AEROSPACE STANDARD

AS85485™	REV. D

Issued 2004-06
Revised 2021-03
Stabilized 2021-06

Superseding AS85485C

Cable, Electric, Filter Line,
Radio Frequency Absorptive

FSC 6145

RATIONALE

AS85485 is being stabilized because the committee does not anticipate future technical changes. Filterline cables are considered well-established products. Qualified suppliers are still maintained. Reference changes noted by the suppliers which results in a product change will be addressed by a new revision.

STABILIZED NOTICE

This document has been declared “Stabilized” by the SAE AE-8D Wire and Cable Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AS85485D

1. SCOPE

1.1 Scope

This specification covers the requirements for radio frequency absorptive component wires and finished cables which function electrically as distributed low-pass filters. Materials and construction details are specified in the detail specification.

1.2 Classification

Products in accordance with this specification shall be of the following types, as specified in the detail specification.

Component wire: A single conductor, insulated as specified in the detail specification.

Finished cable: Constructions other than component wire, utilizing a wire or wires with or without shielding, or with or without an outer jacket.

1.2.1 Current Rating

The current rating shall be determined in accordance with AS50881.

1.2.2 Temperature Rating

The maximum conductor temperature of the component wire or finished cable for continuous use shall be as specified in the detail specification.

1.2.3 Voltage Rating

The AS85485 insulation system has been used in aerospace applications using 115 V (phase to neutral), 400 Hz AC, and 28 VDC. Verification of the suitability of this product for use in other electrical system configurations is the responsibility of the user.

1.2.4 Component Wire Designation

Component wire designation shall be as shown in the following example:

M85485 /5 -22 -7L 6
I I I I I_ Color stripe (as applicable)
I I I I __ Primary jacket preferred color (light violet/light purple)
I I I____ Wire size
I I___ Detail specification number (determines conductor type to be used with cable constructions)
I___ Part number designation “M” and basic specification number

1.2.5 Unshielded, Unjacketed, Multi-Component Cable Designation

Unshielded, unjacketed, multi-component cable designations shall be as shown in the following example:

M85485 /7 -22 T 3 A
I I I I I I_ Component marking designation (letter “A” only/see Table 1)
I I I I I_____ Number of cable component wires (2 through 5)
I I I I___ Construction type (T, M, see Table 2)
I I I T – AS85485/5 with tin copper conductor
I I I M – AS85485/6 with silver high strength copper alloy conductor
I I I___ Conductor size
I I_____ Detail specification number
I_____ Part number designation “M” and basic specification number

Table 1 - Component wire marking and color as designated by letter “A”

Component Wire Mark	Number of Component Wires 2/			
First wire: Component wire one (no stripe) 1/ Second wire: Blue stripe	2	3	4	5
Third wire: Orange stripe				
Fourth wire: Green stripe				
Fifth wire: Red stripe				

1/ Cable designation mark shall be applied to only component wire one. Component wire mark on other component wires is not required, but it is permitted (see construction type).
2/ Component type is determined by construction type.

Table 2 - Cable construction types (designated by detail specification number)

Component Detail Specification	Designated Code	Conductor Type
AS85485/5	T	Tin-coated copper
AS85485/9		
Unassigned	S	Silver-coated copper
Unassigned	N	Nickel-coated copper
AS85485/6	M	Silver-coated high-strength copper alloy
AS85485/10		
Unassigned	P	Nickel-coated high-strength copper alloy

1.2.6 Shielded, Jacketed, Multi-Component Cable Designations

Shielded, jacketed, multi-component cable designations shall be as shown in the following example:

M85485 /8 -22 T 3 A
I I I I I I__ Component wire marking designation (see Table 3)
I I I I I_____ Number of cable component wires (1 through 5)
I I I I____ Construction type (T, M, U, V, see Table 4)
I I I T – AS85485/5 with tin coated copper shield
I I I M – AS85485/6 with silver coated high strength copper alloy shield
I I I U – AS85485/6 with tin coated copper shield
I I I V – AS85485/6 with silver coated copper shield
I I I___ Conductor size
I I_____ Detail specification number
I_____ Part number designation “M” and basic specification number

Table 3 - Jacket and component wire stripe colors as designated by letter “A”

Component Wire Mark	Number of Component Wires 2/					Cable Jacket Color
First wire: Component wire one (no stripe) 1/	1	2	3	4	5	Black
Second wire: Blue stripe						
Third wire: Orange stripe						
Fourth wire: Green stripe						
Fifth wire: Red stripe						

1/ Cable designation mark shall be applied to the jacket. Component wire mark is not required, but it is permitted (see construction type).
2/ Component type is determined by the cable construction type.

Table 4 - Cable construction types (designated by detail specification number)

Component Detail Specification	Code	Conductor Type	Shield Type
AS85485/5 AS85485/9	T	Tin-coated copper	Tin-coated copper
Unassigned	S	Silver-coated copper	Silver-coated copper
Unassigned	N	Nickel-coated copper	Nickel-coated copper
AS85485/6 AS85485/10	M	Silver-coated high-strength copper alloy	Silver-coated high-strength copper alloy
Unassigned	P	Nickel-coated high-strength copper alloy	Nickel-coated high-strength copper alloy
AS85485/6 AS85485/10	U	Silver-coated-high-strength copper alloy	Tin-coated copper
AS85485/6 AS85485/10	V	Silver-coated-high-strength copper alloy	Silver-coated copper
Unassigned	W	Nickel-coated high-strength copper alloy	Nickel-coated copper

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.

AMS1424	Fluid, Aircraft Deicing/Anti-Icing, SAE Type 1
AIR4465	Design and Handling Guide Radio Frequency Absorptive Type Wire and Cables (Filter Line, AS85485)
AIR5717	Mitigating Wire Insulation Damage During Processing and Handling
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
AS5768/1	Tool, Stripper, Manually Actuated, Electrical Insulation, Round Wire, Size 10 to 30
AS50881	Wiring Aerospace Vehicle
AS29606	Wire, Electrical, Stranded, Uninsulated Copper, Copper Alloy, or Aluminum, or Thermocouple Extension, General Specification for
AS85485/5*	Cable, Electric, Filter Line, Component Wire, Tin-Coated Copper Conductor, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/6*	Cable, Electric, Filter Line, Component Wire, Silver-Coated High Strength Copper Alloy Conductor, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/7*	Cable, Electric, Filter Line, Unshielded, Unjacketed, Multiple-Component, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/8*	Cable, Electric, Filter Line, Shielded, Jacketed, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/9*	Cable, Electric, Filter Line, Small Diameter Component Wire, Tin-Coated Copper Conductor, Radio Frequency, Absorptive, 150 °C, 600-Volt
AS85485/10*	Cable, Electric, Filter Line, Small Diameter, Component Wire, Silver-Coated High-Strength Copper Alloy Conductor, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/11*	Cable, Electric, Filter Line, Small Diameter, Unshielded, Unjacketed, Multiple-Component, Radio Frequency Absorptive, 150 °C, 600-Volt
AS85485/12*	Cable, Electric, Filter Line, Small Diameter Wire, Shielded, Jacketed, Radio Frequency Absorptive, 150 °C, 600-Volt
AS9003	Inspection and Test Quality Systems Requirements for Aviation, Space, and Defense Organizations

*AS85485 detail specification

2.1.2 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.

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

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 B63 Standard Test Method for Resistivity of Metallically Conducting Resistance and Contact Materials

ASTM D471 Rubber Property-Effects of Liquids

ASTM D770 Isopropyl Alcohol

ASTM D1153 Standard Specification for Methyl Isobutyl Ketone

ASTM D1655 Standard Specification for Aviation Turbine Fuels

ASTM D3032 Standard Test Methods for Hookup Wire Insulation

ASTM D4814 Standard Specification for Automotive Spark-Ignition Engine Fuel

ASTM E104 Standard Recommended Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions

ASTM E595 Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment

2.1.4 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 Calibration of Measuring and Test Equipment, Requirements for

2.1.5 U.S. Government Publications

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

A-A-59921 Cleaning Compound, Aircraft Surface, Type I

FED-STD-228 Methods of Testing Cable and Wire, Insulated

MIL-DTL-915 Cable and Cord Electrical, for Shipboard Use, General Specification for

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

MIL-DTL-12000 Cable, Cord, and Wire, Electric, Packaging of

MIL-DTL-83133 Turbine Fuel, Aviation, Kerosene Types, NATO F-34 (JP-8) and NATO F-35

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

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

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

MIL-PRF-87252 Coolant Fluid, Hydrolytically Stable, Dielectric

MIL-PRF-87937 Cleaning Compound, Aerospace Equipment

MIL-STD-104 Limits for Electrical Insulation Color

MIL-STD-129 Military Marking for Shipment and Storage

MIL-STD-681 Identification Coding and Application of Hook Up and Lead Wire

SAM System for Award Management*

SD-6 Provisions Governing Qualification

*Available from https://www.sam.gov/portal/public/SAM/.

2.2 Definitions

2.2.1 CRITICAL DEFECTS

A critical defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgment and experience indicate is likely to prevent performance of the actual function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

2.2.2 DEFECT

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

2.2.3 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.

2.2.4 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.

2.2.5 AS85485 FILTER LINE APPLICATIONS

AS85485 requirements are specifically designed for aircraft application (refer to AS50881), but may be used in other applications to address signal noise problems.

