of 38 °C since its initial cool down after sheathing.

(III) *Test procedure.* (1) Using a suitable tool, expose enough of the sheath slitting cord to permit grasping with needle nose pliers.

(2) The prepared test specimens shall be maintained at a temperature of 23 ±1 °C for at least 4 hours immediately prior to and during the test.

(3) Wrap the sheath slitting cord around the plier jaws to ensure a good grip.

(4) Grasp and hold the cable in a convenient position while gently and firmly pulling the sheath slitting cord longitudinally in the direction away from the cable end. The angle of pull may vary to any convenient and functional degree. A small starting notch is permissible.

(5) The sheath slitting cord is considered acceptable if the cord can slit the jacket and/or shield for a continuous length of 0.6 m (2 ft) without breaking the cord.

[59 FR 30507, June 14, 1994; 59 FR 34899, July 7, 1994, as amended at 60 FR 1711, Jan. 5, 1995; 69 FR 18803, Apr. 9, 2004]

§§ 1755.871–1755.889 [Reserved]

§ 1755.890 RUS specification for filled telephone cables with expanded insulation.

(a) *Scope.* (1) This section covers the requirements for filled telephone cables intended for direct burial installation either by trenching or by direct plowing, for underground application by placement in a duct, or for aerial installation by attachment to a support strand.

(i) The conductors are solid copper, individually insulated with an extruded cellular insulating compound which may be either totally expanded or expanded with a solid skin coating.

(ii) The insulated conductors are twisted into pairs which are then stranded or oscillated to form a cylindrical core.

(iii) For high frequency applications, the cable core may be separated into compartments with screening shields.

(iv) A moisture resistant filling compound is applied to the stranded conductors completely covering the insulated conductors and filling the interstices between pairs and units.

(v) The cable structure is completed by the application of suitable core wrapping material, a flooding compound, a shield or a shield/armor, and an overall plastic jacket.

(2) The number of pairs and gauge size of conductors which are used within the RUS program are provided in the following table:

AWG	19	22	24	26
Pairs	6	6	6	
	12	12	12	
	18	18	18	
	25	25	25	25
		50	50	50
		75	75	75
		100	100	100
		150	150	150
		200	200	200
		300	300	300
		400	400	400
		600	600	600
		900	900	900
		1000	1000	1000
			1200	1200
			1500	1500
			1800	1800
				2100
				2400
				2700

NOTE: Cables larger in pair sizes than those shown in this table must meet all requirements of this section.

(3) Screened cable, when specified, must meet all requirements of this section. The pair sizes of screened cables used within the RUS program are referenced in paragraph (e)(2)(i) of this section.

(4) All cables sold to RUS borrowers for projects involving RUS loan funds under this section must be accepted by RUS Technical Standards Committee ''A'' (Telephone). For cables manufactured to the specification of this section, all design changes to an accepted design must be submitted for acceptance. RUS will be the sole authority on what constitutes a design change.

(5) Materials, manufacturing techniques, or cable designs not specifically addressed by this section may be allowed if accepted by RUS. Justification for acceptance of modified materials, manufacturing techniques, or cable designs must be provided to substantiate product utility and long-term stability and endurance.

(6) The American National Standard Institute/Insulated Cable Engineers Association, Inc. (ANSI/ICEA) S-84-608-1988, Standard For Telecommunications Cable, Filled, Polyolefin Insulated, Copper Conductor Technical Requirements referenced throughout this section is incorporated by reference by

RUS. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of ANSI/ICEA S-84-608-1988 are available for inspection during normal business hours at RUS, room 2845, U.S. Department of Agriculture, Washington, DC 20250, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. Copies are available from ICEA, P. O. Box 440, South Yarmouth, MA 02664, telephone number (508) 394-4424.

(7) American Society for Testing and Materials specifications (ASTM) A 505-87, Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements For; ASTM B 193-87, Standard Test Method for Resistivity of Electrical Conductor Materials; ASTM B 224-80, Standard Classification of Coppers; ASTM B 694-86, Standard Specification for Copper, Copper Alloy, and Copper-Clad Stainless Steel Sheet and Strip for Electrical Cable Shielding; ASTM D 4565-90a, Standard Test Methods for Physical and Environmental Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable; and ASTM D 4566-90, Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable referenced in this section are incorporated by reference by RUS. These incorporations by references were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the ASTM standards are available for inspection during normal business hours at RUS, room 2845, U.S. Department of Agriculture, Washington, DC 20250, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. Copies area available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187, telephone number (215) 299-5585.

(b) *Conductors and conductor insulation.* (1) The gauge sizes of the copper conductors covered by this section must be 19, 22, 24, and 26 American Wire Gauge (AWG).

