

CABLE, ELECTRIC, FILTER LINE

1. SCOPE

1.1 SCOPE

This specification covers finished cable and cable components for use as low pass filters to replace standard airframe interconnect wiring for aerospace vehicles and other applications.

1.2 CLASSIFICATION

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

Component Wire: A single conductor, insulated as specified in the applicable specification sheet.

Finished Cable: Any construction other than component wire, utilizing a wire or wires with or without shielding, and with or without an outer jacket.

1.2.1 Temperature Rating

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

2. APPLICABLE DOCUMENTS

2.1 GOVERNMENT-FURNISHED DOCUMENTS

The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1.1 Department of Defense

SPECIFICATIONS

Military

MIL-C-85485 Cable, Electric, Filter Line, Radio Frequency Absorptive

STANDARDS

Military

MIL-STD-104 Limits for Electrical Insulation Color

(Copies of Department of Defense documents may be obtained from the Naval Publications and Forms Center, Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Ave., Philadelphia, PA 19111-5094; or at <http://assist.daps.dla.mil/quicksearch/>.)

2.2 OTHER PUBLICATIONS

The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.2.1 American National Standards Institute (ANSI)

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

(Copies of ASQ documents may be obtained from the ASQ Distribution Center, 5131 S. Third Street, Milwaukee, WI 53207-6028; or at www.asq.org.)

2.2.2 International Organization for Standardization (ISO)

8402 Quality Management and Quality Assurance - Vocabulary

(Copies of ISO documents may be obtained from the International Organization for Standardization; or at www.iso.org.)

3. REQUIREMENTS

3.1 SPECIFICATION SHEETS

The requirements for the component wire and finished cable furnished under this specification shall be as specified herein and in accordance with the applicable specification sheet. In the event of a conflict, the requirements of the specification sheet shall govern.

3.2 QUALIFICATION

The component wire and finished cable furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein (see 4.2).

3.3 CONSTRUCTION AND MATERIALS

Materials not specifically designated herein shall be of the quality and form best suited for the purpose intended. Unless otherwise specified, the materials shall meet the following requirements:

3.3.1 Conductors

Conductor material and construction shall be in accordance with MIL-C-85485 and the applicable specification sheet.

3.3.2 Shields

Shield material and construction shall be in accordance with MIL-C-85485 and the applicable specification sheet. Round braided shields shall have an angle 18 to 40 degrees relative to the axis of the cable.

3.3.3 Insulating Materials

Insulating materials, used for wire insulation or cable jackets, shall be in accordance with MIL-C-85485 and the applicable specification sheet.

3.3.4 Wraps

Tape wraps, where specified in the applicable specification sheet, shall be applied with an overlap of 25 percent, minimum, and shall meet the material and construction requirements of the applicable specification sheet. Overlap is defined as the percentage of tape width covered by successive turns of tape.

3.4 IN-PROCESS

3.4.1 Insulation Flaws

One hundred percent of the wire shall pass the impulse dielectric test or the spark test of MIL-C-85485 at any designated point or points in the manufacturing process prior to completion of the component wire using the voltage specified in the applicable specification sheet.

3.5 COMPONENT WIRE AND FINISHED CABLE

3.5.1 Component Wire

Component wire shall conform to the requirements of Table 1 and to those of the applicable specification sheet.

3.5.2 Finished Cable

Finished cable shall conform to the requirements of Table 2 and to those of the applicable specification sheet. Component wires used in the cable shall conform to the requirements of 3.5.1, prior to cabling.

3.5.3 Cabling

The required number of components as specified in the applicable specification sheet 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 components in the outer layer shall be not less than eight nor more than sixteen times the outside diameter of the cable bundle.

3.5.4 Crosslinking Proof Test and Life Cycle

When finished cable is tested in accordance with 4.5.2, there shall be no cracking of the jacket and, when applicable, no dielectric breakdown of the jacket.

3.5.5 Identification and Color Striping Durability

When required by the specification sheet, identification printing and color striping of the finished cable jacket shall be capable of withstanding the identification and color striping durability test of MIL-C-85485 for the number of cycles and with the weight specified in the applicable specification sheet.

