

FIBER OPTIC CABLES—Continued  
 BULLETIN 1753F–601(PE–90) QUALIFICATIONS TEST DATA

[Initial qualification and three year re-qualification test data required for TELECOMMUNICATIONS PROGRAM product acceptance. Please note that some tests may apply only to a particular cable design.]

Paragraph	Test	Initial qualification	3 Year re-qualification
(e)(4)(ii)	Cold Bend	X	
(f)(1)	Sheath Slitting Cord	X	
(f)(2)	Material Compatibility	X	
(f)(3)	Cable Low & High Bend	X	X
(f)(4)	Compound Flow	X	
(f)(5)	Cyclic Flexing	X	X
(f)(6)	Water Penetration	X	X
(f)(7)	Cable Impact	X	X
(f)(8)	Cable Tensile Loading & Fiber Strain	X	X
(f)(9)	Cable Compression	X	
(f)(10)	Cable Twist	X	X
(f)(11)	Cable Lighting Damage Susceptibility	X	
(f)(12)	Cable External Freezing	X	
(f)(13)	Cable Temperature Cycling	X	X
(f)(14)	Cable Sheath Adherence	X	
(f)(15)	Mid-Span	X	X
(f)(16)(i)	Static Tensile Testing of Aerial Self-Supporting Cables	X	X
(f)(16)(ii)	Cable Galloping	X	
(g)(2)(i)	Thermal Reel Wrap test	X	

[74 FR 20561, May 5, 2009]

**§ 1755.903 Fiber optic service entrance cables.**

(a) *Scope.* This section covers Agency requirements for fiber optic service entrance cables intended for aerial installation either by attachment to a support strand or by an integrated self-supporting arrangement, for underground application by placement in a duct, or for buried installations by trenching, direct plowing, directional or pneumatic boring. Cable meeting this section is recommended for fiber optic service entrances having 12 or fewer fibers with distances less than 100 meters (300 feet).

(1) *General.* (i) Specification requirements are given in SI units which are the controlling units in this part. Approximate English equivalent of units are given for information purposes only.

(ii) The optical waveguides are glass fibers having directly-applied protective coatings, and are called “fibers,” herein. These fibers may be assembled in either loose fiber bundles with a protective core tube, encased in several protective buffer tubes, in tight buffer tubes, or ribbon bundles with a protective core tube.

(iii) Fillers, strength members, core wraps, and bedding tapes may complete the cable core.

(iv) The core or buffer tubes containing the fibers and the interstices between the buffer tubes, fillers, and strength members in the core structure are filled with a suitable material or water swellable elements to exclude water.

(v) The cable structure is completed by an extruded overall plastic jacket. A shield or armor or combination thereof may be included under the jacket. This jacket may have strength members embedded in it, in some designs.

(vi) For rodent resistance or for additional protection with direct buried installations, it is recommended the use of armor under the outer jacket.

(vii) For self-supporting cable the outer jacket may be extruded over the support messenger and cable core.

(viii) For detection purposes, the cable may have toning elements embedded or extruded with the outer jacket.

(2) The cable is fully color coded so that each fiber is distinguishable from every other fiber. A basic color scheme of twelve colors allows individual fiber identification. Colored tubes, binders, threads, striping, or markings provide fiber group identification.

(3) Cables manufactured to the requirements of this section must demonstrate compliance with the qualification testing requirements to ensure satisfactory end-use performance characteristics for the intended applications.

(4) Optical cable designs not specifically addressed by this section may be allowed. Justification for acceptance of a modified design must be provided to substantiate product utility and long term stability and endurance. For information on how to obtain Agency's acceptance of such a modified design, refer to the product acceptance procedures available at [http://www.usda.gov/rus/telecom/listing\\_procedures/index\\_listing\\_procedures.htm](http://www.usda.gov/rus/telecom/listing_procedures/index_listing_procedures.htm) as well as RUS Bulletin 345-3.

