	X	
All other dimensions		X
Materials	X	
Workmanship and Markings		X
All other criteria		X

4.5.3 Periodic Inspection

Periodic inspection shall consist of Groups B and C inspection.

4.5.3.1 Group B Inspection

Group B inspection shall consist of the tests specified in Table 5. Group B inspection shall be made on terminations selected from inspection lots which have passed Group A inspection. Group "B" inspection specimens shall be prepared per 4.4.2.

Table 5 - Group B inspection

Test	Requirement Paragraph	Method Paragraph
Altitude immersion (1 cycle)	3.5.2.5	4.7.5.1
Insulation resistance	3.5.2.2	4.7.2
Dielectric withstanding voltage	3.5.2.3	4.7.3
Voltage drop	3.5.2.1	4.7.1

4.5.3.1.1 Sampling Plan

Sixteen (16) terminations covered by a single detail specification shall be selected 12 months after the date of notification of qualification and after each subsequent 12 month period. This sample shall be selected so as to be representative of all sizes of terminations covered by that detail specification manufactured during the preceding 12 month interval.

4.5.3.1.2 Failures

If 1 or more units fail to pass Group B inspection, the sample shall be considered to have failed.

4.5.3.2 Group C Inspection

Group C inspection shall consist of the examinations and tests specified in Table 6.

Table 6 - Group C inspection

Examination or Test	Requirement Paragraph	Test Method Paragraph
Group I (Uninstalled Terminations) Visual And Dimensional Examination ^{1/}	3.3, 3.5.1.1, 3.6, 3.7	4.6.1
Group II (6 cable assemblies) 1 of each set Visual And Dimensions	3.4 and 3.7	4.6.1
Insulation Resistance	3.5.2.2	4.7.2
Altitude Immersion (1 Cycle)	3.5.2.5	4.7.5.1
Insulation Resistance	3.5.2.2	4.7.2
Altitude Immersion (2 Cycle)	3.5.2.5	4.7.5.1
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1
Tensile Strength	3.5.2.4	4.7.4
Group III (6 cable assemblies) 1 of each set Visual And Dimensions	3.4 and 3.7	4.6.1
Heat Aging	3.5.2.5	4.7.5.5
Insulation Resistance	3.5.2.2	4.7.2
Dielectric Withstanding Voltage	3.5.2.3	4.7.3
Voltage Drop	3.5.2.1	4.7.1

^{1/} Includes certifications that design and materials have not changed since the initial qualification inspection.

4.5.3.2.1 Sampling Plan

As specified in 4.4.3, sample units of each style shall be selected from production lots 36 months after the date of notification, and after each subsequent 36 month period.

4.5.3.2.2 Failures

If 1 or more units fail to pass Group C inspection, the sample shall be considered to have failed.

4.5.3.3 Noncompliance

If a sample fails to pass Group B or Group C inspection, the supplier shall take corrective action on the materials or process, or both, as warranted and on all units of product which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the government, has been taken. After the corrective action has been taken, Group B or Group C inspection, as applicable, shall be repeated on additional units (all inspections, or the inspection which the original sample failed, at the option of the government). Group A inspection may be reinstituted in the event of failure of Group B inspection. Final acceptance shall be withheld until the Group B or Group C reinspection, as applicable, has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the qualifying activity.

4.5.4 Inspection of Preparation for Delivery

The sampling and inspection of the packaging and interior package marking shall be in accordance with Group A quality conformance inspection requirements MIL-STD-2073-1. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with Section 5 and the marking requirements of MIL-STD-129.

4.6 Examinations

4.6.1 Visual and Dimensional Examination

Terminations shall be examined to verify that the materials, design, construction and physical dimensions are in accordance with this specification and the applicable detail specification.

4.6.2 Unrestricted Recovery

The solder preforms shall be removed from the terminations, this can be done by squeezing the preform until it collapses and allowing it to drop out of the termination. Place termination on a clean metallic mandrel having a diameter equal to the minimum cable diameter on which the termination must seal. Suspend mandrel horizontally in an oven at $200\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 5 minutes. Remove from oven and allow to cool, while still suspended, to ambient temperature (see 4.3). When cool, examine parts to ensure that the sealing rings have recovered tightly around mandrel.

4.6.3 Longitudinal Change

Measure the length of the termination to the nearest 0.001 inch. Place terminations in clean aluminum dish and place in an oven at $200\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 5 minutes. Remove from oven and allow to cool. When cool remeasure overall length of termination and calculate longitudinal change.

$$\% \text{ Change} = \frac{L_1 - L_2}{L_1} \times 100$$

where:

L_1 = as supplied length

L_2 = recovered length

4.6.4 Copper Mirror Corrosion

For styles with preinstalled lead, cut lead flush with the end of the termination. For sizes 0.300 inch and larger (as supplied I.D.) the termination shall be cut longitudinally into four sections. For sizes smaller than 0.300 the whole terminations shall be used. The termination or all pieces of cut terminations shall be placed in a clean, dry 1/2 by 12 inch test tube. A copper glass mirror about 1/4 by 1 inch and a calibrated thermometer shall be suspended 6 to 7 inches above the bottom of the test tube by means of a fine, clean copper wire attached to a cork that has been wrapped in clean aluminum foil. A second clean test tube containing only the mirror and thermometer shall be used as a control. The lower 2 inches of the test tube shall be immersed in an oil bath at $121\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ for $16\text{ hours} \pm 0.5\text{ hours}$. The temperature of that portion of the test tube containing the copper mirror shall be below $60\text{ }^{\circ}\text{C}$. After removal from the oil bath and cooling to ambient temperature (see 4.3), visually examine the mirror for areas of transparency by placing it on a white background in good light. The mirrors shall be vacuum deposited copper with a thickness equal to $10\% \pm 5\%$ transmission of normal light of $5000\text{ \AA}$. They shall be stored in a vacuum and shall be used only if no oxide film is present and the copper is not visibly damaged or contaminated.

4.6.5 Wetting

Eight terminations shall be installed on the maximum size cables specified in the detail specification (see 3.1).

4.6.5.1 Unacceptable Termination (Insufficient Heat)

Heat three specimens using a convection heat source and three using an infrared heat source. Carefully observe the solder preform during the heating operation and remove two assemblies from the heat after the solder preform has collapsed but before it has melted. This unacceptable assembly should have the characteristics shown in Figure 1. Examine the exposed cable shield and solder preform for the thermal indicator (see 3.5.1.5.1).

4.6.5.2 Acceptable Termination (Minimum)

After examination of the six unacceptable terminations, return two each to their respective heat sources. Remove from heat at the point where the edges of the solder preform are no longer discernible but the solder has not flowed the full length of the exposed shield and ground lead. This assembly should have the characteristics shown in Figure 2. Examine the soldered area for the thermal indicator (see 3.5.1.5.2).

4.6.5.3 Acceptable Termination (Maximum)

Return the last two unacceptable assemblies to their respective heat sources. Remove from the heat when the contour of the shield braid and ground lead strands become discernible along their full length and a solder fillet is still visible along the shield/ground lead interface. This assembly should have the characteristics shown in Figure 3. Examine the soldered area for the thermal indicator (see 3.5.1.5.3).

4.6.5.4 Typical Termination

The last two specimens shall be heated, one by convection and one by infrared from the initial application of heat until the contour of the shield braid and the ground lead strands become discernible along their full length and a solder fillet is still visible along the shield/ground lead interface. These assemblies should have the characteristics shown in Figure 3.

4.7 Test Methods

4.7.1 Voltage Drop (3.5.2.1)

Assemblies shall be tested as follows:

- a. Test Points: Measurements shall be made by exposing the ground lead conductor and the cable shield on opposite sides of the termination at a point 1/2 inch from the center of the termination.
- b. Measurements: The millivolt drop through the assemblies shall be measured while a current of 1 A is being applied.

4.7.2 Insulation Resistance (3.5.2.2)

Assemblies shall be tested in accordance with Method 302 of MIL-STD-202. The following details shall apply:

- a. Test condition: A.
- b. Conditioning of assemblies: Specimens shall be immersed as specified for 30 minutes prior to start of test (see 4.3.2).
- c. Points of measurement: Between ground-lead and water bath.
- d. Electrification time: 1 minute.

4.7.3 Dielectric Withstanding Voltage (3.5.2.3)

Assemblies shall be tested in accordance with Method 301 of MIL-STD-202. The following details shall apply:

- a. Conditioning of assemblies: Specimens shall be immersed as specified for 30 minutes prior to start of test (see 4.3.2).
- b. Magnitude and nature of potential: 1000 V (RMS).
- c. Points of measurement: Between ground-lead and water bath.

4.7.4 Tensile Strength (3.5.2.4)

The specimen shall be placed in a standard tensile testing machine so that the termination is centered between, at least 2 inches from the jaws. The ground lead shall be clamped in one jaw and the cable on the opposite end of the termination shall be clamped in the other jaw. Sufficient force shall be applied to pull the wire out of the termination or break the wire. The travel speed of the lead shall be 1 inch per minute. The clamping surface of the jaws may be serrated to provide sufficient force.

4.7.5 Environmental Conditioning (3.5.2.5)

The assemblies shall be exposed to the following conditions. After conditioning specimens shall meet the requirements listed in Table 3.

4.7.5.1 Altitude Immersion

The assemblies, immersed as specified, shall be placed in a suitable chamber, the free ends shall be placed in a suitable chamber, the free ends shall be within the chamber, and shall not be sealed (see 4.3.2). The chamber pressure shall be reduced to 75 000 feet (26.78 mm of Hg) and maintained for 30 minutes. The chamber shall then be returned to ambient pressure (see 4.3). This shall constitute 1 cycle. A total of 3 cycles shall be run. The assemblies shall remain immersed until the completion of the dielectric withstanding voltage test (see Table 2).

4.7.5.2 Temperature Cycling

The assemblies shall be tested in accordance with Method 107, test condition F of MIL-STD-202.

4.7.5.3 Moisture Resistance

The assemblies shall be tested in accordance with Method 106 of MIL-STD-202 except sub-cycle 7b shall not be required.

4.7.5.4 Fluid Immersion

The assembly shall be immersed in the fluids specified in Table 7 at the temperature and time period listed.