3. REQUIREMENTS

3.1 Basic and Detail Specifications (see 5.13)

The requirements for the component wire and finished cable furnished under this specification shall be as specified herein and in accordance with the detail specification. In the event of discrepancy between this specification and the requirements of the detail specification, the requirements of the detail specification shall govern.

3.2 Qualification

The component wire or finished cable furnished under this specification shall be a product which is qualified for listing on the applicable qualified products list (see 4.6 and 7.6). The provisions of 4.9 for retention of qualification are included in this requirement.

3.3 Materials

Unless otherwise specified in the detail specification, the wire or cable materials shall be as specified herein. The wire or cable insulation shall contain no additives except those required as wetting agents in suspensoids, pigmentation for colors, and lubricants used in extrusion. Fillers shall be added only when required. The use of reclaimed or recycled insulation material is not prohibited, but if used, the recycled materials shall not have been degraded, shall be free of contaminants, and shall be identical with the original materials in performance.

3.3.1 Conductor Material (see 5.2)

All conductors shall meet the material requirements of AS29606. The wire supplier is responsible for all quality assurance and compliance requirements imposed on the conductor per AS29606. Conductor material data shall be maintained for a minimum of 6 years.

3.3.2 Braided Round Wire Strand Shield Material

Braided round wire strands shall meet all the applicable conductor material requirements of AS29606 prior to braiding (see 3.3.1).

3.3.3 Insulation Material

All insulating and filter layer materials shall be in accordance with the detail specification and shall meet all applicable requirements of Table 9 and the detail specification.

3.4 Construction

Construction of the component wire and finished cable shall be as specified herein and in the detail specification.

3.4.1 Uninsulated Conductor Construction (see 5.2)

The conductor construction prior to the application of the insulation shall be in accordance with AS29606. In the event of a conflict between AS29606 and the detail specification, the detail specification shall take precedence.

3.4.2 Insulated Conductor Splice (see 5.3)

Insulated conductor splices shall meet the requirement of AS29606.

3.4.3 Insulated Conductor Elongation and Breaking Strength (see 5.8)

Unless otherwise specified in the detail specification, the insulated conductor elongation and tensile break strength shall be in accordance with AS29606.

3.4.4 Insulated Conductor Construction (see 5.13)

The insulated conductor diameter, strand count, and strand diameter shall be in accordance with AS29606 and as listed in the detail specification. Applicability of the “general purpose” or of the “small diameter” requirements for maximum conductor diameter shall be as indicated in the detail specification.

3.4.5 Shield Construction (see 5.13)

The shield shall be constructed as specified in the detail specification.

3.4.6 Insulation Construction and Stripping (5.13)

The insulating and filter layers shall be constructed as specified in the detail specification. All component insulation shall be readily removable by an AS5768/1 tool without damage to the conductor.

3.4.7 Cable Jacket Construction and Stripping (see 5.13)

The cable jacket shall be constructed as specified in the detail specification and removable without damage to the shield.

3.5 Component Wire and Finished Cable (see 5.13)

The component wire and finished cable shall conform to the requirements of Table 9 and those of the detail specification. The requirements of 3.5.1 through 3.5.31 also apply. Unless otherwise specified, component wire shall conform to all applicable requirements prior to assembly into the finished cable.

3.5.1 Blocking (see 5.6)

Adjacent turns or layers of the component wire or cable jacket shall not stick to one another when tested as specified in 5.6 at the temperature specified in the detail specification.

3.5.2 Cabling (see 5.13)

The required number of component wires as specified in the detail specification shall be cabled together with a left hand lay. For cables having multiple layers, the outer layer shall be left hand and the inner layer or layers may be either right hand or left hand lay. The lay length of the individual component wires shall be not less than eight times nor more than 16 times the diameter of the applicable layer. Fillers and binders shall be used only as specified in the detail specification.

3.5.3 Color (see 5.13)

The color of component wire shall be light violet, designated by 7L, unless otherwise specified. All solid colors and the colors of all striping shall be in accordance with MIL-STD-104, Class 1. Color stripes shall conform to MIL-STD-681.

3.5.4 Crosslinking Proof Test and Life Cycle (see 5.11)

When samples are tested in accordance with 5.11, there shall be no cracking of the insulation or jacket and no dielectric breakdown, as applicable.

3.5.5 Electrical Conductor and Shield Continuity (see 5.13)

One hundred percent of all finished cable shall be tested for electrical continuity prior to shipment. There shall be no indication of electrical discontinuity in any of the component wires or shields.

3.5.6 Continuous Lengths (see 5.10)

The individual continuous lengths of component wire or finished cable in each inspection lot shall be of such footage that, when inspected in accordance with 5.10, the inspection lot shall conform to the continuous length requirements of Table 5. Unless otherwise specified in the contract or order, the footage of the individual continuous lengths in each spool or reel shall be marked on the spool or reel in the sequence in which the lengths will be unwound by the user.

Table 5 - Minimum continuous lengths

Product Description	Required Minimum Percent of the Total Inspection Lot Footage in Continuous Lengths Greater Than		
	250 feet	100 feet	50 feet
Component Wire	85%	100%	--
Finished Cable	--	85%	100%

3.5.7 Identification of Product (see 5.13)

The identification of product printed mark shall consist of the following information:

a. Detail specification part identification number (PIN) as shown in 1.2.4 through 1.2.6, unless otherwise specified.

b. Manufacturer's identification in accordance with the manufacturer's commercial and government entity (CAGE) listed in "SAM."

c. For finished shielded and jacketed cable, the words "FILTER LINE" shall follow the manufacturer's code.

3.5.8 Part Identification Number (PIN) Mark Application (see 5.13)

The PIN application shall consist of the following:

a. The component wire or jacket and shielded cable shall be identified by a printed PIN mark applied to the outer surface, or visible through the outer surface, of the wire or cable insulation.

b. PIN marking of unshielded, unjacketed cable shall be located on component number 1.

c. PIN marking of components of shielded and jacketed finished cable shall not be required.

d. Printing of the PIN color code designator on surface of component wire insulation jacket (see 1.2.4) is not required.

e. Printing of the PIN color code designator on surface of twisted cable or jacket and shielded cable shall be covered by the letter designation "A" (see 1.2.5 and 1.2.6).

f. For the component wire, the PIN shall be at intervals of 9 to 60 inches, as measured from the beginning of one complete marking to the beginning of the succeeding completed marking.

g. For unshielded, unjacketed, and jacket shielded cables, the distance between the end of one complete Identification of Product mark and the beginning of the next complete mark shall not be greater than 12 inches.

h. The Identification of Product printing shall be white in color in accordance with MIL-STD-104, Class 1. Identification printing shall be applied with the vertical axes of the printed characters lengthwise of the component wire or jacket and shielded cable when the nominal diameter is 0.050 inch or smaller. The vertical axes of the printed characters may be either crosswise or lengthwise of the component wire or finished cable when the nominal diameter exceeds 0.050 inch. All printed characters shall be complete and legible.

3.5.9 Durability of Identification of Product and Color Stripe (see 5.12)

Identification of product printing and color stripe, when applied to the outer surface of the component wire or jacket and shielded cable, where applicable, shall be capable of withstanding the durability test specified in 5.12.2 for the number of cycles and with the weight specified in the detail specification.

3.5.10 Insulation and Jacket Flaws (see 5.18)

When required by the detail specification, 100% of the component wire and finished cable shall pass the spark test or the impulse dielectric test of 5.18. Testing of finished component wire or cable shall be performed during the final winding on shipment spools or reels. Component wire intended for finished cable shall be tested prior to cabling.

3.5.11 Workmanship (see 5.13)

All details of workmanship shall be in accordance with high grade wire and cable manufacturing practice. The insulation shall be free of cracks, splits, irregularities, and imbedded foreign material.

3.5.12 Wrap Test (5.29)

There shall be no cracking or splitting of the insulation when tested in accordance with 5.29 at the temperature and for the time specified in the detail specification.

3.5.13 Jacket Resistivity (see 5.1)

When tested in accordance with 5.1, the jacket resistivity value for conductive jackets shall be 150 Ω-cm, maximum.

3.5.14 Attenuation or Insertion Loss Component Wire Only (see 5.4)

When specified in the detail specification, attenuation (insertion loss) shall be performed in accordance with 5.4.

3.5.15 Low Temperature - Cold Bend (see 5.20)

When samples are tested in accordance with 5.20, there shall be no cracking of the insulation or jacket and no dielectric breakdown.

3.5.16 Bend Test - Post-Environmental (see 5.5)

When sample is tested in accordance with 5.5, there shall be no cracking of the insulation or jacket.

3.5.17 Component and Cable Jacket Concentricity and Wall Thickness (see 5.7)

When specified in the detail specification, the concentricity and wall thickness shall be performed in accordance with 5.7.

3.5.18 Conductor Resistance (see 5.9)

The conductor resistance value shall be in accordance with the detail specification when tested in accordance with 5.9.

3.5.19 Flammability (see 5.14)

The length of flame travel and time of burning shall be as specified in the detail specification when tested in accordance with 5.14.

3.5.20 Humidity Resistance (see 5.15)

The component wire insulation resistance value shall be in accordance with the detail specification after exposure to the humidity in accordance with 5.15.