(5) The cable must be designed for the temperatures ranges of Table 1-1, *Cable Normal Temperature Ranges*, of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(6) *Tensile rating*. The cable must have ratings that are no less than the tensile ratings indicated in paragraph 1.1.4, *Tensile Rating*, of Part 1 of the ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(7) *Self-supporting cables*. Based on the storm loading districts referenced in Section 25, Loading of Grades B and C, of ANSI/IEEE C2-2007 (incorporated by reference at §1755.901(b)), and the maximum span and location of cable installation provided by the end user, the manufacturer must provide a cable design with sag and tension tables showing the maximum span and sag information for that particular installation. The information included must be for Rule B, *Ice and Wind Loading*, and when applicable, information on Rule 250C, *Extreme Wind Loading*. Additionally, to ensure the proper ground clearance, typically a minimum of 4.7 m (15.5 feet), the end user should factor in the maximum sag under loaded conditions as well as height of attachment for each application.

(8) *Minimum bend diameter*. For cable under loaded and unloaded conditions, the cable must have the minimum bend diameters indicated in paragraph 1.1.5, *Minimum Bend Diameter*, of Part 1 of ICEA S-110-717 (incorporated by reference at §1755.901(c)). For very small

cables, manufacturers may specify fixed cable minimum bend diameters that are independent of the outside diameter.

(9) All cables sold to RUS Telecommunications borrowers must be accepted by the Agency's Technical Standards Committee "A" for projects involving RUS loan funds. All design changes to Agency acceptable designs must be submitted to the Agency for acceptance. Optical cable designs not specifically addressed by this section may be allowed, if accepted by the Agency. Justification for acceptance of a modified design must be provided to substantiate product utility and long term stability and endurance. For information on how to obtain the Agency's acceptance of cables, refer to the product acceptance procedures available at [http://www.usda.gov/rus/telecom/listing\\_procedures/index\\_listing\\_procedures.htm](http://www.usda.gov/rus/telecom/listing_procedures/index_listing_procedures.htm) as well as RUS Bulletin 345-3.

(10) The Agency intends that the optical fibers contained in the cables meeting the requirement of this section have characteristics that will allow signals, having a range of wavelengths, to be carried simultaneously.

(11) The manufacturer is responsible to establish a quality assurance system meeting industry standards described in paragraph 1.8 of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(12) The cable made must meet paragraph 1.10 of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(b) *Optical fibers*. (1) The solid glass optical fibers must consist of a cylindrical core and cladding covered by either an ultraviolet-cured acrylate or other suitable coating. Each fiber must be continuous throughout its length.

(2) Optical fibers must meet the fiber attributes of Table 2, *G.652.B attributes*, of ITU-T Recommendation G.652 (incorporated by reference at §1755.901(f)), unless the end user specifically asks for another type of fiber. However, when the end user stipulates a low water peak fiber, the optical fibers must meet the fiber attributes of Table 4, *G.652.D attributes*, of ITU-T Recommendation G.652; or when the end user stipulates a low bending loss fiber, the optical fibers must meet the fiber

## § 1755.903

## 7 CFR Ch. XVII (1–1–14 Edition)

attributes of Table 7–1, *G.657 class A attributes*, of ITU-T Recommendation G.657 (incorporated by reference at §1755.901(f)).

(i) Additionally, optical ribbon fibers must meet paragraph 3.3, *Optical Fiber Ribbons*, of Part 3 of ICEA S–110–717 (incorporated by reference at §1755.901(c)).

(ii) [Reserved]

(3) *Multimode fibers*. Optical fibers must meet the requirements of paragraphs 2.1 and 2.3.1 of ANSI/ICEA S–87–640 (incorporated by reference at §1755.901(c)).

(4) *Matched cable*. Unless otherwise specified by the buyer, all single mode fiber cables delivered to an Agency-financed project must be manufactured to the same MFD specification. However, notwithstanding the requirements indicated in paragraphs (d)(2) and (d)(3) of this section, the maximum MFD tolerance allowed for cables meeting the requirements of this section must be of a magnitude meeting the definition of “matched cable,” as defined in paragraph (b) of §1755.900. With the use of cables meeting this definition the user can reasonably expect that the average bi-directional loss of a fusion splice to be  $\leq 0.1$  dB.