3.5.6 Identification of Product

When specified by the procuring activity, component wire or finished cable shall be identified by a marking applied to the outer surface. The identification shall consist of the appropriate mark as specified by the contract or the applicable specification sheet. The mark color shall be in accordance with MIL-STD-104, Class 1, and shall be contrasting to that of the marking surface. Identification shall be applied with the vertical axis of the printed characters parallel to the longitudinal axis of the wire or cable when the nominal diameter of the marking surface is 0.050 inch (1.3 mm) or smaller. The vertical axis of the printed characters may be either perpendicular or parallel to the longitudinal axis of the wire or cable when the nominal diameter of the marking surface exceeds 0.050 inch (1.3 mm).

3.5.7 Immersion

When finished cable is tested in accordance with 4.5.5, the diameter increase shall be not more than 5 percent, there shall be no cracking of the jacket and, when applicable, there shall be no dielectric breakdown of the jacket.

3.5.8 Insulation Flaws

One hundred percent of component wire and unshielded, unjacketed cable shall pass the impulse dielectric test or the spark test of MIL-C-85485 using the voltage specified in the applicable specification sheet. Testing shall be performed during the final winding of the wire or cable on shipment spools or reels.

3.5.9 Jacket Concentricity

When finished cable is tested in accordance with MIL-C-85485, the jacket concentricity shall be not less than 70 percent.

3.5.10 Jacket Flaws

When required by the applicable specification sheet, one hundred percent of finished shielded and jacketed cable shall pass the jacket flaws test of MIL-C-85485 using the voltage specified in the applicable specification sheet. Testing shall be performed during the final winding of the cable on shipment spools or reels.

3.5.11 Jacket Flexure Endurance

When required by the specification sheet and tested in accordance with 4.5.7, there shall be no cracking of the jacket.

3.5.12 Jacket Resistivity

When finished cable is tested in accordance with MIL-C-85485, the jacket resistivity for conductive jackets shall be 150 ohm-cm, maximum.

3.5.13 Low Temperature-Cold Bend

When finished cable is tested in accordance with 4.5.8, there shall be no cracking of the jacket and, when applicable, no dielectric breakdown of the jacket.

3.5.14 Thermal Stability

When component wire is tested in accordance with 4.5.9, there shall be no dielectric breakdown during the voltage withstand (dielectric) test and the stop band attenuation requirements for the applicable component wire size shall be met. There shall be no cracking of the insulation after the bend test and no dielectric breakdown during the voltage withstand (post environmental) test.

3.5.15 Weight Loss

When required by the specification sheet and tested in accordance with 4.5.10, specimens of cable with woven or spiral, round or flat, shielding shall not exceed a weight loss of 0.45 percent.

3.5.16 Wrap Test

When component wire is tested in accordance with 4.5.11, there shall be no cracking of the insulation.

TABLE 1. PROPERTIES OF COMPONENT WIRE

Examination or Test	Requirement	Test Method	*Test Type
Attenuation (Insertion Loss)	Specification Sheet	MIL-C-85485	2
Blocking	Specification Sheet and MIL-C-85485	MIL-C-85485	Q
Color	Specification Sheet and MIL-C-85485	4.5.3	1
Component Wire Diameter	Specification Sheet	4.5.3	1
Concentricity	Specification Sheet	4.5.1	2
Conductor Diameter	Specification Sheet	4.5.3	1
Conductor Elongation and Breaking Strength	Specification Sheet or MIL-C-85485	MIL-C-85485	1
Conductor Resistance	Specification Sheet	MIL-C-85485	1
Conductor Splices	MIL-C-85485	4.5.3	1
Conductor Stranding	Specification Sheet and MIL-C-85485	4.5.3	1
Construction and Materials	Specification Sheet and 3.3	4.5.3	1
Crosslinking Proof Test	Specification Sheet and MIL-C-85485	MIL-C-85485	2
Flammability	Specification Sheet	MIL-C-85485	2
Fluoride Extraction	Specification Sheet	4.5.4	Q
Humidity Resistance	Specification Sheet	MIL-C-85485	Q
Identification and Color Striping Durability	Specification Sheet	MIL-C-85485	1
Identification of Product	Specification Sheet and 3.5.6	4.5.3	1
Immersion	Specification Sheet	MIL-C-85485	Q
Insulation Elongation and Tensile Strength	Specification Sheet	MIL-C-85485	1
Insulation Flaws	Specification Sheet and 3.5.8	MIL-C-85485	3
Insulation Resistance	Specification Sheet	4.5.6	1
Insulation Thickness	Specification Sheet	4.5.3	2
Life Cycle	Specification Sheet and MIL-C-85485	MIL-C-85485	Q
Low Temperature-Cold Bend	Specification Sheet and MIL-C-85485	MIL-C-85485	2
Removability of Insulation	MIL-C-85485	MIL-C-85485	1
Shrinkage	Specification Sheet	MIL-C-85485	2
Smoke	Specification Sheet	MIL-C-85485	Q
Surface Resistance	Specification Sheet	MIL-C-85485	Q
Thermal Shock Resistance	Specification Sheet	MIL-C-85485	2
Thermal Stability	Specification Sheet and 3.5.14	4.5.9	Q
Vacuum Stability	Specification Sheet	MIL-C-85485	Q
Weight	Specification Sheet	MIL-C-85485	1
Workmanship	MIL-C-85485	MIL-C-85485	1
Wrap Test	Specification Sheet and 3.5.16	4.5.11	2