3.5.21 Immersion (see 5.16)

After fluid exposure in accordance with 5.16, the component wire or finished cable diameter percent change shall be 5% maximum. There shall be no cracking or splitting of the insulation material. The component wire and cable shall have no dielectric breakdown.

3.5.22 Insulation and Jacket Elongation and Tensile Strength (see 5.17)

The insulation elongation and tensile strength value shall be in accordance with the detail specification when tested in accordance with 5.17.

3.5.23 Insulation Resistance (see 5.19)

The insulation resistance value shall be in accordance with the detail specification when tested in accordance with 5.19.

3.5.24 Shield Coverage (see 5.21)

The shield coverage value shall be in accordance with the detail specification when tested in accordance with 5.21.

3.5.25 Shrinkage (see 5.22)

The shrinkage value shall be in accordance with the detail specification when tested in accordance with 5.22.

3.5.26 Voltage Withstand (see 5.27)

When applicable, the voltage withstand value (volts) shall be specified in the detail specification and performed in accordance with 5.27.

3.5.27 Smoke (see 5.23)

The component wire shall show no indication of visible smoke at the conductor temperature specified in the detail specification when tested in accordance with 5.23.

3.5.28 Surface Resistance (see 5.24)

The surface resistance value shall be in accordance with the detail specification when tested in accordance with 5.24.

3.5.29 Thermal Shock Resistance (see 5.25)

The thermal shock resistance oven temperature and the maximum change in insulation movement shall be as specified in the detail specification when tested in accordance with 5.25.

3.5.30 Thermal Stability (See 5.26)

The thermal stability test shall be perfomed in accordance with 5.26. The voltage withstand test value and stop band attenuation test value shall be in accordance with the detail specification.

3.5.31 Weight (see 5.28)

The component wire or cable shall not exceed the weight specified in the detail specification when tested in accordance with 5.28.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

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

4.2 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.

4.3 Test Equipment and Inspection Facilities

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 NCSL Z540-3 or equivalent standards.

4.4 AS9003 Quality Assurance Compliance

The supplier's quality assurance program for wire production shall comply with the AS9003 inspection and test quality system. Independent certification of the processes is not required. 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 supplier to provide evidence of compliance to AS9003. The qualifying activity (QA) authority reserves the right to monitor, measure, and validate compliance at their discretion.

4.5 Classification of Inspections

The examinations and tests of component wire and finished cable under this specification shall be divided into the classifications shown in Table 6.

Table 6 - Quality assurance classification

Classification	Paragraph
Qualification inspection	4.6
Quality conformance inspection	4.7
Process control inspection	4.8
Retention of Qualification	4.9

4.5.1 Inspection Conditions

Unless otherwise specified herein or in the detail specification, all measurements and tests shall be made at temperatures of 15 to 35 °C (59 to 95 °F) at air pressure of 650 to 800 mm Hg, and a relative humidity of 45 to 75%. Whenever these conditions must be closely controlled in order to obtain more reproducible results, the temperature, relative humidity, and atmospheric pressure conditions of 25 +0, -2 °C (77 +0, -3.6 °F), 50% ± 12% relative humidity, and 650 to 800 mm Hg shall be used.

4.6 Initial Qualification Inspection

Initial qualification inspection shall consist of the examination and tests listed in Table 9 of this specification as applicable to the component wire or finished cable. Qualification approval for finished cable must be obtained both for the component wire and for the finished construction. The qualifying activity (see 7.6) is required to perform or witness the tests as indicated in Table 9 and the manufacturer shall perform the remaining tests. All test laboratories require qualifying activity approval.

4.6.1 Initial Qualification Inspection Procedure

A request for qualification shall be made to the qualifying activity (see 7.6) prior to initiating testing. Testing cannot begin until the manufacturer has received an authorization letter. The manufacturer is recommended to provide the qualifying activity a test plan based on the authorization letter to ensure the manufacturer and qualifying activity maintain communication and document changes as needed. The qualifying activity shall not approve a component that does not meet the requirements specified herein. The qualifying activity has the authority to impose specific specification test requirements to resolve test failures/discrepancies and to waive testing to verify specific product manufacturing changes or qualifications by similarity (see 4.6.4). Any change in the manufacturer's process control inspections, quality conformance inspections, or manufacturing control drawings (editorial changes are acceptable) without the express approval of the qualifying activity may result in loss of qualification for that product.

4.6.2 Initial Qualification Test Reports

The qualifying activity shall provide the manufacturer a data package of all designated tests specified in Table 9. The qualifying activity test method procedures shall be made available to the manufacturer upon request. The manufacturer shall provide a test report to the qualifying activity for the designated tests specified in Table 9. The test report shall be signed by the manufacturing authority responsible for ensuring compliance to the specification requirements. The manufacturer may combine the qualifying activity test data with the manufacturer's test data into one final test report. The final test report and/or data package shall remain on file with the manufacturer for a minimum period of 6 years and be available to the qualifying activity upon request. The manufacturer test report shall contain as a minimum the following information:

a. Copy of all certifications specified herein.

b. The quantitative results for tests specified in Table 9 and the authorization letter.

c. A tabulated comparison between the insulation and conductor construction herein and each manufacturing control drawing for components qualified by similarity.

d. Corrective action reports (as applicable).

4.6.3 Qualification Samples

For qualification testing, a wire length shall be obtained from a normal production run (see 7.6.3). If a normal production wire sample is not available, the manufacturer shall produce a sample with the same materials, manufacturing procedures, and methods of inspection as would be used to provide the wire to a purchaser. Except as provided in 4.6.4, a component wire or finished cable sample of the required length shall be tested for each range of component wire or finished cable sizes for which qualification is desired. The sample may be any size of component wire or finished cable within the size range specified below. Within each size range for which qualification is desired for shielded, jacketed cable, both a single conductor and a multiple-conductor finished cable sample must be tested if they fall within that size range. Ten linear feet of the coated conductor strand used in the manufacture of the finished wire sample shall be submitted with the finished wire sample.

Table 7 - Component wire sampling

Component Wire Size Range	Required Length of Sample (Feet)
24 and smaller	200
22 through 18	200
16 and larger	200

Table 8 - Jacketed and shielded cable sampling

Finished Cable Size Range Nominal Overall Diameter (Inches)	Required Length of Sample (Feet)
≤0.100	100
>0.100 and ≤0.150	
>0.150 and ≤0.225	
>0.225	

4.6.4 Optional Qualification Samples (Qualification by Similarity)

In cases where two or more detail specifications cover component wire or finished cable identical in materials and construction except for conductor and/or shield material (i.e., the specified conductor or shield may be tin-coated copper, silver-coated high strength copper alloy, or as specified in the detail specification), the component wire or finished cable sample in accordance with 4.6.3 may qualify any one of the detail specification components. For those detail specifications so qualified by similarity, a conductor and/or strand shall be tested in accordance with the applicable conductor and/or strand requirements in Table 9. One conductor and/or strand shall be tested for each size range specified in 4.6.3. Approval of the qualification sample shall also qualify the same component wire or finished cable size range or ranges in each of the other detail specifications. Ten linear feet of the conductor strand and shield strand applicable to the same wire or cable size range as the finished wire or cable samples shall be submitted when qualification by similarity is requested. (Note: For purposes of determining identity of construction in detail specifications under this provision, small differences in specified component wire or finished cable diameter or weight which are due to differences in the specified conductor or shield shall not be considered as constituting differences in construction of the component wire or finished cable.)

Table 9 - Properties of component wire and finished cable

Examination or Test	Requirement	Method
Component Wire		
Blocking 1/	3.5.1	5.6
Color	3.5.3	5.13
Insulated conductor construction	3.4.4	5.13
Concentricity	3.5.17	5.7
Attenuation or insertion loss component wire only	3.5.14	5.4
Insulated conductor elongation and breaking strength	3.4.3	5.8
Conductor material	3.3.1	5.2
Conductor resistance	3.5.18	5.9
Insulated conductor splices	3.4.2	5.3
Insulated conductor stranding	3.4.4	5.13
Construction and materials	3.3, 3.4, and 3.5	5.13
Continuous lengths	3.5.6	5.10
Crosslinking proof test 1/	3.5.4	5.11
Durability of identification of product and color stripe 1/	3.5.9	5.12
Flammability	3.5.19	5.14
Humidity resistance 1/	3.5.20	5.15
Identification of product 1/	3.5.7	5.13
Immersion	3.5.21	5.16
Insulation elongation and tensile strength	3.5.22	5.17
Insulation and jacket flaws	3.5.10	5.18
Insulation resistance	3.5.23	5.19
Insulation thickness 1/	3.5.17	5.7
Life cycle 1/	3.5.4	5.11
Low temperature - cold bend 1/	3.5.15	5.20
Removability of insulation	3.4.6	5.13
Shrinkage 1/	3.5.25	5.22
Smoke	3.5.27	5.23
Surface resistance	3.5.28	5.24
Thermal shock resistance 1/	3.5.29	5.25
Thermal stability 1/	3.5.30	5.26
Voltage withstand (post-environmental)	3.5.26	5.27.2
Weight	3.5.31	5.28
Workmanship	3.5.11	5.13
Wrap 1/	3.5.12	5.29
Finished Cable		
Blocking 1/	3.5.1	5.6
Cabling	3.5.2	5.13
Color	3.5.3	5.13
Concentricity	3.5.17	5.7
Conductor and shield continuity	3.5.5	5.13
Construction and materials	3.3, 3.4, and 3.5	5.13
Continuous lengths	3.5.6	5.10
Crosslinking proof test 1/	3.5.4	5.11
Durability of identification of product and color stripe 1/	3.5.9	5.12
Finished cable diameter 1/	3.5	5.13

Examination or Test	Requirement	Method
Flammability	3.5.19	5.14
Identification of product 1/	3.5.7	5.13
Immersion	3.5.21	5.16
Jacket elongation and tensile strength 1/	3.5.22	5.17
Insulation and jacket flaws	3.5.10	5.18
Jacket resistivity 1/	3.5.13	5.1
Jacket thickness 1/	3.5.17	5.7
Life cycle 1/	3.5.4	5.11
Low temperature-cold bend 1/	3.5.15	5.20
Removability of cable jacket 1/	3.4.7	5.13
Shield coverage and angle 1/	3.5.24	5.21
Thermal stability 1/	3.5.30	5.26
Voltage withstand (dielectric)	3.5.26	5.27.1
Voltage withstand (post-environmental)	3.5.26	5.27.2
Weight 1/	3.5.31	5.28
Workmanship	3.5.11	5.13

1/ Tests shall be performed by the qualifying activity.