(5) Buyers will normally specify the MFD for the fibers in the cable. When a buyer does not specify the MFD at 1310 nm, the fibers must be manufactured to an MFD of  $9.2 \mu\text{m}$  with a maximum tolerance range of  $\pm 0.5 \mu\text{m}$  ( $362 \pm 20$  microns), unless the buyer agrees to accept cable with fibers specified to a different MFD. When the buyer does specify a MFD and tolerance conflicting with the MFD maximum tolerance allowed by paragraph (d)(4) of this section, the requirements of paragraph (d)(4) must prevail.

(6) Factory splices are not allowed.

(7) All optical fibers in any single length of cable must be of the same type unless otherwise specified by end user.

(8) Optical fiber dimensions and data reporting must be as required by paragraph 7.13.1.1 of ANSI/ICEA S–87–640 (incorporated by reference at §1755.901(c)).

(c) *Buffers/coating*. (1) The optical fibers contained in a buffer tube (loose tube) loosely packaged must have a clearance between the fibers and the

inside of the container sufficient to allow for thermal expansions without constraining the fibers. The protective container must be manufactured from a material having a coefficient of friction sufficiently low to allow the fibers free movement. The design may contain more than one tube. Loose buffer tubes must meet the requirements of Paragraph 3.2.1, *Loose Buffer Tube Dimensions*, of Part 3 of ICEA S–110–717 (incorporated by reference at §1755.901(c)).

(2) The loose tube coverings of each color and other fiber package types removed from the finished cable must meet the following shrinkback and cold bend performance requirements. The fibers may be left in the tube.

(i) *Shrinkback*. Testing must be conducted per ASTM D 4565 (incorporated by reference at §1755.901(d)), paragraph 14.1, using a talc bed at a temperature of  $95 \text{ }^\circ\text{C}$ . Shrinkback must not exceed 5 percent of the original 150 millimeter length of the specimen. The total shrinkage of the specimen must be measured.

(ii) *Cold bend*. Testing must be conducted on at least one tube from each color in the cable. Stabilize the specimen to  $-20 \pm 1 \text{ }^\circ\text{C}$  for a minimum of four hours. While holding the specimen and mandrel at the test temperature, wrap the tube in a tight helix ten times around a mandrel with a diameter the greater of five times the tube diameter or 50 mm. The tube must show no evidence of cracking when observed with normal or corrected-to-normal vision.

(3) Optical fiber coating must meet the requirements of paragraph 2.4, *Optical Fiber Coatings and Requirements*, of Part 2 of ICEA S–110–717 (incorporated by reference at §1755.901(c)).

(i) All protective coverings in any single length of cable must be continuous and be of the same material except at splice locations.

(ii) The protective coverings must be free from holes, splits, blisters, and other imperfections and must be as smooth and concentric as is consistent with the best commercial practice.

(iii) Repairs to the fiber coatings are not allowed.

(d) *Fiber and buffer tube identification*. Fibers within a unit and the units

within a cable must be identified as indicated in paragraphs 4.2 and 4.3 of Part 4 of ICEA S-110-717 (incorporated by reference at §1755.901(c)), respectively.

(e) *Strength members.* (1) Combined strength of all the strength members must be sufficient to support the stress of installation and to protect the cable in service. Strength members must meet paragraph 4.4, *Strength Members*, of ICEA S-110-717 (incorporated by reference at §1755.901(c)). Self supporting aerial cables using the strength members as an integral part of the cable strength must comply with paragraph C.4, *Static Tensile Testing of Aerial Self-Supporting Cables*, of ANNEX C of ICEA S-110-717.

(2) Strength members may be incorporated into the core as a central support member or filler, as fillers between the fiber packages, as an annular serving over the core, as an annular serving over the intermediate jacket, embedded in the outer jacket or as a combination of any of these methods.