*Test Type:

- 1 = Quality Conformance Test, Group 1 (see 4.3)
- 2 = Quality Conformance Test, Group 2 (see 4.3)
- 3 = Quality Conformance Test, Group 3 (see 4.3)
- Q = Qualification Test (see 4.2)

TABLE 2. PROPERTIES OF FINISHED CABLE

Examination or Test	Requirement	Test Method	*Test Type
Blocking	Specification Sheet and MIL-C-85485	MIL-C-85485	Q
Cabling	Specification Sheet and 3.5.3	4.5.3	1
Conductor and Shield Continuity	MIL-C-85485	MIL-C-85485	3
Construction and Materials	Specification Sheet and 3.3	4.5.3	1
Crosslinking Proof Test	Specification Sheet and 3.5.4	4.5.2	2
Dimensions	Specification Sheet	4.5.3	1
Flammability	Specification Sheet	MIL-C-85485	2
Fluoride Extraction	Specification Sheet	4.5.4	Q
Identification and Color Striping Durability	Specification Sheet and 3.5.5	MIL-C-85485	1
Identification of Product	Specification Sheet and 3.5.6	4.5.3	1
Immersion	3.5.7	4.5.5	Q
Insulation Flaws	Specification Sheet and 3.5.8	MIL-C-85485	3
Jacket Color	Specification Sheet and MIL-C-85485	4.5.3	1
Jacket Concentricity	3.5.9	MIL-C-85485	2
Jacket Elongation and Tensile Strength	Specification Sheet	MIL-C-85485	1
Jacket Flaws	Specification Sheet and 3.5.10	MIL-C-85485	3
Jacket Flexure Endurance	Specification Sheet and 3.5.11	4.5.7	2
Jacket Resistivity	3.5.12	MIL-C-85485	2
Jacket Thickness	Specification Sheet	4.5.3	2
Life Cycle	Specification Sheet and 3.5.4	4.5.2	Q
Low Temperature-Cold Bend	Specification Sheet and 3.5.13	4.5.8	2
Shield Coverage and Angle	Specification Sheet and 3.3.2	MIL-C-85485	1
Thermal Shock Resistance	Specification Sheet	MIL-C-85485	2
Vacuum Stability	Specification Sheet	MIL-C-85485	Q
Voltage Withstand (Dielectric)	Specification Sheet	MIL-C-85485	3
Weight	Specification Sheet	MIL-C-85485	1
Weight Loss	Specification Sheet and 3.5.15	4.5.10	2
Workmanship	MIL-C-85485	MIL-C-85485	1

***Test Type:**

- 1 = Quality Conformance Test, Group 1 (see 4.3)
- 2 = Quality Conformance Test, Group 2 (see 4.3)
- 3 = Quality Conformance Test, Group 3 (see 4.3)
- Q = Qualification Test (see 4.2)

4. QUALITY ASSURANCE PROVISIONS

4.1 RESPONSIBILITY FOR INSPECTION

The supplier is responsible for the performance of all the inspection tests specified herein. The supplier may utilize his own or any other inspection facility and services acceptable to the buyer. Inspection records of the examinations and tests shall be kept complete and available to the buyer as required.