4.6.5 Forwarding of Qualification Samples

A duplicate group of qualification samples from the same lot as required for manufacturer tests and the manufacturer's certified test report shall be forwarded to the testing laboratory designated in the letter of authorization from the activity responsible for qualification (see 7.6), plainly identified by securely attached, durable tags marked with the following information:

a. Sample for qualification test.

b. Cable, electric, filter line, radio frequency absorptive.

c. Detail specification part number.

d. Manufacturer's name and code number as listed in SAM.

e. Manufacturer's part number.

f. Comprehensive description and manufacturer's name and formulation number of the base materials from which the product is made. (This information will not be divulged by the qualifying activity.)

g. Place and date of manufacture of sample.

h. Submitted by (name) (date) for qualification tests in accordance with the requirements of AS85485 under authorization (refer to authorizing letter).

i. The tags or spools must be stamped by the qualifying activity representative as representative samples of the manufacturer's normal production capability. Samples submitted without the stamp will not be accepted.

4.7 Quality Conformance Inspection

Quality conformance inspection shall consist of the examinations and tests listed in Table 10 and described under Section 5. Quality conformance inspection shall be performed on every lot of component wire or finished cable procured under this specification.

4.7.1 Sampling for Quality Conformance Inspection

ANSI/ASQC Z1.4 shall apply for definitions of inspection terms used herein. For purposes of this specification, the following shall apply:

a. The inspection lot shall include all component wire or finished cable of one part number subjected to inspection at one time.

b. The unit of product for determining lot size for sampling shall be one continuous length of component wire or finished cable as offered for inspection.

c. Sample Unit (Groups I and II Tests)

The sample unit for Groups I and II tests, except for the Group I insulation resistance test, shall consist of a single piece of component wire or finished cable chosen at random from the inspection lot and of sufficient length to permit all applicable examinations and tests. Unless otherwise specified, the length of the sample unit for Group I tests of Table 10, other than insulation resistance, shall be 20 feet and the length of the sample unit for Group II tests shall be 25 feet. Not more than one sample unit for each group of tests shall be taken from a single unit of product.

d. Sample Unit for Insulation Resistance Test (Group I)

The sample unit for the Group I insulation resistance test shall be a specimen at least 26 feet in length selected at random from component wire which has passed the Group III insulation flaws test. It is optional whether the specimen is tested on the reel or removed from the reel for the test, provided the length of the specimen can be determined.

e. Inspection Levels and Acceptable Quality Levels (AQL) (Groups I and II Tests)

For Group I characteristics, including the insulation resistance test, the inspection level shall be S-2 and the AQL shall be 6.5% defective units in accordance with ANSI/ASQC Z1.4. For Group II characteristics, the inspection level shall be S-3 and the AQL shall be 1.5% defective units. Major and minor defects shall be as defined herein (see 2.2).

f. Sampling and Acceptance for the Group III Tests

The sample for the Group III tests shall be 100% of the component wire or finished cable and every length of the wire or cable shall be subjected fully to these tests. Insulation breakdowns resulting from the test and ends or portions not subjected to the test shall be cut out of the component wire or finished cable.

g. Sampling and Acceptability for Group IV Examination

The inspection level and acceptance quality level for continuous lengths examination shall be as required by 5.10.

4.7.2 Nonconforming Inspection Lots

Disposition of inspection lots found unacceptable under initial quality conformance inspection shall be in accordance with ANSI/ASQC Z1.4.

Table 10 - Quality conformance inspection

Examination or Test	Requirement	Method
Group I Characteristics		
Cabling	3.5.2	5.13
Color	3.5.3	5.13
Component wire diameter	3.5	5.13
Conductor diameter	3.4.4	5.13
Conductor elongation and breaking strength	3.4.3	5.8
Conductor resistance 1/	3.5.18	5.9
Conductor stranding	3.4.4	5.13
Durability of marking and color stripe	3.5.9	5.12
Finished cable diameter	3.5	5.13
Identification of product	3.5.7	5.13
Insulation elongation and tensile strength	3.5.22	5.17
Insulation resistance 1/	3.5.23	5.19
Removability of insulation	3.4.6	5.13
Shield coverage and angle	3.5.24	5.21
Weight 1/	3.5.31	5.28
Workmanship	3.5.11	5.13
Group II Characteristics		
Attenuation or Insertion Loss (component wire only)	3.5.14	5.4
Concentricity	3.5.17	5.7
Crosslinking proof test	3.5.4	5.11
Flammability 1/	3.5.19	5.14
Insulation thickness	3.5.17	5.7
Jacket resistivity	3.5.13	5.1
Jacket thickness	3.5.17	5.7
Removability of cable jacket 1/	3.4.7	5.13
Low temperature - cold bend 1/	3.5.15	5.20
Shrinkage	3.5.25	5.22
Thermal shock resistance	3.5.29	5.25
Voltage withstand (post-environmental) 1/	3.5.26	5.27.2
Wrap test	3.5.12	5.29
Group III Characteristics		
Conductor and shield continuity	3.5.5	5.13
Insulation and jacket flaws	3.5.10	5.18
Voltage withstand (dielectric)	3.5.26	5.27.1
Group IV Characteristics		
Continuous lengths (component wires)	3.5.6	5.10

1/ When approved by the qualifying activity, the test is not required if controlled materials have remained unchanged since the previous retention of qualification period (see 4.9). There is no time limit on the waivers except as noted in Table 12.

4.8 Process Control Inspection

This inspection comprises tests and examinations of such a nature that the tests cannot be performed on the component wire or finished cable as submitted for inspection and therefore must be conducted at the most appropriate stage of the manufacturing operations. The process control tests shall consist of the tests listed in Table 11. Process control inspection shall be performed on every lot of component wire or finished cable procured under this specification.

Table 11 - Process control inspection

Examination or Test	Requirement	Method
Conductor material	3.3.1	5.2
Conductor splices	3.4.2	5.3
Construction and materials	3.3, 3.4, and 3.5	5.13
Spark test of primary insulation (when specified)	3.5.10	5.18

4.8.1 Sampling for Process Control Inspection

a. Conductor Material

From each week's production of individual coated strands or from every 1000 pounds of such strands, whichever is less, three 10-foot lengths of strand shall be selected in such a manner as to be representative of the material to be used in the component wire.

b. Insulation Material

Three samples representative of each inspection lot shall be selected after extrusion.

c. Insulated Conductor Splices

The method of conductor splicing shall be in accordance with 3.4.2. At the discretion of the qualifying activity representative, the method may be observed.

d. Spark Test of Primary Insulation

When a spark test of the primary insulation is required (3.5.10), the test sample shall be 100% of the wire after application of the primary insulation and prior to application of any other material. One hundred percent of the wire shall be tested at this stage in production. Portions showing dielectric breakdown under test shall be cut out and testing of the balance of production shall be resumed.

4.8.2 Rejection and Retest in Process Control Inspection

When a sample selected from a production run fails to meet the specified tests, no items still on hand or later produced shall be accepted until the extent and cause of the failure have been determined. After investigation, the qualified manufacturer shall advise the user activity and qualifying activity of the action taken and, after corrections have been made, shall repeat all the process control tests. Rejection after corrective action will require that the qualified manufacturer advise the qualifying activity of the details surrounding the retest and cause for rejection. Nonconformities of primary insulation in the spark test shall be handled as provided in 5.18.1.

4.8.3 Effect of Process Control Failure on Quality Conformance Testing

Quality conformance testing may be continued during the investigation of the failure of a process control sample, but final acceptance of the material shall not be made until it is determined that the lot meets all the process control requirements and quality conformance requirements of the specification.

4.9 Retention of Qualification

Periodic qualification re-evaluations shall be made at 3-year intervals after the date of the qualification test reference specified in the letter of notification of the product's acceptability for qualification. The manufacturer shall not begin retention of qualification until notified by the qualifying activity. The manufacturer shall perform the tests in Tables 10 and 11. The qualifying activity shall perform the retention of qualification tests in Table 12. The qualifying activity may shift the reporting date to accommodate testing schedules, but no later than 18 months from the retention of qualification due date. Failure of the manufacturer to submit retention of qualification test report or certification within 30 days after the end of the reporting period may result in the removal of the product or products from the Qualified Products List (QPL).