(2) Each conductor must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraph 2.1.

(3) Factory joints made in conductors during the manufacturing process must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraph 2.2.

(4) The raw materials used for conductor insulation must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 3.1 through 3.1.3.

(5) The finished conductor insulation must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 3.2.2, 3.2.3, and 3.3.

(6) Insulated conductor must not have an overall diameter greater than 2 millimeters (mm) (0.081 inch (in.)).

(7) A permissible overall performance level of faults in conductor insulation must average not greater than one fault per 12,000 conductor meters (40,000 conductor feet) for each gauge of conductor.

(i) All insulated conductors must be continuously tested for insulation faults during the twinning operation with a method of testing acceptable to RUS. The length count and number of faults must be recorded. The information must be retained for a period of 6 months and be available for review by RUS when requested.

(ii) The voltages for determining compliance with the requirements of this section are as follows:

AWG	Direct Current Voltages (kilovolts)
19	4.5
22	3.6
24	3.0
26	2.4

(8) Repairs to the conductor insulation during manufacture are permissible. The method of repair must be accepted by RUS prior to its use. The repaired insulation must be capable of meeting the relevant electrical requirements of this section.

(9) All repaired sections of insulation must be retested in the same manner as originally tested for compliance with paragraph (b)(7) of this section.

(10) The colored insulating material removed from or tested on the conductor, from a finished cable, must meet the performance requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 3.4.1 through 3.4.6.

(c) *Identification of pairs and twisting of pairs.* (1) The insulation must be colored to identify:

(i) The tip and ring conductor of each pair; and

(ii) Each pair in the completed cable.

(2) The colors to be used in the pairs in the 25 pair group, together with the pair numbers must be in accordance with the table specified in ANSI/ICEA S-84-608-1988, paragraph 3.5.

(3) Positive identification of the tip and ring conductors of each pair by marking each conductor of a pair with the color of its mate is permissible. The method of marking must be accepted by RUS prior to its use.

(4) Other methods of providing positive identification of the tip and ring conductors of each pair may be employed if accepted by RUS prior to its use.

(5) The insulated conductors must be twisted into pairs.

(6) In order to provide sufficiently high crosstalk isolation, the pair twists must be designed to enable the cable to meet the capacitance unbalance and crosstalk loss requirements of paragraphs (k)(5), (k)(6), and (k)(8) this section.

(7) The average length of pair twists in any pair in the finished cable, when measured on any 3 meter (10 foot) length, must not exceed the requirement specified in ANSI/ICEA S-84-608-1988, paragraph 3.5.

(d) *Forming of the cable core.* (1) Twisted pairs must be assembled in such a way as to form a substantially cylindrical group.

(2) When desired for lay-up reasons, the basic group may be divided into two or more subgroups called units.

(3) Each group, or unit in a particular group, must be enclosed in bindings of the colors indicated for its particular pair count. The pair count, indicated by the colors of insulation, must be consecutive as indicated in paragraph (d)(6) of this section through units in a group.

(4) The filling compound must be applied to the cable core in such a way as to provide as near a completely filled core as is commercially practical.

(5) Threads and tapes used as binders must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 4.2 and 4.2.1.

(6) The colors of the bindings and their significance with respect to pair count must be as follows:

Group No.	Color of Bindings	Group Pair Count
1	White-Blue	1–25
2	White-Orange	26–50
3	White-Green	51–75
4	White-Brown	76–100
5	White-Slate	101–125
6	Red-Blue	126–150
7	Red-Orange	151–175
8	Red-Green	176–200
9	Red-Brown	201–225
10	Red-Slate	226–250
11	Black-Blue	251–275
12	Black-Orange	276–300
13	Black-Green	301–325
14	Black-Brown	326–350
15	Black-Slate	351–375
16	Yellow-Blue	376–400
17	Yellow-Orange	401–425
18	Yellow-Green	426–450
19	Yellow-Brown	451–475
20	Yellow-Slate	476–500
21	Violet-Blue	501–525
22	Violet-Orange	526–550
23	Violet-Green	551–575
24	Violet-Brown	576–600

(7) The use of the white unit binder in cables of 100 pairs or less is optional.

(8) When desired for manufacturing reasons, two or more 25 pair groups may be bound together with nonhygroscopic and nonwicking threads or tapes into a super-unit. Threads or tapes must meet the requirements specified in paragraph (d)(5) of this section. The group binders and the super-unit binders must be color coded such that the combination of the two binders must positively identify each 25 pair group from every other 25 pair group in the cable. Super-unit binders must be of the color shown in the following table:

SUPER-UNIT BINDER COLORS

Pair Numbers	Binder Color
1–600	White
601–1200	Red
1201–1800	Black
1801–2400	Yellow
2401–3000	Violet
3001–3600	Blue
3601–4200	Orange
4201–4800	Green
4801–5400	Brown
5401–6000	Slate

(9) Color binders must not be missing for more than 90 meters (300 feet) from any 25 pair group or from any subgroup used as part of a super-unit. At any cable cross-section, no adjacent 25 pair groups and no more than one subgroup of any super-unit may have missing binders. In no case must the total number of missing binders exceed three. Missing super-unit binders must not be permitted for any distance.