(3) The central support member or filler must contain no more than one splice per kilometer of cable. Individual fillers placed between the fiber packages and placed as annular servings over the core must contain no more than one splice per kilometer of cable. Cable sections having central member or filler splices must meet the same physical requirements as unspliced cable sections.

(4) Notwithstanding what has been indicated in other parts of this document, in each length of completed cable having a metallic central member, the dielectric strength between the optional armor and the metallic center member must withstand at least 15 kilovolts direct current for 3 seconds.

(f) *Forming the cable core.* (1) Protected fibers must be assembled with the optional central support member and strength members in such a way as to form a cylindrical group or other acceptable core constructions and must meet Section 4.5, *Assembly of Cables*, of Part 4 of ICEA S-110-717 (incorporated by reference at 1755.901(c)). Other acceptable cable cores include round, figure 8, flat or oval designs.

(2) The standard cylindrical group or core designs must consist of 12 fibers or less.

(3) When threads or tapes are used as core binders, they must be colored either white or natural and must be a non-hygroscopic and non-wicking dielectric material. Water swell-able threads and tapes are permitted.

(g) *Filling/flooding compounds and water blocking elements.* (1) To prevent the ingress and migration of water through the cable and core, filling/flooding compounds or water blocking elements must be used.

(i) Filling compounds must be applied into the interior of the loose fiber tubes and into the interstices of the core. When a core wrap is used, the filling compound must also be applied to the core wrap, over the core wrap and between the core wrap and inner jacket when required.

(ii) Flooding compounds must be sufficiently applied between the optional inner jacket and armor and between the armor and outer jacket so that voids and air spaces in these areas are minimized. The use of floodant between the armor and outer jacket is not required when uniform bonding, per paragraph 1(9) of this section, is achieved between the plastic-clad armor and the outer jacket. Floodant must exhibit adhesive properties sufficient to prevent jacket slip when tested per the requirements of paragraphs 7.26 through 7.26.2 of Part 7, *Testing, Test Methods, and Requirements*, of ANS/ICEA S-87-640 (incorporated by reference at 1755.901(c)).

(iii) Water blocking elements must achieve equal or better performance in preventing the ingress and migration of water as compared to filling and flooding compounds. In lieu of a flooding compound, water blocking elements may be applied between the optional inner jacket and armor and between the armor and outer jacket to prevent water migration. The use of the water blocking elements between the armor and outer jacket is not required when uniform bonding, per paragraph 1(10) of this section, is achieved between the plastic-clad armor and the outer jacket.

(2) The materials must be homogeneous and uniformly mixed; free

from dirt, metallic particles and other foreign matter; easily removed; nontoxic and present no dermal hazards.

(3) The individual cable manufacturer must satisfy the Agency that the filling compound or water blocking elements selected for use is suitable for its intended application.

(i) Filling/Flooding compound materials must be compatible with the cable components when tested per paragraph 7.16, *Material Compatibility and Cable Aging Test*, of Part 7 of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(ii) Water blocking elements must be compatible with the cable components when tested per paragraph 7.16, *Material Compatibility and Cable Aging Test*, of Part 7 of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(h) *Core wrap (optional)*. (1) At the option of the manufacturer, one or more layers of non-hygroscopic and non-wicking dielectric material may be applied with an overlap over the core.

(2) The core wrap(s) can be used to provide a heat barrier to prevent deformation or adhesion between the fiber tubes or can be used to contain the core.

(3) When core wraps are used, sufficient filling compound must be applied to the core wraps so that voids or air spaces existing between the core wraps and between the core and the inner side of the core wrap are minimized.

(i) *Inner jacket (optional)*. (1) Inner jackets may be applied directly over the core or over the strength members. Inner jackets are optional.

(2) The inner jacket material and test requirements must be the same as for the outer jacket material per paragraph (n) of this section, except that either black or natural polyethylene may be used. In the case of natural polyethylene, the requirements for absorption coefficient and the inclusion of furnace black are waived.