Table 12 - Tests applicable only to qualification inspection and qualification re-evaluation

Examination or Test	Requirement	Method
Blocking 1/	3.5.1	5.6
Component Wire		
Cross linking proof test	3.5.4	5.11
Insulation elongation and tensile strength	3.5.22	5.17
Shrinkage	3.5.25	5.22
Finished Cable		
Cross linking proof test	3.5.4	5.11
Durability of marking and color striping	3.5.9	5.12
Jacket elongation and tensile strength	3.5.22	5.17
Jacket resistivity	3.5.13	5.1
Low temperature-cold bend	3.5.15	5.20
Humidity resistance 1/	3.5.20	5.15
Immersion 1/	3.5.21	5.16
Life cycle	3.5.4	5.11
Smoke 1/	3.5.27	5.23
Surface resistance	3.5.28	5.24
Thermal stability	3.5.30	5.26

1/ Test is not required if the manufacturer submits material certifications and certify that the materials have remained unchanged since the previous retention of qualification submittal. If materials have changed, the manufacturer will perform the tests waived in Table 10 and qualifying activity shall perform the tests in Table 12. Material certification waivers in Table 12 are only permitted for one retention qualification period (6-year interval).

4.9.1 Retention of Qualification Procedure

a. Manufacturer Responsibility

It shall be the responsibility of the qualified manufacturer to furnish to the qualifying activity, at 3-year intervals, the data necessary to establish the continued conformity of the product to all qualification requirements. The data shall be complete test results of a sample representative of current production. The manufacturer shall provide a test report to the qualifying activity for the tests specified in Table 10. The manufacturer test report shall be signed by the manufacturing authority responsible for ensuring compliance to the specification requirements. The manufacturer test report and qualifying activity data package shall remain on file with the manufacturer for a minimum period of 6 years and be available to the qualifying activity upon request.

b. Qualifying Activity Responsibility

The qualifying activity shall provide the manufacturer a data package of all tests performed in accordance with Table 12. The qualifying activity test method procedures shall be made available to the manufacturer upon request.

c. Retention of Qualification Sample

A sample shall be selected from each component wire and each cable detail specification except as permitted by 4.6.4. The sample shall be from the range of sizes 30 through 10. At the discretion of the qualifying activity, test records from current production may be accepted for the re-evaluation to the extent the samples are available. Samples from current production need be subjected to only the tests for which no production test records are available. The samples, each 200 feet long, and test reports with supporting data shall be submitted to the qualifying activity as specified in 4.6.5. All conductor and strand samples shall be 10 feet long.

d. Retention of Qualification Test Report

The manufacturer test report shall contain as a minimum a summary of quality conformance inspection pass or fail results for tests specified in Table 10 and the authorization letter. If qualification by similarity is authorized, the report shall include a tabulated comparison between wire or cable detail specification construction (dimensions and materials) being qualified and manufacturer drawings for the wire or cable.

e. Corrective Action Report (As Applicable)

If a failure occurs, no product represented by the sample nor any other product manufactured with the same materials and processes, which has not already been submitted for quality conformance inspection, shall be offered for acceptance until the cause for failure has been determined and concurred in by the qualifying activity as not affecting the ability of the product to pass qualification inspection requirements. In the event the date for re-evaluation has passed, the manufacturer shall still be considered, but final acceptance of product from such a manufacturer is contingent upon his product meeting all the qualifying requirements of the specification.

4.9.2 Material and Process Changes During Retention of Qualification Intervals

Except for changes approved by the purchase order, the wire supplied under purchase order shall be the same material formulations, material sources, and manufacturing processes as approved by the qualifying activity. It is the responsibility of the wire manufacturer to notify the qualifying activity when materials, material formulations, and manufacturing processes need to be changed. The wire manufacturer is responsible for verifying and documenting all performance characteristics including quality conformance and qualification requirements. The changes are categorized as minor and major.

a. Minor Change

To address a minor change, the manufacturer will provide written notification of the change to the qualifying activity and maintain documentation of compliance. The qualifying activity may request results of product testing to confirm compliance and approve the change under the existing qualification. A minor change includes modification of processing additives, colorants, braids, finishers, coatings, and inks. It also includes manufacturing process parameters, integrating processes, and relocating equipment within the qualified manufacturing site.

b. Major Change

To address a major change, a request for change will be submitted to the qualifying activity. The qualifying activity will provide authorization to proceed and define the qualification submittal and third party testing in accordance with Table 9. All qualification tests identified shall be performed, either by the wire manufacturer, the qualifying activity, or an approved third party laboratory at the discretion of the qualifying activity. A major change includes the conductor source and formulation and the modification of insulating material to include resin change, source change (new resin producer), or alternate production location for the resin.

5. TEST METHODS

5.1 Jacket Resistivity Test

A 6-inch specimen of conductive jacket material shall be prepared by removing the jacket from the cable. The jacket may be pulled from the end of the cable as a tube, or it may be slit longitudinally and removed. The resistivity of the jacket material shall be determined in accordance with ASTM B63 with the 6-inch specimen.

5.2 Conductor Material and Construction Prior to Insulation Application Test

The conductor construction prior to insulation application shall be tested in accordance with AS29606. Tests may be performed by the conductor manufacturer, but the detail results shall be provided to the insulation manufacturer upon request. Conductor manufacturer certification may be used as an alternative to the test results.

5.3 Insulated Conductor Splice Test

Conductor splices in the wire shall be certified in conformance with AS29606.

5.4 Attenuation or Insertion Loss Component Wire Only Test

The configuration of specimen and test equipment for determining attenuation is shown in Figure 1. Matching pads shall be used, when specified, to reduce measurement SWR. The cable under test and the matching pads, if required, are connected between a signal generator and a detector. The matching pads should have a characteristic impedance of 50 Ω ± 2 Ω on one end, and Z_0 ± 10% on the other end, where Z_0 is the characteristic impedance of the cable configuration under test, as determined by MIL-DTL-915. Unless otherwise specified, single conductor cables shall be measured between conductor and shield and cables of two or more conductors shall be tested between one conductor, and all other shields and conductors grounded together at both ends of the cable specimen.

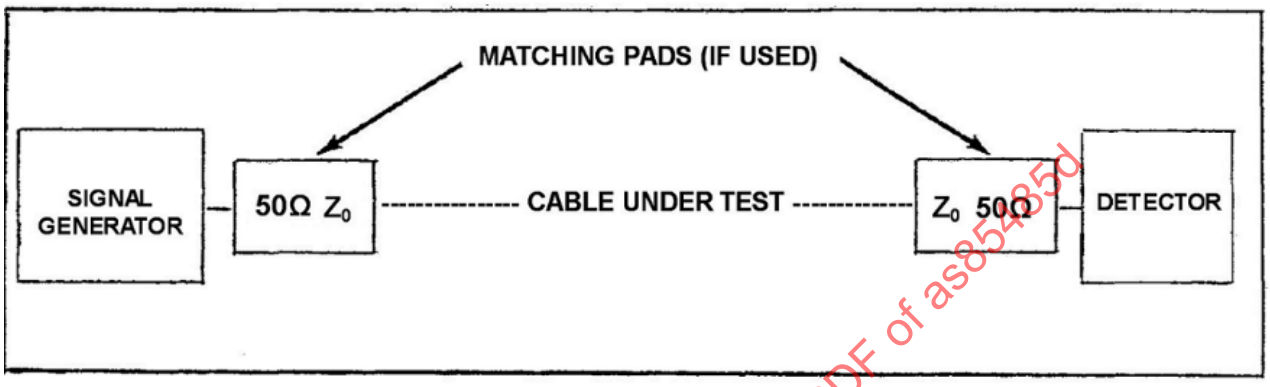

Figure 1 - Configuration of specimen and test equipment

5.4.1 Measurement Procedure

The measuring system shall be configured as shown in Figure 1. Connect the Z_0 ends of the matching pads together. If matching pads are not used, connect the signal generator to the detector. At each test frequency, record the detector reading. Designate this reading V_0. Then separate the matching pads (or signal generator and detector) and insert the cable to be tested. Again, record the detector reading at each test frequency. Designate this reading V_1. Designate the length of cable tested L (feet). The raw attenuation data at each test frequency is given by:

$$\text{Attenuation (dB/foot)} = \frac{20}{L} \text{Log}_{10} \left[\frac{V_0}{V_1} \right] \quad \text{(Eq. 1)}$$

Measurements shall be made at a minimum of ten frequencies per decade, shall be spaced in a reasonably uniform manner throughout the decade, and shall include both the beginning and the end of the decade.

5.4.2 Band Pass Measurement

The band pass frequency range shall be 0.1 to 10 MHz. The length of cable used shall be sufficient to produce an attenuation of at least 14 dB/100 feet at 10 MHz. An 80- to 100-foot length will usually be suitable. A standard regression analysis shall be performed on the raw attenuation data derived from Equation 1, expressed in dB/100 feet. The regression analysis is used to smooth out SWR effects. The regression polynomial used shall be:

$$A(f) = a_1 \sqrt{f} + a_2 f \quad \text{(Eq. 2)}$$

where:

f = frequency in MHz

a1, a2 = coefficients determined by regression analysis

A(f) = attenuation in dB/100 feet at frequency (f)

Using the coefficients a_1 and a_2 determined by the regression analysis, calculate the attenuation A(f) using Equation 2 at the frequencies specified in the detail specification. These values shall be designated as the pass band cable attenuation.