(10) Any reel of cable which contains missing binders must be labeled indicating the colors and location of the binders involved. The labeling must be applied to the reel and also to the cable.

(e) *Screened cable.* (1) Screened cable must be constructed such that a metallic, internal screen(s) must be provided to separate and provide sufficient isolation between the compartments to meet the requirements of this section.

(2) At the option of the user or manufacturer, identified service pairs providing for voice order and fault location may be placed in screened cables.

(i) The number of service pairs provided must be one per twenty-five operating pairs plus two for a cable size up to and including 400 pairs, subject to a minimum of four service pairs. The pair counts for screened cables are as follows:

SCREENED CABLE PAIR COUNTS

Carrier Pair Count	Service Pairs	Total Pair Count
24	4	28
50	4	54
100	6	106
150	8	158
200	10	210
300	14	314
400	18	418

(ii) The service pairs must be equally divided among the compartments. The color sequence must be repeated in each compartment.

(iii) The electrical and physical characteristics of each service pair must meet all the requirements set forth in this section.

(iv) The colors used for the service pairs must be in accordance with the requirements of paragraph (b)(5) of this section. The color code used for the service pairs together with the service pair number are shown in the following table:

COLOR CODE FOR SERVICE PAIRS

Service Pair No.	Color	
	Tip	Ring
1	White	Red
2	“	Black
3	“	Yellow
4	“	Violet
5	Red	Black
6	“	Yellow
7	“	Violet
8	Black	Yellow
9	“	Violet

(3) The screen tape must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 5.1 through 5.4.

(4) The screen tape must be tested for dielectric strength by completely removing the protective coating from one end to be used for grounding purposes.

(i) Using an electrode, over a 30 centimeter (1 foot) length, apply a direct current (dc) voltage at the rate of rise of 500 volts/second until failure.

(ii) No breakdown should occur below 8 kilovolts.

(f) *Filling compound.* (1) After or during the stranding operation and prior to application of the core wrap, filling compound must be applied to the cable core. The compound must be as nearly colorless as is commercially feasible and consistent with the end product requirements and pair identification.

(2) The filling compound must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 4.4 through 4.4.4.

(3) The individual cable manufacturer must satisfy RUS that the filling compound selected for use is suitable for its intended application. The filling compound must be applied to the cable

in such a manner that the cable components will not be degraded.

(g) *Core wrap.* (1) The core wrap must comply with the requirements specified in ANSI/ICEA-S-84–608–1988, paragraph 4.3.

(2) If required for manufacturing reasons, white or colored binders of nonhygroscopic and nonwicking material may be applied over the core and/or wrap. When used, binders must meet the requirements specified in paragraph (d)(5) of this section.

(3) Sufficient filling compound must have been applied to the core wrap so that voids or air spaces existing between the core and the inner side of the core wrap are minimized.

(h) *Flooding compound.* (1) Sufficient flooding compound must be applied on all sheath interfaces so that voids and air spaces in these areas are minimized. When the optional armored design is used, the flooding compound must be applied between the core wrap and shield, between the shield and armor, and between the armor and the jacket so that voids and air spaces in these areas are minimized. The use of floodant over the outer metallic substrate is not required if uniform bonding, per paragraph (i)(7) of this section, is achieved between the plastic-clad metal and the jacket.

(2) The flooding compound must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 4.5 and the jacket slip test requirements of appendix A, paragraph (III)(5) of this section.

(3) The individual cable manufacturer must satisfy RUS that the flooding compound selected for use is acceptable for the application.

(i) *Shield and optional armor.* (1) A single corrugated shield must be applied longitudinally over the core wrap.

(2) For unarmored cable the shield overlap must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.2. Core diameter is defined as the diameter under the core wrap and binding.

(3) For cables containing the coated aluminum shield/coated steel armor (CACSP) sheath design, the coated aluminum shield must be applied in accordance with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.2, Dual Tape Shielding System.

(4) General requirements for application of the shielding material are as follows:

(i) Successive lengths of shielding tapes may be joined during the manufacturing process by means of cold weld, electric weld, soldering with a nonacid flux or other acceptable means.

(ii) Shield splices must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.3.