(j) *Armor (optional)*. (1) A steel armor, plastic coated on both sides, is recommended for direct buried service entrance cable in gopher areas. Armor is also optional for duct and aerial cable as required by the end user. The plastic coated steel armor must be applied longitudinally directly over the core wrap

or the intermediate jacket and must have an overlapping edge.

(2) The uncoated steel tape must be electrolytic chrome coated steel (ECCS) with a thickness of  $0.155 \pm 0.015$  millimeters.

(3) The reduction in thickness of the armoring material due to the corrugating or application process must be kept to a minimum and must not exceed 10 percent at any spot.

(4) The armor of each length of cable must be electrically continuous with no more than one joint or splice allowed per kilometer of cable. This requirement does not apply to a joint or splice made in the raw material by the raw material manufacturer.

(5) The breaking strength of any section of an armor tape, containing a factory splice joint, must not be less than 80 percent of the breaking strength of an adjacent section of the armor of equal length without a joint.

(6) For cables containing no floodant over the armor, the overlap portions of the armor tape must be bonded in cables having a flat, non-corrugated armor to meet the requirements of paragraphs (r)(1) and (r)(2) of this section. If the tape is corrugated, the overlap portions of the armor must be sufficiently bonded and the corrugations must be sufficiently in register to meet the requirements of paragraphs (r)(1) and (r)(2) of this section.

(7) The armor tape must be so applied as to enable the cable to meet the testing requirements of paragraphs (r)(1) and (r)(2) of this section.

(8) The protective coating on the steel armor must meet the Bonding-to-Metal, Heat Sealability, Lap-Shear and Moisture Resistance requirements of Type I, Class 2 coated metals per ASTM B 736 (incorporated by reference at §1755.901(d)).

(9) When the jacket is bonded to the plastic coated armor, the bond between the plastic coated armor and the outer jacket must not be less than 525 Newtons per meter over at least 90 percent of the cable circumference when tested per ASTM D 4565 (incorporated by reference at §1755.901(d)). For cables with strength members embedded in the jacket, and residing directly over the armor, the area of the armor directly

under the strength member is excluded from the 90 percent calculation.

(k) *Optional support messenger (aerial cable)*. (1) Integrated messenger(s) for self-supporting cable must provide adequate strength to operate under the appropriate weather loading conditions over the maximum specified span.

(2) Based on the storm loading districts referenced in Section 25, Loading of Grades B and C, of ANSI/IEEE C2-2007 (incorporated by reference at §1755.901(b)), and the maximum span and location of cable installation provided by the end user, the manufacturer must provide a cable design with sag and tension tables showing the maximum span and sag information for that particular installation. The information included must be for Rule B, *Ice and Wind Loading*, and when applicable, information on Rule 250C, *Extreme Wind Loading*. Additionally, to ensure the proper ground clearance, typically a minimum of 4.7 m (15.5 feet) the end user should factor in the maximum sag under loaded conditions as well as height of attachment for each application.

(1) *Outer jacket*. (1) The outer jacket must provide the cable with a tough, flexible, protective covering which can withstand exposure to sunlight, to atmosphere temperatures and to stresses reasonably expected in normal installation and service.

(2) The jacket must be free from holes, splits, blisters, or other imperfections, and must be as smooth and concentric as is consistent with the best commercial practice.

(3) Jacket materials must meet the stipulations of paragraph 5.4 of ANSI/ICEA S-87-640 (incorporated by reference at §1755.901(c)), except that the concentration of furnace black does not necessarily need to be initially contained in the raw material and may be added later during the jacket making process. Jacket thickness must have a 0.50 mm minimum thickness over the core or over any radial strength member used as the primary strength element(s), 0.20 mm when not used as the primary strength member, and 0.30 mm over any optional toning elements.

(4) Jacket Repairs must meet the stipulations of paragraph 5.5, *Jacket Re-*

*pairs*, of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(5) *Jacket Testing*: The jacket must be tested to determine compliance with requirements of this section. The specific tests for the jacket are described in paragraphs 7.6 through 7.11.2 of Part 7, *Testing, Test Methods, and Requirements*, of ANSI/ICEA S-87-640 (incorporated by reference at §1755.901(c)).