5.4.3 Transition Band Measurement

The transition band frequency range shall be 10 to 1000 MHz. More than one cable length may be necessary to obtain accurate attenuation data for the entire band. An appropriate range of specimen lengths will be 6 to 120 inches. A standard regression analysis shall be performed on the raw data given by Equation 1. The regression polynomial used shall be:

$$B(f) = b_0 + b_1 f + b_2 f^2 + b_3 f^3 \quad \text{(Eq. 3)}$$

where:

f = frequency in MHz

b0, b1, b2, b3 = coefficients determined by regression analysis

B(f) = attenuation in dB/foot at frequency (f)

Data points falling in the noise level of the measuring system may be excluded from the regression analysis, provided that the noise level is numerically greater than 100 dB/foot. If more than one cable length is used, and if the data sets taken on the various cable lengths overlap, then any disparity between data sets should be resolved by using the data from the longer length in the regression analysis. Using the coefficients b_0, b_1, b_2, and b_3 determined by the regression analysis, calculate the attenuation B(f) using Equation 3 at the frequencies specified in the detail specification. These values shall be designated as the transition band cable attenuation.

5.4.4 Stop Band Measurement

The stop band frequency range shall be 1 to 12 GHz. The length of cable shall be 6 inches. The measured values of attenuation as determined by Equation 1 shall be designated as the stop band cable attenuation.

5.5 Bend Test - Post-Environmental

At a temperature maintained between 20 °C and 25 °C (68 °F and 77 °F), one end of a component wire or finished cable specimen shall be secured to the mandrel and the other end to the weight specified. For component wire, the mandrel and weight shall be as specified in the detail specification. For finished cable specimens, the mandrel shall be as specified in Table 13 and sufficient weight shall be used to maintain contact with the mandrel. The mandrel shall be rotated until the full length of the specimen is wrapped around the mandrel and is under the specified tension with adjoining turns in contact. The mandrel then shall be rotated in the reverse direction until the full length of the specimen which was outside during the first wrapping is now next to the mandrel. This procedure shall be repeated until two bends in each direction have been formed in the same section of the specimen. The specimen then shall be examined for cracking of the insulation or jacket, as applicable.

Table 13 - Mandrel diameters for cables for bend test, crosslinking proof test, immersion, life cycle, and low temperature-cold bend

Finished Cable Diameter (Inches)	Mandrel Diameter (Inches)
≤0.125	3
>0.125 and ≤0.250	6
>0.250 and ≤0.360	10
>0.360 and ≤0.750	18
>0.750 and ≤1.200	30
>1.200 and ≤2.000	48

5.6 Blocking Test

One end of a piece of component wire or finished cable, of sufficient length to perform the test, shall be affixed to a mandrel. The mandrel size shall be determined based upon the component wire or finished cable diameter and using the corresponding mandrel size as specified for bend testing in Table 13. The specimen shall then be wound helically on the mandrel for at least three turns, with the succeeding turns in close contact with one another. The tension for winding component wire shall be equal to the test load specified for the cold bend test of the same size wire in the detail specification and for finished cable shall be of sufficient weight to keep the cable in contact with the mandrel. The winding shall be continued until there are at least three closely wound layers of such helical turns on the mandrel. The free end of the specimen shall then be affixed to the mandrel so as to prevent unwinding or loosening of the turns or layers and the mandrel and specimen shall be placed for 6 hours in an air-circulating oven at the temperature specified on the detail specification. At the end of the 6-hour period, the mandrel and specimen shall be removed from the oven and allowed to cool to room temperature. After cooling, the specimen shall be unwound manually, meanwhile being examined for evidence of adhesion (blocking) of adjacent turns or layers.

5.7 Component and Cable Jacket Concentricity and Wall Thickness Test

The concentricity of finished cable jacket and of component primary insulation and jacket shall be determined in accordance with the procedures of 5.7.1 and 5.7.2, as applicable. All wall thickness measurements shall be made on cross sections of the component wire or cable jacket under suitable magnification.

5.7.1 Component Wire Layers

The concentricity of the component wire layers shall be determined by locating and recording the minimum and maximum wall thickness on a cross section of the component wire. The wall thickness shall be the shortest distance between the outer rim of the layer and the outer rim of the underlying layer or conductor. The percent concentricity is defined as 100 times the ratio of the minimum wall thickness to the maximum wall thickness. The average wall thickness is defined as the mean of the maximum and minimum wall thicknesses.

5.7.2 Cable Jacket

The concentricity of the finished cable jacket shall be determined by first locating and recording the minimum wall thickness measured on a cross section of the jacket. The maximum wall thickness of this same cross section of the jacket shall be measured and recorded. For cable jackets, 100 times the ratio of the minimum wall thickness to the maximum wall thickness shall define the concentricity.

5.8 Insulated Conductor Elongation and Breaking Strength Test

5.8.1 Soft or annealed copper conductor elongation tests shall be performed in accordance with Method 3211 of FED-STD-228. For wire sizes 20 and larger, the tests shall be performed upon individual strands taken from the conductor of the component wire. For sizes 22 and smaller, the tests shall be performed upon the whole conductor removed from the component wire and the elongation shall be measured when the first strand of the conductor breaks. For wire sizes 20 and larger, only the values obtained with individual strands shall be considered and, for wire sizes 22 and smaller, only the values obtained with the whole conductor shall be considered in determining the conformance of soft or annealed copper conductors to elongation requirements of this specification.

5.8.2 High-strength alloy conductor elongation and breaking strength tests shall be performed in accordance with Method 3212 of FED-STD-228, except that the tensile strength shall be reported as the breaking strength of the conductor rather than in pounds per square inch. The tests shall be performed upon the whole conductor removed from the component wire. Conductor elongation shall be measured when the first strand of the conductor breaks, and the total tensile force indicated by the testing machine at break of that strand shall be regarded as the breaking strength of the conductor. Only the values thus obtained with the whole conductor shall be considered in determining the conformity of high-strength alloy conductors to the elongation and breaking strength requirements of this specification.

5.9 Conductor Resistance Test

The DC resistance of the conductor shall be measured in accordance with Method 6021 of FED-STD-228, except that the component wire shall be tested dry without immersion.

5.10 Continuous Lengths Test

Unless otherwise specified in the ordering data (7.5), the inspection requirements for continuous component wire lengths shall be satisfied by the manufacturer's certificate of conformity and the presence of the required piece length markings on the spools or reels (3.5.6). However, the purchaser reserves the right to examine such certified lots if deemed necessary to assure that the lengths actually conform to requirement. When the ordering data specifies examination of the component wire lengths, the purchaser representative shall examine the wire at his/her own discretion to determine conformity in this characteristic. In measuring continuous component wire lengths where the wire has been marked or stripped of insulation in lieu of being cut to mark insulation failures or identify untested or improperly tested areas (5.18.2), such marking or stripping shall be considered equivalent to complete severance of the wire at the two ends of each marked or stripped area.

5.11 Crosslinking Proof Test and Life Cycle Test

5.11.1 Component Wire Test

For component wire, 1 inch of insulation shall be removed from each end of a 24-inch specimen. The central portion of the specimen then shall be bent at least halfway around a horizontally positioned smooth stainless steel mandrel of the diameter specified in the detail specification. To prevent sticking of the specimen to the mandrel, the mandrel shall be covered with a dispersion coating of polytetrafluoroethylene. Each end of the conductor shall be loaded with the weight specified in the detail specification so that the portion of the insulation between the conductor and mandrel is under compression while the conductor is under tension. The specimen, so prepared on the mandrel, shall be conditioned in an air-circulating oven for the time and at the temperature specified in the detail specification. The velocity of air past the specimens (measured at room temperature) shall be between 100 ft/min and 200 ft/min. After conditioning, the oven shall be shut off, the door opened, and the specimens allowed to cool in the oven for at least 1 hour. When cool, the specimens shall be freed from tension, removed from the mandrel, and straightened. The component wire then shall be subjected to the bend test (5.5) followed by the voltage withstand test (5.27.2).

5.11.2 Finished Cable Test

For finished cable, 2 inches of jacket shall be removed from each end of a 24-inch specimen. If the cable is shielded, the shield shall be pushed back and formed into a pigtail at each end of the specimen so that it will not interfere with other preparations. One inch of the insulation of each of the component wires then shall be removed from each end of the specimen. The conductors shall be tied together at each end and loaded with weights equal to 0.5 times the number of conductors times the test load specified for the component wire. Weights shall not be hung on the shield. The central portion of the specimen then shall be bent at least halfway around a horizontally positioned smooth stainless steel mandrel of the diameter specified in Table 13. To prevent sticking of the specimen to the mandrel, the mandrel shall be covered with a dispersion coating of polytetrafluoroethylene. The specimen, so prepared on the mandrel, shall be conditioned in an air-circulating oven for the time and at the temperature specified in the applicable detail specification. The velocity of air past the specimens (measured at room temperature) shall be between 100 ft/min and 200 ft/min. After conditioning, the oven shall be shut off, the door opened, and the specimens allowed to cool in the oven for at least 1 hour. When cool, the specimens shall be freed from tension, removed from the mandrel, and straightened. The finished cable specimens then shall be subjected to the bend test (5.5) followed by the voltage withstand test (5.27.2).