(iii) The corrugations and the application process of the coated aluminum and copper bearing shields must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.1.

(iv) The shielding material must be applied in such a manner as to enable the cable to pass the cold bend test specified in paragraph (l)(3) of this section.

(5) The following is a list of acceptable materials for use as cable shielding. Other types of shielding materials may also be used provided they are accepted by RUS prior to their use.

Standard Cable	Gopher Resistant Cable
8-mil Coated Aluminum [1] 5-mil Copper	10-mil Copper 6-mil Copper-Clad Stainless Steel 5 mil Copper-Clad Stainless Steel 5 mil Copper-Clad Alloy Steel 7-mil Alloy 194 6-mil Alloy 194 8-mil Coated Aluminum [1] and 6-mil Coated Steel [1]

[1] Dimensions of uncoated metal.

(i) The 8-mil aluminum tape must be plastic coated on both sides and must comply with the requirements of ANSI/ICEA S-84–608–1988, paragraph 6.2.2.

(ii) The 5-mil copper tape must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.2.3.

(iii) The 10-mil copper tape must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.2.4.

(iv) The 6-mil copper clad stainless steel tape must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.2.5.

(v) The 5-mil copper clad stainless steel tape must be in the fully annealed condition and must conform to the requirements of American Society for Testing and Materials (ASTM) B 694–86, with a cladding ratio of 16/68/16.

(A) The electrical conductivity of the clad tape must be a minimum of 28 percent of the International Annealed Copper Standard (IACS) when measured per ASTM B 193–87.

(B) The tape must be nominally 0.13 millimeter (0.005 inch) thick with a minimum thickness of 0.11 millimeter (0.0045 inch).

(vi) The 5-mil copper clad alloy steel tape must be in the fully annealed condition and the copper component must conform to the requirements of ASTM B 224–80 and the alloy steel component must conform to the requirements of ASTM A 505–87, with a cladding ratio of 16/68/16.

(A) The electrical conductivity of the copper clad alloy steel tape must comply with the requirement specified in (5)(v)(A) of this section.

(B) The thickness of the copper clad alloy steel tape must comply with the requirements specified in (5)(v)(B) of this section.

(vii) The 6-mil and 7-mil 194 copper alloy tapes must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.2.6.

(6) The corrugation extensibility of the coated aluminum shield must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.4.

(7) When the jacket is bonded to the plastic coated aluminum shield, the bond between the jacket and shield must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 7.2.6.

(8) A single plastic coated steel corrugated armor must be applied longitudinally directly over the coated aluminum shield listed in paragraph (i)(5) of this section with an overlap complying with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.2, Outer Steel Tape.

(9) Successive lengths of steel armoring tapes may be joined during the manufacturing process by means of cold weld, electric weld, soldering with a nonacid flux or other acceptable means. Armor splices must comply with the breaking strength and resistance requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.3.

(10) The corrugations and the application process of the coated steel armor must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.3.1.

(i) The corrugations of the armor tape must coincide with the corrugations of the coated aluminum shield.

(ii) Overlapped portions of the armor tape must be in register (corrugations must coincide at overlap) and in contact at the outer edge.

(11) The armoring material must be so applied to enable the cable to pass the cold bend test specified in paragraph (l)(3) of this section.

(12) The 6-mil steel tape must be electrolytic chrome coated steel (ECCS) plastic coated on both sides and must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 6.2.8.

(13) When the jacket is bonded to the plastic coated steel armor, the bond between the jacket and armor must comply with the requirement specified in ANSI/ICEA-S-84–608–1988, paragraph 7.2.6.

(j) *Cable jacket.* (1) The jacket must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 7.2.

(2) The raw materials used for the cable jacket must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 7.2.1.

(3) Jacketing material removed from or tested on the cable must meet the performance requirements specified in ANSI/ICEA S-84–608–1988, paragraphs 7.2.3 and 7.2.4.

(4) The thickness of the jacket must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 7.2.2.

(k) *Electrical requirements*—(1) *Conductor resistance.* The direct current resistance of any conductor in a completed cable and the average resistance of all conductors in a Quality Control Lot must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.1.

(2) *Resistance unbalance.* (i) The direct current resistance unbalance between the two conductors of any pair in a

completed cable and the average resistance unbalance of all pairs in a completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.2.

(ii) The resistance unbalance between tip and ring conductors shall be random with respect to the direction of unbalance. That is, the resistance of the tip conductors shall not be consistently higher with respect to the ring conductors and vice versa.

(3) *Mutual capacitance*. The average mutual capacitance of all pairs in a completed cable and the individual mutual capacitance of any pair in a completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.3.