(m) *Sheath slitting cord (optional)*. (1) A sheath slitting cord is optional.

(2) When a sheath slitting cord is used it must be non-hygroscopic and non-wicking, or be rendered such by the filling or flooding compound, continuous throughout a length of cable and of sufficient strength to open the sheath over at least a one meter length without breaking the cord at a temperature of  $23 \pm 5$  °C.

(n) *Identification and length markers*. (1) Each length of cable must be permanently labeled OPTICAL CABLE, OC, OPTICAL FIBER CABLE, or OF on the outer jacket and identified as to manufacturer and year of manufacture.

(2) Each length of cable intended for direct burial installation must be marked with a telephone handset in compliance with the requirements of the Rule 350G of ANSI/IEEE C2-2007 (incorporated by reference at §1755.901(b)).

(3) Mark the number of fibers on the jacket.

(4) The identification and date marking must conform to paragraph 6.1, Identification and Date Marking, of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(5) The length marking must conform to paragraph 6.3, Length Marking, of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(o) *Optical performance of a finished cable*. (1) Unless otherwise specified by the end user, the optical performance of a finished cable must comply with the attributes of Table 2, *G.652.B attributes*, found in ITU Recommendation G.652 (incorporated by reference at §1755.901(f)). However, when the end user stipulates a low water peak fiber the finished cable must meet the attributes of Table 4, *G.652.D attributes*, found in ITU-T Recommendation G.652; or when the end user stipulates a low bending loss fiber, the finished cable

must meet the attributes of Table 7–1, *class A attributes*, of ITU-T Recommendation G.657 (incorporated by reference at § 1755.901(f)).

(i) The attenuation methods must be per Table 8.4, *Optical attenuation measurement methods*, of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(ii) The cable must have a maximum attenuation of 0.1 dB at a point of discontinuity (a localized deviation of the optical fiber loss). Per paragraphs 8.4 and 8.4.1 of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)), measurements must be conducted at 1310 and 1550 nm, and at 1625 nm when specified by the end user.

(iii) The cable cutoff wavelength ( $\gamma_{cc}$ ) must be reported per paragraph 8.5.1 of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(2) *Multimode optical fiber cable*. Unless otherwise specified by the end user, the optical performance of the fibers in a finished cable must comply with Table 8.1, *Attenuation coefficient performance requirement (dB/km)*, Table 8.2, *Multimode bandwidth coefficient performance requirements (MHz-km)*, and Table 8.3, *Points discontinuity acceptance criteria (d)*, of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(3) Because the accuracy of attenuation measurements for single mode fibers becomes questionable when measured on short cable lengths, attenuation measurements are to be made utilizing characterization cable lengths. Master Cable reels must be tested and the attenuation values measured will be used for shorter ship lengths of cable.

(4) Because the accuracy of attenuation measurements for multimode fibers becomes questionable when measured on short cable lengths, attenuation measurements are to be made utilizing characterization cable lengths. If the ship length of cable is less than one kilometer, the attenuation values measured on longer lengths of cable (characterization length of cable) before cutting to the ship lengths of cable may be applied to the ship lengths.

(5) Attenuation must be measured per Table 8.4, *Optical Attenuation Meas-*

*urement Methods*, ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(6) The bandwidth of multimode fibers in a finished cable must be no less than the values specified in Table 8.2 per paragraph 8.3.1 of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(p) *Mechanical requirements*. (1) *Cable Testing*: Cable designs must meet the requirements of Part 7, Testing and Test Methods, of ICEA S–110–717 (incorporated by reference at § 1755.901(c)), except for paragraph 7.15 applicable to tight tube fibers.

(2) *Bend test*. All cables manufactured must meet the “Cable Low and High Temperature Bend Test” described in Section 7.21 (paragraphs 7.21, 7.21.1, and 7.21.2) of ANSI/ICEA S–87–640 (incorporated by reference at § 1755.901(c)).

(q) *Pre-connectorized cable (optional)*. (1) At the option of the manufacturer and upon request by the end user, the cable may be factory terminated with connectors.