4.2 QUALIFICATION INSPECTION

Qualification inspection shall consist of all tests listed in Table 1 for component wire and Table 2 for finished cable. Requalification testing shall be performed any time changes in materials or processes occur that are deemed to have the potential for significantly altering the form, fit, function, or appearance of the product.

4.2.1 Sampling for Qualification Inspection

Except as provided in 4.2.1.1, 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.

<u>Component Wire Size Range</u>		<u>Required Length of Sample</u>	
<u>AWG</u>	<u>mm²</u>	<u>feet</u>	<u>m</u>
30 through 24	0.057 through 0.24	400	122
22 through 18	0.38 through 0.96	400	122
16 through 10	1.23 through 4.74	400	122
8 through 0000	8.60 through 106.9	400	122

<u>Cable Size Range (overall diameter)</u>		<u>Required Length of Sample</u>	
<u>inch</u>	<u>mm</u>	<u>feet</u>	<u>m</u>
< 0.180	< 4.6	100	30
≥ 0.180	≥ 4.6	100	30

4.2.1.1 Optional Qualification Samples

In cases where two or more specification sheets cover component wire or finished cable identical in materials and construction except for conductor and/or shield (i.e., the specified conductor or shield may be tin-coated copper, silver-coated high-strength copper alloy or as specified in the applicable specification sheet), the component wire or finished cable sample in accordance with 4.2.1 may qualify any one of the specification sheets. Approval of the qualification sample shall also qualify the same component wire or finished cable size range or ranges in each of the other specification sheets. (Note: For purposes of determining identity of construction in specification sheets 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.)

4.2.2 Qualification Test Reports

When requested by the procuring activity, qualification test reports shall be plainly identified with the following information:

Qualification test report for
CABLE, ELECTRIC, FILTER LINE
Manufacturer's Name
Part number of qualification sample
Specification 55F

4.3 QUALITY CONFORMANCE INSPECTION

Quality conformance inspection shall consist only of those examinations and tests listed in Table 1 and Table 2 identified by a group number, as applicable to component wire or to finished cable. Quality conformance inspection shall be performed on every lot of wire and cable procured under this specification.

4.3.1 Sampling for Quality Conformance Inspection

ISO 8402 shall apply for definitions of inspection terms used herein. For purposes of this specification, the following shall apply:

4.3.1.1 Lot

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

4.3.1.2 Unit of Product

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.

4.3.1.3 Sample Unit (Groups 1 and 2 tests)

The sample unit for Groups 1 and 2 tests, except for the Group 1 insulation resistance test, shall consist of a single length 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 1 tests of Table 1 and Table 2 shall be 20 feet (6.1 m) and the length of the sample unit for Group 2 tests shall be 25 feet (7.5 m). Not more than one sample unit for each group of tests shall be taken from a single unit of product.

4.3.1.3.1 *Sample Unit for Insulation Resistance Test (Group 1)*

The sample unit for the Group 1 insulation resistance test shall be a specimen 26 feet (7.9 m) in length selected at random from component wire which has passed the insulation flaws test.

4.3.1.4 Inspection Levels and Sampling Plan (Groups 1 and 2 tests)

The inspection level shall be S-2 for Group 1, S-3 for Group 2, using a C = 0 sampling plan in accordance with ANSI/ASQ Z1.4.

4.3.1.5 Sampling and Acceptance Level for Group 3 Tests

Unless otherwise specified in the applicable specification sheet, the component wire or finished cable sample for the Group 3 insulation flaws test or jacket flaws test shall be 100 percent of the component wire or finished cable, and every length of the wire or cable shall be fully tested. Portions showing breakdown resulting from the test and ends or portions not subjected to the test shall be marked or removed. Unless otherwise specified in the applicable specification sheet, the finished cable sample for the Group 3 conductor and shield continuity and dielectric withstand tests shall be 100 percent of the finished cable. Portions showing breakdown in these dielectric tests shall be removed and the remaining lengths tested until no failure occurs.

4.3.2 Nonconforming Inspection Lots

Disposition of material found unacceptable under quality conformance inspection shall be in accordance with ANSI/ASQ Z1.4.

4.4 PROCESS CONTROL INSPECTION

This inspection comprises tests and examinations (Table 3) of such a nature that they cannot be performed on the component wire or finished cable and therefore must be performed at an appropriate stage of manufacture. Process control inspection shall be performed on every lot of wire or cable procured under this specification.