(4) *Capacitance difference*. (i) The capacitance difference for completed cables having 75 pairs or greater must comply with the requirement specified in ANSI/ICEA S-84–608–1988, paragraph 8.4.

(ii) When measuring screened cable, the inner and outer pairs must be selected from both sides of the screen.

(5) *Pair-to-pair capacitance unbalance*—(i) *Pair-to-pair*. The capacitance unbalance as measured on the completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.5.

(ii) *Screened cable*. In cables with 25 pairs or less and within each group of multigroup cables, the pair-to-pair capacitance unbalance between any two pairs in an individual compartment must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.5. The pair-to-pair capacitance unbalances to be considered must be:

(A) Between pairs adjacent in a layer in an individual compartment;

(B) Between pairs in centers of 4 pairs or less in an individual compartment; and

(C) Between pairs in adjacent layers in an individual compartment when the number of pairs in the inner (smaller) layer is 6 or less. The center is counted as a layer.

(iii) In cables with 25 pairs or less, the root-mean-square (rms) value is to include all the pair-to-pair unbalances measured for each compartment separately.

(iv) In cables containing more than 25 pairs, the rms value must include the pair-to-pair unbalances in the separate compartments.

(6) *Pair-to-ground capacitance unbalance*—(i) *Pair-to-ground*. The capacitance unbalance as measured on the completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.6.

(ii) When measuring pair-to-ground capacitance unbalance all pairs except the pair under test are grounded to the shield and/or shield/armor except when measuring cables containing super units in which case all other pairs in the same super unit must be grounded to the shield.

(iii) The screen tape must be left floating during the test.

(iv) Pair-to-ground capacitance unbalance may vary directly with the length of the cable.

(7) *Attenuation*. (i) For nonscreened and screened cables, the average attenuation of all pairs on any reel when measured at 150 and 772 kilohertz must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.7, Foam and/or Foam-Skin Column.

(ii) For T1C type cables over 12 pairs, the maximum average attenuation of all pairs on any reel must not exceed the values listed below when measured at a frequency of 1576 kilohertz at or corrected to a temperature of 20 ±1 °C. The test must be conducted in accordance with ASTM D 4566–90.

AWG	Maximum Average Attenuation decibel/kilometer (dB/km) (decibel/mile)
19	14.9 (24.0)
22	21.6 (34.8)
24	27.2 (43.8)

(8) *Crosstalk loss*. (i) The equal level far-end power sum crosstalk loss (FEXT) as measured on the completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.8, FEXT Table.

(ii) The near-end power sum crosstalk loss (NEXT) as measured on completed cable must comply with the requirements specified in ANSI/ICEA S-84–608–1988, paragraph 8.8, NEXT Table.

(iii) *Screened cable.* (A) For screened cables the NEXT as measured on the completed cable must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 8.9 and 8.9.1.

(B) For T1C screened cable the NEXT as measured on the completed cable must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraphs 8.9 and 8.9.2.

(9) *Insulation resistance.* The insulation resistance of each insulated conductor in a completed cable must comply with the requirement specified in ANSI/ICEA S-84-608-1988, paragraph 8.11.

(10) *High voltage test.* (i) In each length of completed cable, the insulation between conductors must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraph 8.12, Foam and/or Foam-Skin Column.

(ii) In each length of completed cable, the dielectric between the shield and/or armor and conductors in the core must comply with the requirements specified in ANSI/ICEA S-84-608-1988, paragraph 8.13, Single Jacketed, Foam and/or Foam-Skin Column. In screened cable the screen tape must be left floating.

(iii) *Screened cable.* (A) In each length of completed screened cable, the dielectric between the screen tape and the conductors in the core must comply with the requirement specified in ANSI/ICEA S-84-608-1988, paragraph 8.14.

(B) In this test, the cable shield and/or armor must be left floating.

(11) *Electrical variations.* (i) Pairs in each length of cable having either a ground, cross, short, or open circuit condition will not be permitted.

(ii) The maximum number of pairs in a cable which may vary as specified in paragraph (k)(11)(iii) of this section from the electrical parameters given in this section are listed below. These pairs may be excluded from the arithmetic calculation.

Nominal Pair Count	Maximum Number of Pairs With Allowable Electrical Variation
6–100	1
101–300	2
301–400	3
401–600	4
601 and above	6

(iii) *Parameter variations.* (A) *Capacitance unbalance-to-ground.* If the cable fails either the maximum individual pair or average capacitance unbalance-to-ground requirement and all individual pairs are 3937 picofarad/kilometer (1200 picofarad/1000 feet) or less, the number of pairs specified in paragraph (k)(11)(ii) of this section may be eliminated from the average and maximum individual calculations.

(B) *Resistance unbalance.* Individual pair of 7 percent for all gauges.