5.12 Durability of Marking and Color Striping Test

The durability of product identification or color markings shall be evaluated at 20 to 25 °C (68 to 77 °F).

5.12.1 Durability Test Equipment

The marking durability tester shall be designed to hold a short specimen firmly clamped in a horizontal position with the upper longitudinal surface of the specimen fully exposed. The instrument shall be capable of rubbing a small cylindrical steel mandrel, which shall be a sewing needle 0.025 inch in diameter, repeatedly over the upper surface of the specimen, in such a position that the longitudinal axes of the mandrel and the specimen are at right angles to each other with cylindrical surfaces in contact. A weight affixed to a jig above the mandrel shall control the thrust exerted normal to the surface of the insulation. A motor driven, reciprocating cam mechanism and counter shall be used to deliver an accurate number of abrading strokes in a direction parallel to the axis of the specimen. The length of the stroke shall be 3/8 inch and the frequency shall be 120 strokes (60 stroking cycles) per minute.

5.12.2 Durability Test

To perform the test a specimen shall be mounted in the specimen clamp and the weight specified in the detail specification shall be applied through the abrading mandrel to the marked surface. The counter shall be set at zero and the drive motor started. The specimen shall be subjected to the number of strokes of the mandrel specified in the detail specification and shall then be examined. If a continuous line of solid color insulation coating or of the stripe, band, or printed marking, as applicable, has been erased or obliterated by the mandrel, the specimen shall be considered as having failed. Three specimens shall be tested from each sample unit, and failure of any specimen shall constitute failure of the sample unit.

5.13 Examination of Product

All samples shall be examined carefully to determine conformance to this specification and to the detail specifications with regard to requirements not covered by specific test methods. To verify electrical continuity a resistance tester shall be connected to each end of the same conductor or shield on the finished component or cable.

5.14 Flammability Test

Flammability shall be tested in accordance with Method B (60 degrees) of ASTM D3032 using a 30 second flame application.

5.15 Humidity Resistance

5.15.1 Specimen

A 52-foot specimen of component wire shall be subjected to the humidity resistance test.

5.15.2 Test Chamber

The apparatus shall consist of a test chamber capable of maintaining an internal temperature of 70 °C ± 2 °C (158 °F ± 3.6 °F) and an internal relative humidity of 95% ± 5%. The test chamber shall be capable of being so sealed as to retain the total moisture content in the test space. The heat loss from the chamber shall be sufficient to reduce the internal temperature from the above specified operating temperature to not more than 38 °C (100.4 °F) within a period of 16 hours from the time of removal of the source of heat. Distilled or demineralized water shall be used to obtain the required humidity.

5.15.3 Test Procedure

To perform the test, the specimen shall be placed in the test chamber and the temperature and relative humidity raised over a 2-hour period to the values specified in 5.15.2 and maintained at such for a period of 6 hours. At the end of the 6-hour period the heat shall be shut off. During the following 16-hour period, the temperature must drop to 38 °C (100.4 °F) or lower. At the end of the 16-hour period, heat shall be again supplied for a 2-hour period to stabilize at 70 °C ± 2 °C (158 °F ± 3.6 °F). This cycle (2 hours heating, 6 hours at high temperature, 16 hours cooling) shall be repeated a sufficient number of times to extend the total time of the test to 360 hours (15 cycles). At the end of the fifteenth cycle, the 50-foot center section of the specimen shall be immersed in a 5%, by weight, solution of sodium chloride in water at room temperature. The insulation resistance of the specimen shall be measured with the outer surface of the specimen grounded, through an electrode in the electrolyte, and with a potential of 250 to 500 VDC applied to the conductor of the specimen after 1 minute of electrification at this potential. The insulation resistance shall be converted to megohms for 1000 feet by the calculation shown in 5.19.

5.16 Immersion Test

Specimens of component wire or finished cable of sufficient length to perform the subsequent tests shall be measured at their midpoints to determine their initial diameters and then shall be immersed to within 6 inches of their ends in each of the fluids (using a separate specimen for each fluid) for the time and at the temperature specified in Table 14. During immersion, the radius of bend of the specimens shall be not less than 14 times, nor more than 35 times, the specified maximum diameter of the component wire or finished cable under test. Upon removal from the fluids, the specimen shall remain for 1 hour in free air at room temperature. The diameters then shall be re-measured at the original point of measurement and compared to the initial diameters. The percent change in diameter then shall be calculated. For component wire, 1 inch of insulation shall be removed from each end of a 24-inch length of each specimen. For finished cable, 2 inches of the jacket shall be removed from each end of a 24-inch length of each specimen. If applicable, the shield shall be pushed back and formed into a pigtail at each end of the specimen. One inch of the insulation of each of the component wires then shall be removed from each end of the specimen. The specimens then shall be subjected to the bend test (5.5), followed by the voltage withstand test (5.27.2).

Table 14 - Immersion test fluids

Test Fluid		Test Temperature	Immersion Time
(a)	MIL-PRF-23699, Lubricating Oil, Aircraft Turbine Engine, Synthetic Base	48 to 50 °C (118 to 122 °F)	20 hours
(b)	MIL-PRF-5606, Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance	48 to 50 °C (118 to 122 °F)	20 hours
(c)	ASTM D770, Isopropyl Alcohol	18 to 20 °C (64 to 72 °F)	168 hours
(d)	MIL-DTL-5624, Turbine Fuel, Aviation, Grade JP-4; or MIL-DTL-83133, Turbine Fuel JP-8; or Jet A, ASTM D1655 Aviation Turbine Fuels	20 to 25 °C (68 to 77 °F)	168 hours
(e)	AMS1424, Fluid, Deicing/Anti-Icing, Aircraft Fluid, Undiluted	48 to 50 °C (118 to 122 °F)	20 hours
(f)	AMS1424, Fluid, Deicing/Anti-Icing, Aircraft Diluted 60/40 (Fluid/Water) Ratio	48 to 50 °C (118 to 122 °F)	20 hours
(g)	A-A-59921, Cleaning Compound, Aircraft Surface, Type I	48 to 50 °C (118 to 122 °F)	20 hours
(h)	ASTM D1153, Methyl Isobutyl Ketone (for Use in Organic Coatings)	20 to 25 °C (68 to 77 °F)	168 hours
(i)	AS1241, Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft	48 to 50 °C (118 to 122 °F)	20 hours
(j)	MIL-PRF-7808, Lubricating Oil, Aircraft Turbine Engine, Synthetic Base	118 to 121 °C (244 to 250 °F)	30 minutes
(k)	MIL-PRF-87937, Cleaning Compound, Aerospace Equipment, Type II or Type IV Undiluted	63 to 68 °C (145 to 154 °F)	20 hours
(l)	MIL-PRF-87937 Cleaning Compound, Aerospace Equipment, Type II or Type IV Diluted 25/75 (Fluid/Water) Ratio	63 to 68 °C (145 to 154 °F)	20 hours
(m)	ASTM D471, Standard Test Method for Rubber Property, Fuel A	20 to 25 °C (68 to 77 °F)	168 hours
(n)	ASTM D471, Standard Test Method for Rubber Property, Fuel D	20 to 25 °C (68 to 77 °F)	168 hours
(o)	ASTM D471, Standard Test Method for Rubber Property, Oil Number 1	20 to 25 °C (68 to 77 °F)	168 hours
(p)	MIL-PRF-87252, Silicate Ester or Equivalent	20 to 25 °C (68 to 77 °F)	168 hours
(q)	ASTM D4814, Gasoline, Automotive, Combat	20 to 25 °C (68 to 77 °F)	168 hours

5.17 Insulation and Jacket Elongation and Tensile Strength Test

Specimens of the entire component insulation shall be carefully removed from the conductor and tested for tensile strength and elongation in accordance with FED-STD-228, Methods 3021 and 3031, respectively, using 1-inch bench marks, a 1-inch initial jaw separation, and a jaw separation speed of 2 in/min. For finished cable insulation, the method shall be the same, but only the cable jacket shall be tested.

5.18 Insulation and Jacket Flaws Test

5.18.1 Spark Test

For the spark test of component insulation or cable jacket the component wire or finished cable shall be passed through a bead chain electrode spark test device using the voltage and frequency specified in the detail specification. The conductor and shield, as applicable, shall be grounded at one or both ends. The electrode shall be of a suitable bead chain or fine mesh construction that will give intimate metallic contact with practically all the insulation surface. Electrode length and speed of specimen movement shall be such that the insulation is subjected to the test voltage for a minimum of 0.2 second. Any portion showing insulation breakdown shall be cut out including at least 2 inches of wire or cable on each side of the failure.

5.18.2 Impulse Dielectric Test

For the impulse dielectric test of component insulation or cable jacket the component wire or finished cable shall be tested in accordance with ASTM D3032, Section 13, Method A at the voltage specified in the detail specification. For finished cable the conductor and shield, as applicable, shall be grounded at one or both ends. When specified in the contract or order (7.5.2d) dielectric failure, untested portions, or portions which have been exposed to fewer or more than the specified number of pulses may be marked by stripping the insulation or by any other suitable method of marking as specified in the contract in lieu of being cut out of the wire or cable.