TABLE 3. PROCESS CONTROL INSPECTION

Examination or Test	Requirement	Test Method
Construction and Materials	Specification Sheet and 3.3	4.5.3
Conductor Splices	MIL-C-85485	4.5.3
Insulation Flaws	Specification Sheet and 3.4.1	MIL-C-85485

4.4.1 Sampling for Process Control Inspection

4.4.1.1 Conductor Material

Process control sample selection and inspection of uninsulated conductor shall be performed at receiving inspection. The conductor lot size, for purposes of sampling, shall consist of the number of reels of a given type and size of conductor received at one time from one supplier against a single purchase order. For lot sizes of 3 reels or less, one 15-foot (4.5-m) length of conductor shall be selected from each reel. For lot sizes of not less than 4 and not more than 25 reels, a minimum of three 15-foot (4.5-m) lengths of conductor shall be selected at random, in such a manner as to be representative of the material. For lot sizes in excess of 25 reels, the inspection level shall be Level 1 and the AQL shall be 4.0 percent in accordance with ANSI/ASQ Z1.4.

4.4.1.2 Insulation Flaws (impulse dielectric test or spark test)

One hundred percent of the wire, after the application of the primary insulation, shall be tested in accordance with the applicable specification sheet and MIL-C-85485.

4.4.2 Rejection and Retest in Process Control Inspection

When a sample selected from an inspection lot fails to meet the specified test (Table 3), except the insulation flaws test (see 4.4.1.2), no items still on hand or later produced from that lot shall be accepted until the extent and cause of the failure has been determined.

4.4.2.1 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 and quality conformance requirements of the specification.

4.5 TEST METHODS

4.5.1 Concentricity

The concentricity of the component primary insulation and jacket shall be determined in accordance with the procedures of 4.5.1.1 and 4.5.1.2, as applicable. All wall thickness measurements shall be made on cross sections of the wire under suitable magnification. A wall thickness shall be the shortest distance between the outer rim of the primary insulation or finished component wire, as applicable, and the outer rim of the outermost strand of the conductor.

4.5.1.1 Concentric Lay Wires

The concentricity of the component primary insulation and jacket shall be determined in accordance with MIL-C-85485.

4.5.1.2 Rope Lay Conductor

The concentricity of the primary insulation or of the finished component wire shall be determined by first locating and recording the minimum wall thickness measured on a cross section of the primary insulation or of the finished component wire. From this point on the outer rim of the primary insulation or finished component wire at which the minimum wall thickness was measured, three more reference points 90 degrees apart on the outside rim of the primary insulation or finished component wire shall be established. At each of the three reference points the nearest member of the rope lay conductor shall be selected and the minimum wall thickness between that member and the outer rim of the primary insulation or finished component wire shall be measured. The average of the four readings shall be considered to be the average wall thickness. For rope lay wires, 100 times the ratio of the minimum wall thickness to the average wall thickness shall define the percent concentricity.

4.5.2 Crosslinking Proof Test and Life Cycle

A specimen of finished cable shall be tested in accordance with MIL-C-85485 using the time and temperature specified in the applicable specification sheet, except that the voltage withstand test shall be conducted on shielded and jacketed specimens only.

4.5.3 Examination of Product

All samples shall be examined carefully to determine conformance to this specification and to the applicable specification sheet with regard to requirements not covered by specific test methods.

4.5.4 Fluoride Extraction

For component wire or filler, prior to cabling, or for finished cable, approximately 0.5 gram of insulation, filler, or jacket material, as applicable, shall be removed, cut into 3-inch (76-mm) lengths and weighed to the nearest milligram. A polystyrene test tube (without its cap) shall also be weighed to the nearest 0.1 gram. After filling with approximately 14 ml of distilled water, the polystyrene test tube shall be reweighed. The insulation, filler, or jacket specimen shall then be placed into the test tube, making sure that the specimen is fully submerged, and the test tube cap is tightly attached. The test tube shall then be partially immersed in a $70 \pm 2^\circ\text{C}$ water bath so that the water levels of the bath and the test tube are equal. The test tube shall be so conditioned for 168 hours with the set-up being periodically checked to make sure that the specimen is still submerged. After conditioning, the test tube shall be removed from the bath and allowed to cool. The cap shall then be removed from the test tube, and the tube, water and specimen shall be weighed to determine the water weight loss. If the water loss is more than 0.5 gram, the test shall be rerun. Otherwise, 5 ml of the test tube water shall be analyzed for fluoride ion content using an Ion Chromatograph. The fluoride ion content shall be reported in ppm of water and shall not exceed the amount specified in the applicable SCD. A blank test in accordance with 4.5.4.1 should also be conducted in case the result is needed for calculation purposes.