(2) All connectors must be accepted by the Agency prior to their use. For information on how to obtain the Agency’s acceptance, refer to the product acceptance procedures available at [http://www.usda.gov/rus/telecom/listing\\_procedures/index\\_listing\\_procedures.htm](http://www.usda.gov/rus/telecom/listing_procedures/index_listing_procedures.htm) as well as RUS Bulletin 345–3.

(r) *Acceptance testing and extent of testing*. (1) The tests described in this section are intended for acceptance of cable designs and major modifications of accepted designs. What constitutes a major modification is at the discretion of the Agency. These tests are intended to show the inherent capability of the manufacturer to produce cable products that have satisfactory performance characteristics, long life, and long-term optical stability, but are not intended as field tests. For information on how to obtain the Agency’s acceptance, refer to the product acceptance procedures available at [http://www.usda.gov/rus/telecom/listing\\_procedures/index\\_listing\\_procedures.htm](http://www.usda.gov/rus/telecom/listing_procedures/index_listing_procedures.htm) as well as RUS Bulletin 345–3.

(2) For initial acceptance, the manufacturer must submit:

(i) An original signature certification that the product fully complies with each paragraph of this section;

(ii) Qualification Test Data for demonstrating that the cable meets the requirements of this section;

(iii) A set of instructions for handling the cable;

(iv) OSHA Material Safety Data Sheets for all components;

(v) Agree to periodic plant inspections;

(vi) Agency's "Buy American" Requirements. For each cable for which the Agency acceptance is requested, the manufacturer must include a certification stating whether the cable complies with the following two domestic origin manufacturing provisions:

(A) Final assembly or manufacture of the product, as the product would be used by an Agency's borrower, is completed in the United States or eligible countries. For a list of eligible countries, see <http://www.usda.gov/rus/telecom/publications/eligible.htm>; and

(B) The cost of United States and eligible countries' components (in any combination) within the product is more than 50 percent of the total cost of all components utilized in the product. The cost of non-domestic components (components not manufactured within the United States or eligible countries) which are included in the finished product must include all duties, taxes, and delivery charges to the point of assembly or manufacture;

(vii) Written user testimonials concerning performance of the product; and

(viii) Other nonproprietary data deemed necessary by the Chief, Technical Support Branch (Telecommunications).

(3) For continued Agency product acceptance, the manufacturer must submit an original signature certification that the product fully complies with each paragraph of this section and a certification stating whether the cable meets the two domestic provisions of paragraph (t)(2)(vi) above for acceptance by January every three years. The certification must be based on test data showing compliance with the requirements of this section. The test data must have been gathered within 90

days of the submission and must be kept on files per paragraph (u)(1).

(4) Initial and re-qualification acceptance requests should be addressed to: Chairman, Technical Standards Committee "A" (Telecommunications), STOP 1550, Advanced Services Division, Rural Development Utilities Program, Washington, DC 20250-1550.

(s) *Records of optical and physical tests.*

(1) Each manufacturer must maintain suitable summary records for a period of at least 3 years of all optical and physical tests required on completed cable manufactured under the requirement of this section. The test data for a particular reel must be in a form that it may be readily available to the Agency upon request. The optical data must be furnished to the end user on a suitable and easily readable form.

(2) Measurements and computed values must be rounded off to the number of places or figures specified for the requirement per paragraph 1.3 of ANSI/ICEA S-87-640 (incorporated by reference at §1755.901(c)).

(t) *Manufacturing irregularities.* (1) Repairs to the armor, when present, are not permitted in cable supplied to the end user under the requirement of this section. The armor for each length of cable must be tested for continuity using the procedures of ASTM D 4566 (incorporated by reference at §1755.901(d)).

(2) Minor defects in the inner and outer jacket (defects having a dimension of 3 millimeter or less in any direction) may be repaired by means of heat fusing per good commercial practices utilizing sheath grade compounds.

(3) Buffer tube repair is permitted only in conjunction with fiber splicing.