5.18.3 Impulse Dielectric Test Alternative

As an alternative to 5.18.2, testing may be performed in accordance with ASTM D3032, Section 13, Method B, with the following changes:

a. As a minimum, subject the wire or cable to no less than six positive and negative crests of supply voltage (ASTM D3032 requires a minimum of 18 positive and negative crests).

b. Use 0.25 mm ± 0.005 mm for a spacing between the plate and the wire (ASTM D3032 uses 0.15 mm).

5.19 Insulation Resistance Test

The uninsulated ends of a component wire specimen at least 26 feet in length shall be connected to a positive DC terminal and the specimen shall be immersed to within 6 inches of its ends in a water bath, at 25 °C ± 5 °C (77 °F ± 9 °F), containing 0.5 to 1.0% of an anionic wetting agent. The specimen shall remain immersed for not less than 4 hours, after which a potential of not less than 250 V or more than 500 V shall be applied between the conductor and the water bath which serves as the second electrode. The insulation resistance shall be determined after 1 minute of electrification at this potential, and shall be expressed as megohms for 1000 feet by the following calculation:

$$\text{Megohms for 1000 feet} = \frac{\text{Specimen resistance (megohms)} \times \text{immersed length (feet)}}{1000} \quad \text{(Eq. 4)}$$

5.20 Low Temperature - Cold Bend

One end of the component wire or finished cable specimen 36 inches in length shall be secured to a rotatable mandrel in a cold chamber and the other end to the load weight specified in the detail specification for component wire and to a load weight sufficient to keep the cable vertical and tangent for finished cable. The diameter of the mandrel shall be as specified in the detail specification for component wire, and as specified in Table 13 for finished cable. Provision shall be made for rotating the mandrel by means of a handle or control located outside the chamber. The specimen and the mandrel shall be conditioned for the time and at the temperature specified in the detail specification. At the end of this period and while both mandrel and specimen are still at this low temperature, the specimen shall be wrapped helically for 20 turns for component wires and for five turns for finished cables, or its entire length, whichever is the lesser number of turns, around the mandrel without opening the chamber. The bending shall be accomplished at a uniform rate of 2 rpm ± 1 rpm. At the completion of this test, the specimen shall be removed from the cold box and from the mandrel without straightening. The specimen shall be examined without magnification, for cracks in the insulation. For component wire, 1 inch of insulation shall be removed from each end of the specimen. For finished cable, 2 inches of the jacket shall be removed from each end of the specimen and, if applicable, the shield shall be pushed back and formed into a pigtail at each end. One inch of the insulation of each of the component wires then shall be removed from each end of the specimen. The specimens then shall be subjected to the voltage withstand test specified in 5.27.2 with the bent portion submerged.

5.21 Shield Coverage

The percent coverage of the braid shall be determined by the following formula:

$$K = (2F - F^2) \times 100 \quad \text{(Eq. 5)}$$

where:

K = percent coverage

F = $EPd_2/\sin \alpha$

P = picks per inch of cable length

α = angle of braid with axis of cable

E = number of strands per carrier

d_1 = diameter of one of the round shield strands or thickness of flattened strand

d_2 = diameter of one of the round shield strands or width of flattened strand

$$\tan \alpha = 2\pi(D + 2d_1) P / C \quad \text{(Eq. 6)}$$

where:

C = number of carriers

b = component wire diameter

B = geometry factor of Table 15

D = diameter of cable under shield; for seven components or less:

$$D = Bb \quad \text{(Eq. 7)}$$

where:

D = average measured diameter of cable under shield for more than seven components

Table 15 - Cable geometry factor (B)

Number of Components	Factor (B)
1	1.0
2	1.8
3	2.1
4	2.4
5	2.7
6	3.0
7	3.0

5.22 Shrinkage

A 12-inch specimen of component wire shall be cut so that the insulation and conductor are flush at both ends. The specimen shall then be aged at the temperature specified in the detail specification for 6 hours in an air-circulating oven. At the end of this period, the specimen shall be removed from the oven and allowed to return to room temperature. Shrinkage of the insulation shall then be measured as the greatest distance which any layer of the insulation has receded from either end of the conductor; that is, the measurement obtained at the end showing the greater shrinkage shall be considered the shrinkage of the specimen.

5.23 Smoke Test

This test shall be conducted in still air at an ambient temperature of 25 °C ± 5 °C (77 °F ± 9 °F). A specimen approximately 15 feet long of component wire shall be so suspended that at least the central 10-foot section is horizontal and unsupported. One end of the wire shall be suitably weighted in order that no sagging will occur throughout the test. An electric current shall be applied to the wire, and the voltage drop measured over the central 10-foot portion. From the current and voltage values, the resistance of the wire shall be calculated. The temperature of the wire conductor shall be determined from the change in resistance. The current shall be so adjusted that the conductor temperature stabilizes at the temperature specified in the detail specification. This conductor temperature shall be thus maintained for 15 minutes during which time it shall be examined for visible smoke. A flat-black background shall be used for this test.

5.24 Surface Resistance Test

The surface resistance of the component wire shall be measured using the procedure of FED-STD-228, Method 6041, except that the required humidity shall be maintained per ASTM E104, Method A and without instrumentation of the chamber. All specimens, after attachment of the required electrodes, shall be cleaned by the procedure described in the test method. The specimens shall be positioned in the test chamber so that their ends are at least 1 inch from any wall of the chamber.

5.25 Thermal Shock Resistance Test

5.25.1 Preparation of Specimen

A specimen of component wire five feet long shall be prepared by carefully removing 1 inch of insulation from each end of the wire. A specimen of finished cable five feet long shall be prepared by cutting the component wires, shield, and jacket flush at each end, then carefully removing 1 inch of jacket from each end of the cable. A razor blade or equivalent, held perpendicular to the axis of the wire, shall be used to cut the insulation or jacket for the removal operation. The distance between the end of the conductor and the insulation or jacket at each end of the specimen shall be measured to the nearest 0.01 inch. The specimen shall be formed into a loose coil not less than 1 foot in diameter and shall be laid on a wire screen for handling throughout the test.

5.25.2 Test Procedure

For the test procedure, the specimen shall be placed for 30 minutes in a preheated air-circulating oven at the temperature specified in the detail specification. The specimen shall then be removed from the oven and, within 2 minutes, placed in a chamber which has been precooled to -55 °C ± 2 °C (-67 °F ± 3.6 °F). It shall be exposed to this temperature for 30 minutes, after which it shall be removed and allowed a minimum of 30 minutes to return to room temperature, 20 to 25 °C (68 to 77 °F). At the conclusion of this cycle, the distance from the end of each layer of insulation, or jacket for finished cable specimens, to the end of the conductor shall be measured to the nearest 0.01 inch. This thermal shock cycle and the measurements shall be repeated for an additional three cycles (a total of four cycles). Any measurement varying from the original measurement by more than the amount specified in the detail specification shall constitute failure. Any flaring of any layer shall also constitute failure.

5.26 Thermal Stability Test

A 10-foot sample of cable shall be formed into a loose coil approximately 1 foot in diameter and aged in a circulating air oven for the time and temperature specified in the detail specification. The velocity of air past the sample (measured at room temperature) shall be between 100 ft/min and 200 ft/min. After aging, the sample shall be allowed to cool to room temperature and shall then be subjected to the voltage withstand test of 5.27.2. A 6-inch specimen shall then be cut from the center of the 10-foot sample. This 6-inch specimen shall be used to determine the stop band attenuation of the aged cable in accordance with 5.4.4.

5.27 Voltage Withstand Test

5.27.1 Voltage Withstand (Dielectric) Test

Voltage withstand (dielectric) test shall be performed upon 100% of all finished cable by applying the specified voltage between each conductor or shield in turn and all the other conductors and shield which shall be tied together and grounded. The test voltage shall be as specified in the detail specification and the time of electrification shall be not less than 15 seconds or more than 30 seconds.

5.27.2 Wet Voltage Withstand (Post-Environmental) Test

The wet voltage withstand test specimen after an environmental test shall be immersed in a 5%, by weight, solution of sodium chloride in water at 20 to 25 °C (68 to 77 °F), except that the uninsulated ends and 1.5 inches of insulated wire or cable at each end of the specimen shall protrude above the surface of the solution. After immersion for 5 hours, the voltage specified in the detail specification shall be applied between the conductor, or the shield as applicable, and an electrode in contact with the liquid. The voltage shall be gradually increased at a uniform rate from zero to the specified voltage in 0.5 minute, maintained at that voltage for a period of 5 minutes for component wire specimens and 1 minute for finished cable specimens, and gradually reduced to zero in 0.5 minute.

5.28 Weight

The weight of each lot of component wire or finished cable shall be determined by Procedure I. Lots failing to meet the weight requirement of the detail specification when tested in accordance with Procedure I shall be subjected to Procedure II. All reels or spools failing to meet the requirements of the detail specification when tested by Procedure II shall be rejected. The sampling plans of 4.7.1 are not applicable in Procedure II.

5.28.1 Procedure I

The length and weight of a specimen at least 10 feet long shall be accurately measured and the resultant measurements converted to pounds per 1000 feet.