4.5.4.1 Blank Test

A blank test follows the same procedure as 4.5.4 except that a specimen is not included. What is tested is the distilled water and the specimen tube. Ideally, there are no fluoride ions in either the test tube or the distilled water such that the result for the blank test would be zero. However, there may be a low non-zero result (i.e. 0.005 ppm). If this occurs, the ppm of fluoride for the blank test must be subtracted from the ppm of fluoride obtained from the specimen. A blank test also performs the same function as a calibration as it can indicate a problem with the test procedure. For example, should the blank test produce a result of 15 ppm of fluoride, this would be an indication that the ion chromatograph is not functioning correctly, tap water was used in place of distilled water, etc.

4.5.4.2 Calculation

If necessary, the blank test result shall be subtracted from the specimen result to obtain the net fluoride ion content (ppm). The fluoride ion content of the insulation, filler, or jacket weight shall then be calculated as follows:

$$F \text{ ion} = \frac{\text{Net F ion (ppm)} \times \text{Original water weight}}{\text{Specimen weight}}$$

4.5.5 Immersion

Specimens of finished cable shall be tested in accordance with MIL-C-85485, except that the voltage withstand test shall be conducted on shielded and jacketed specimens only.

4.5.6 Insulation Resistance

The uninsulated ends of a wire specimen at least 26 feet (7.9 m) in length shall be connected electrically to a DC terminal. The specimen shall be immersed to within 6 inches (152 mm) of its ends in a water bath at $25 \pm 5^\circ\text{C}$ containing 0.5 to 1.0 percent of an anionic wetting agent. After 4 hours minimum of immersion, the specimen shall be subjected to a potential of 250 to 500 volts applied between the conductor and the water bath, which serves as the second electrode. The insulation resistance of the specimen shall be determined after one minute of electrification at this potential and shall be calculated to megohms for 1000 feet as follows:

$$\text{Megohms for 1000 feet} = \frac{\text{Specimen resistance (megohms)} \times \text{Immersed length (feet)}}{1000}$$

4.5.7 Jacket Flexure Endurance

A 12-inch (305-mm) specimen of finished cable shall be bent over a mandrel of the diameter specified in the applicable specification sheet for 180° , straightened, and reverse bent 180° over the same mandrel. This cycle shall be repeated for a total of ten cycles, after which the jacket shall be examined for cracking. Jacket wrinkles created during the test shall not be cause for rejection.

4.5.8 Low Temperature-Cold Bend

A specimen of finished cable shall be tested in accordance with MIL-C-85485 using the time and temperature specified in the applicable specification sheet, except that the voltage withstand test shall be conducted on shielded and jacketed specimens only.

4.5.9 Thermal Stability

A 10-foot (3.0-m) sample of component wire shall be shielded in accordance with the requirements of the single conductor cable using that particular wire. The 10-foot (3.0-m) sample of shielded cable shall be formed into a loose coil approximately 1 foot (305 mm) in diameter and aged in a circulating air oven for the time and temperature specified in the applicable specification sheet. The velocity of the air past the sample (measured at room temperature) shall be between 100 and 200 feet per minute. After aging, the sample shall be

allowed to cool to room temperature and shall then be subjected to the voltage withstand (dielectric) test in MIL-C-85485. A 6-inch (*152-mm*) specimen shall then be cut from the center of the 10-foot (*3.0-m*) sample. This 6-inch (*152-mm*) specimen shall be used to determine the stop band attenuation of the aged cable in accordance with MIL-C-85485. A 24-inch (*610-mm*) specimen shall be cut from the remaining sample and the shield removed. The wire shall then be subjected to the bend test, using the mandrel and weight as specified in the applicable specification sheet for the crosslinking proof test, followed by the voltage withstand (post-environmental) test specified in MIL-C-85485.