(u) *Packaging and preparation for shipment.* (1) All cables must comply with paragraph 6.5, *Packaging and Marking*, of ICEA S-110-717 (incorporated by reference at §1755.901(c)).

(2) For cables shipped on reels a circumferential thermal wrap or other means of protection complying with section (w)(3) of this section must be secured between the outer edges of the reel flange to protect the cable against damage during storage and shipment. This requirement applies to reels weighing more than 75 lbs. The thermal

## § 1755.910

## 7 CFR Ch. XVII (1–1–14 Edition)

wrap is optional for reels weighing 75 lbs or less.

(3) The thermal wrap must meet the requirements included in the *Thermal Reel Wrap Test*, described below in paragraphs (w)(3)(i) and (w)(3)(ii) of this section. This test procedure is for qualification of initial and subsequent changes in thermal reel wraps.

(i) *Sample selection.* All testing must be performed on two 450 millimeter (18 inches) lengths of cable removed sequentially from the same fiber jacketed cable. This cable must not have been exposed to temperatures in excess of 38 °C (100 °F) since its initial cool down after sheathing.

(ii) *Test procedure.* (A) Place the two samples on an insulating material such as wood.

(B) Tape thermocouples to the jackets of each sample to measure the jacket temperature.

(C) Cover one sample with the thermal reel wrap.

(D) Expose the samples to a radiant heat source capable of heating the uncovered sample to a minimum of 71 °C (160 °F). A GE 600 watt photoflood lamp or an equivalent lamp having the light spectrum approximately that of the sun must be used.

(E) The height of the lamp above the jacket must be 380 millimeters (15 inches) or an equivalent height that produces the 71 °C (160 °F) jacket temperature on the unwrapped sample must be used.

(F) After the samples have stabilized at the temperature, the jacket temperatures of the samples must be recorded after one hour of exposure to the heat source.

(G) Compute the temperature difference between jackets.

(H) The temperature difference between the jacket with the thermal reel wrap and the jacket without the reel wrap must be greater than or equal to 17 °C (63 °F).

(4) Cable must be sealed at the ends to prevent entrance of moisture.

(5) The end-of-pull (outer end) of the cable must be securely fastened to prevent the cable from coming loose during transit. The start-of-pull (inner end) of the cable must project through a slot in the flange of the reel, around an inner riser, or into a recess on the

flange near the drum and fastened in such a way to prevent the cable from becoming loose during installation.

(6) Spikes, staples or other fastening devices must be used in a manner which will not result in penetration of the cable.

(7) The minimum size arbor hole must be 44.5 mm (1.75 inch) and must admit a spindle without binding.

(8) Each reel must be plainly marked to indicate the direction in which it should be rolled to prevent loosening of the cable on the reel.

(9) Each reel must be stenciled or lettered with the name of the manufacturer.

(10) The following information must be either stenciled on the reel or on a tag firmly attached to the reel: Optical Cable, Type and Number of Fibers, Armored or Nonarmored, Year of Manufacture, Name of Cable Manufacturer, Length of Cable, Reel Number, REA 7 CFR 1755.903.

Example: Optical Cable, G.657 class A, 4 fibers, Armored. XYZ Company, 1050 meters, Reel Number 3, REA 7 CFR 1755.903.

(11) When pre-connectorized cable is shipped, the splicing modules must be protected to prevent damage during shipment and handling.

[74 FR 20561, May 5, 2009]

### § 1755.910 RUS specification for outside plant housings and serving area interface systems.

(a) *Scope.* (1) The purpose of this specification is to inform manufacturers and users of outside plant housings and serving area interface (SAI) systems of the engineering and technical requirements that are considered necessary for satisfactory performance in outside plant environments. Included are the mechanical, electrical, and environmental requirements, desired design features, and test methods for evaluation of the product.

(2) The housing and terminal requirements reflect the best engineering judgment available at the present time and may be subject to change due to advances in technology, economic conditions, or other factors.

(3) The test procedures described in this section are required by RUS to demonstrate the functional reliability