(C) *Conductor resistance, maximum.* The following table shows maximum conductor resistance:

AWG	ohms/kilometer	(ohms/1000 feet)
19	29.9	(9.1)
22	60.0	(18.3)
24	94.5	(28.8)
26	151.6	(46.2)

NOTE: RUS recognizes that in large pair count cable (600 pair and above) a cross, short, or open circuit condition occasionally may develop in a pair which does not affect the performance of the other cable pairs. In these circumstances rejection of the entire cable may be economically unsound or repairs may be impractical. In such circumstances the manufacturer may desire to negotiate with the customer for acceptance of the cable. No more than 0.5 percent of the pairs may be involved.

(l) *Mechanical requirements*—(1) *Compound flow test.* All cables manufactured in accordance with the requirements of this section must be capable of meeting the compound flow test specified in ANSI/ICEA S-84-608-1988, paragraph 9.1 using a test temperature of 80 ±1 °C.

(2) *Water penetration test.* All cables manufactured in accordance with the requirements of this section must be capable of meeting the water penetration test specified in ANSI/ICEA S-84-608-1988, paragraph 9.2.

(3) *Cable cold bend test.* All cables manufactured in accordance with the requirements of this section must be capable of meeting the cable cold bend test specified in ANSI/ICEA S-84-608-1988, paragraph 9.3.

(4) *Cable impact test.* All cables manufactured in accordance with the requirements of this section must be capable of meeting the cable impact test specified in ANSI/ICEA S-84–608–1988, paragraph 9.4.

(5) *Jacket notch test (CACSP sheath only).* All cables utilizing the coated aluminum/coated steel sheath (CACSP) design manufactured in accordance with the requirements of this section must be capable of meeting the jacket notch test specified in ANSI/ICEA S-84–608–1988, paragraph 9.5.

(6) *Cable torsion test (CACSP sheath only).* All cables utilizing the coated aluminum/coated steel sheath (CACSP) design manufactured in accordance with the requirements of this section must be capable of meeting the cable torsion test specified in ANSI/ICEA S-84–608–1988, paragraph 9.6.

(m) *Sheath slitting cord (optional).* (1) Sheath slitting cord may be used in the cable structure at the option of the manufacturer unless specified by the end user.

(2) When a sheath slitting cord is used it must be nonhygroscopic and nonwicking, continuous throughout a length of cable and of sufficient strength to open the sheath without breaking the cord.

(n) *Identification marker and length marker.* (1) Each length of cable must be identified in accordance with ANSI/ICEA S-84–608–1988, paragraphs 10.1 through 10.1.4. The color of the ink used for the initial outer jacket marking must be either white or silver.

(2) The markings must be printed on the jacket at regular intervals of not more than 0.6 meter (2 feet).

(3) The completed cable must have sequentially numbered length markers in accordance with ANSI/ICEA S-84–608–1988, paragraph 10.1.5. The color of the ink used for the initial outer jacket marking must be either white or silver.

(o) *Preconnectorized cable (optional).* (1) At the option of the manufacturer and upon request by the purchaser, cables 100 pairs and larger may be factory terminated in 25 pair splicing modules.

(2) The splicing modules must meet the requirements of RUS Bulletin 345–54, PE-52, RUS Specification for Telephone Cable Splicing Connectors (Incorporated by Reference at §1755.97), and be accepted by RUS prior to their use.

(p) *Acceptance testing and extent of testing.* (1) The tests described in appendix A of 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 RUS. These tests are intended to show the inherent capability of the manufacturer to produce cable products having long life and stability.

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

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

(ii) Qualification Test Data, per appendix A of this section;

(iii) To periodic plant inspections;

(iv) A certification that the product does or does not comply with the domestic origin manufacturing provisions of the ''Buy American'' requirements of the Rural Electrification Act of 1938 (7 U.S.C. 901 *et seq.*);

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

(vi) Other nonproprietary data deemed necessary by the Chief, Outside Plant Branch (Telephone).

(3) For requalification acceptance, the manufacturer must submit an original signature certification that the product fully complies with each section of the specification, excluding the Qualification Section, and a certification that the product does or does not comply with the domestic origin manufacturing provisions of the ''Buy American'' requirements of the Rural Electrification Act of 1938 (7 U.S.C. 901 *et seq.*), for acceptance by August 30 of each year. The required data must have been gathered within 90 days of the submission. If the initial acceptance of a product to this specification was within 180 days of August 30, then requalification for that product will not be required for that year.

(4) Initial and requalification acceptance requests should be addressed to:

Chairman, Technical Standards Committee ''A'' (Telephone), Telecommunications Standard Division, Rural Utilities Service, Washington, DC 20250–1500.