4.5.10 Weight Loss

A 5-foot (*1.5-m*) length of shielded cable shall be flush cut and weighed to the nearest 0.001 grams. Prior to weighing, the jacket surface of cables with jackets may be wiped clean with a suitable low boiling solvent such as isopropyl alcohol to remove any accumulation of debris. If a wipe is performed, the test specimen should be allowed to re-equilibrate to ambient conditions for 30 minutes. After cleaning, the sample should be handled using cotton gloves to avoid any contamination with finger oils. The cable jacket, if any, shall be removed by longitudinally slitting with a razor blade or a similar tool. After removal, the jacket and shielded inner bundle shall be wrapped into a loose coil and suspended in a forced air flow oven at $250 \pm 2^\circ\text{C}$ for 20 minutes. After this conditioning, the collective test specimen shall be allowed to cool to ambient conditions for 30 minutes and then reweighed to the nearest 0.001 grams. The percent weight loss shall be calculated per the following formula:

$$\% \text{ Weight Loss} = \frac{(\text{Original Weight} - \text{Final Weight})}{\text{Original Weight}} \times 100$$

4.5.11 Wrap Test

4.5.11.1 Wire Sizes AWG 10 and Smaller

Component wire shall be tested in accordance with MIL-C-85485.

4.5.11.2 Wires Sizes AWG 8 and Larger

A specimen of component wire, with a length of 12 inches (*305 mm*) plus the additional length required for wrapping on the mandrel, shall be wrapped tightly for two close turns around a mandrel, the diameter of which is 3 times the outside diameter of the wire. The wrapping may be accomplished manually and shall be in the middle portion of the specimen so that 6 inches (*152 mm*) of each end shall remain straight. The specimen shall then be placed in an air oven and conditioned for the time and at the temperature specified in the applicable specification sheet. After conditioning, the specimen shall be removed from the oven and examined visually without the aid of magnification for cracks.

5. STANDARD PACKAGING

Unless otherwise specified (see 6.1), the following shall define the standard spooling and labeling requirements for wire and cable furnished under this specification. Standard shipping tolerance on ordered quantity, for both wire and cable, shall be ± 10 percent.

5.1 SPOOLING REQUIREMENTS

All layers of wire and cable shall be wound on spools or reels (see 5.1.3) with sufficient tension to prevent shifting of layers and creation of crossovers within layers.

5.1.1 Component Wire

Component wire lengths shall be wound on spools or reels with the ends spliced together to provide one mechanically and electrically continuous length. Unless otherwise specified, the minimum continuous length between splices shall be in accordance with Table 4.

TABLE 4. COMPONENT WIRE LENGTHS

Wire Size Range (AWG)	Minimum Length
30 through 10	100 feet (30 m)
8 and larger	50 feet (15 m)

(NOTE: Metric lengths specified above apply only to those orders placed in metric.)

5.1.2 Finished Cable

Finished cable lengths shall be wound on spools or reels with all ends exposed. There shall be no more than 5 lengths per spool or reel and no length shall be less than 50 feet (15 m).

5.1.3 Spools and Reels

Spools and reels shall be of a nonreturnable type. Each spool and reel shall have an appropriate diameter for the respective wire or cable size. In no case shall the barrel of the spool or reel have a diameter less than 3.5 inches (89 mm). Spools and reels shall be suitably finished to prevent corrosion under typical storage and handling conditions. Loaded plastic spools shall not exceed 50 pounds (23 kg). Loaded wooden reels shall have no weight restriction.

5.1.4 Containers

Unless otherwise specified (see 6.1), component wire and finished cable shall be delivered in standard commercial containers so constructed as to ensure acceptance by common or other carrier for safe transportation at the lowest rate to the point of delivery.

5.2 LABELING REQUIREMENTS

All spools and reels shall be identified with the following information:

Manufacturer's Part Number
 Lot Number
 Quantity in Feet (or Meters)
 Name of Manufacturer

6. NOTES

6.1 ORDERING DATA

Procurement documents should specify the following:

- a. Title, number, and revision of this specification
- b. Applicable specification sheet part number
- c. Quantity
- d. Special preparation for delivery requirements, if applicable (see Section 5)

6.2 METRIC UNITS

Metric units (where shown in parentheses) are for information only.

6.3 MIL-C-85485

Wherever MIL-C-85485 refers to "applicable specification sheet", use the applicable Tyco Electronics specification sheet (see 3.1).