(5) *Tests on 100 percent of completed cable.* (i) The shield and/or armor of each length of cable must be tested for continuity in accordance with ANSI/ICEA S-84-608-1988, paragraph 8.16.

(ii) The screen tape of each length of screened cable must be tested for continuity in accordance with ANSI/ICEA S-84-608-1988, paragraph 8.16.

(iii) Dielectric strength between conductors and shield and/or armor must be tested to determine freedom from grounds in accordance with paragraph (k)(10)(ii) of this section.

(iv) Dielectric strength between conductors and screen tape must be tested to determine freedom from grounds in accordance with paragraph (k)(10)(iii) of this section.

(v) Each conductor in the completed cable must be tested for continuity in accordance with ANSI/ICEA S-84-608-1988, paragraph 8.16.

(vi) Dielectric strength between conductors, in each length of completed cable, must be tested to insure freedom from shorts and crosses in each length of completed cable in accordance with paragraph (k)(10)(i) of this section.

(vii) Each conductor in the completed preconnectorized cable must be tested for continuity.

(viii) Each length of completed preconnectorized cable must be tested for split pairs.

(ix) The average mutual capacitance must be measured on all cables. If the average mutual capacitance for the first 100 pairs tested from randomly selected groups is between 50 and 53 nanofarads/kilometer (nF/km) (80 and 85 nanofarad/mile), the remainder of the pairs need not be tested on the 100 percent basis (See paragraph (k)(3) of this section).

(6) *Capability tests.* Tests on a quality assurance basis must be made as frequently as is required for each manufacturer to determine and maintain compliance with:

(i) Performance requirements for conductor insulation, jacketing material, and filling and flooding compounds;

(ii) Bonding properties of coated or laminated shielding and armoring materials and performance requirements for screen tape;

(iii) Sequential marking and lettering;

(iv) Capacitance difference, capacitance unbalance, crosstalk, and attenuation;

(v) Insulation resistance, conductor resistance, and resistance unbalance;

(vi) Cable cold bend and cable impact tests;

(vii) Water penetration and compound flow tests; and

(viii) Jacket notch and cable torsion tests.

(q) *Summary of records of electrical and physical tests.* (1) Each manufacturer must maintain suitable summary records for a period of at least 3 years of all electrical and physical tests required on completed cable by this section as set forth in paragraphs (p)(5) and (p)(6) of this section. The test data for a particular reel must be in a form that it may be readily available to the purchaser or to RUS upon request.

(2) Measurements and computed values must be rounded off to the number of places or figures specified for the requirement according to ANSI/ICEA S-84-608-1988, paragraph 1.3.

(r) *Manufacturing irregularities.* (1) Repairs to the shield and/or armor are not permitted in cable supplied to end users under this section.

(2) Minor defects in jackets (defects having a dimension of 3 millimeters (0.125 inch.) or less in any direction) may be repaired by means of heat fusing in accordance with good commercial practices utilizing sheath grade compounds.

(s) *Preparation for shipment.* (1) The cable must be shipped on reels. The diameter of the drum must be large enough to prevent damage to the cable from reeling or unreeling. The reels must be substantial and so constructed as to prevent damage to the cable during shipment and handling.

(2) The thermal wrap must comply with the requirements of ANSI/ICEA S-84-608-1988, paragraph 10.3. When a thermal reel wrap is supplied, the wrap must be applied to the reel and must be suitably secured in place to minimize thermal exposure to the cable during storage and shipment. The use of the thermal reel wrap as a means of reel protection will be at the option of the

manufacturer unless specified by the end user.

(3) The outer end of the cable must be securely fastened to the reel head so as to prevent the cable from becoming loose in transit. The inner end of the cable must be securely fastened in such a way as to make it readily available if required for electrical testing. Spikes, staples, or other fastening devices which penetrate the cable jacket must not be used. The method of fastening the cable ends must be acceptable to RUS and accepted prior to its use.

(4) Each length of cable must be wound on a separate reel unless otherwise specified or agreed to by the purchaser.

(5) The arbor hole must admit a spindle 63 millimeters (2.5 inches) in diameter without binding. Steel arbor hole liners may be used but must be accepted by RUS prior to their use.

(6) 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.

(7) Each reel must be stenciled or labeled on either one or both sides with the information specified in ANSI/ICEA S-84-608-1988, paragraph 10.4 and the RUS cable designation:

Cable Designation

BFCE
Cable Construction
Pair Count
Conductor Gauge

E = Expanded Insulation
A = Coated Aluminum Shield
C = Copper Shield
Y = Gopher Resistant Shield
X = Armored, Separate Shield
H = T1 Screened Cable
H1C = T1C Screened Cable
P = Preconnectorized

Example: BFCEXH100–22

Buried Filled Cable, Expanded Insulation, Armored (w/separate shield), T1 Screened Cable, 100 pair, 22 AWG.

(8) When cable manufactured to the requirements of this specification is shipped, both ends must be equipped with end caps acceptable to RUS.

(9) When preconnectorized cables are shipped, the splicing modules must be protected to prevent damage during shipment and handling. The protection method must be acceptable to RUS and accepted prior to its use.

(10) All cables ordered for use in underground duct applications must be equipped with a factory-installed pulling-eye on the outer end in accordance with ANSI/ICEA S-84-608-1988, paragraph 10.5.2.

(The information and recordkeeping requirements of this section have been approved by the Office of Management and Budget (OMB) under the control number 0572–0059)

APPENDIX A TO §1755.890—QUALIFICATION TEST METHODS

(I) The test procedures described in this appendix are for qualification of initial cable designs and major modifications of accepted designs. Included in (V) of this appendix are suggested formats that may to be used in submitting test results to RUS.

(II) *Sample selection and preparation.* (1) All testing must be performed on lengths removed sequentially from the same 25 pair, 22 gauge jacketed cable. This cable must not have been exposed to temperatures in excess of 38 °C since its initial cool down after sheathing. The lengths specified are minimum lengths and if desirable from a laboratory testing standpoint longer lengths may be used.

(a) Length A must be 10 ±0.2 meters (33 ±0.5 feet) long and must be maintained at 23 ±3 °C. One length is required.

(b) Length B must be 12 ±0.2 meters (40 ±0.5 feet) long. Prepare the test sample by removing the jacket, shield or shield/armor, and core wrap for a sufficient distance on both ends to allow the insulated conductors to be flared out. Remove sufficient conductor insulation so that appropriate electrical test connections can be made at both ends. Coil the sample with a diameter of 15 to 20 times its sheath diameter. Three lengths are required.

(c) Length C must be one meter (3 feet) long. Four lengths are required.

(d) Length D must be 300 millimeters (1 foot) long. Four lengths are required.

(e) Length E must be 600 millimeters (2 feet) long. Four lengths are required.

(f) Length F must be 3 meters (10 feet) long and must be maintained at 23 ±3 °C for the duration of the test. Two lengths are required.

(2) *Data reference temperature.* Unless otherwise specified, all measurements must be made at 23 ±3 °C.

(III) *Environmental tests*—(1) *Heat aging test*—(a) *Test samples.* Place one sample each of lengths B, C, D, and E in an oven or environmental chamber. The ends of Sample B must exit from the chamber or oven for electrical tests. Securely seal the oven exit holes.

(b) *Sequence of tests.* The samples are to be subjected to the following tests after conditioning:

(i) Water Immersion Test outlined in (III)(2) of this appendix;

(ii) Water Penetration Test outlined in (III)(3) of this appendix;

(iii) Insulation Compression Test outlined in (III)(4) of this appendix; and

(iv) Jacket Slip Strength Test outlined in (III)(5) of this appendix.

(c) *Initial Measurements.* (i) For Sample B measure the open circuit capacitance for each odd numbered pair at 1, 150, and 772 kilohertz, and the attenuation at 150 and 772 kilohertz after conditioning the sample at the data reference temperature for 24 hours. Calculate the average and standard deviation for the data of the 13 pairs on a per kilometer or (on a per mile) basis.

(ii) The attenuation at 150 and 772 kilohertz may be calculated from open circuit admittance (Yoc) and short circuit impedance (Zsc) or may be obtained by direct measurement of attenuation.

(iii) Record on suggested formats in (V) of this appendix or on other easily readable formats.

(d) *Heat conditioning.* (i) Immediately after completing the initial measurements, condition the sample for 14 days at a temperature of 65 ±2 °C.

(ii) At the end of this period note any exudation of cable filler. Measure and calculate the parameters given in (III)(1)(c) of this appendix. Record on suggested formats in (V) of this appendix or other easily readable formats.

(iii) Cut away and discard a one meter (3 foot) section from each end of length B.

(e) *Overall electrical deviation.* (i) Calculate the percent change in all average parameters between the final parameters after conditioning and the initial parameters in (III)(1)(c) of this appendix.

(ii) The stability of the electrical parameters after completion of this test must be within the following prescribed limits:

(A) *Capacitance.* The average mutual capacitance must be within 5 percent of its original value;

(B) The change in average mutual capacitance must be less than 5 percent over frequency 1 to 150 kilohertz; and

(C) *Attenuation.* The 150 and 772 kilohertz attenuation must not have increased by more than 5 percent over their original values.

(2) *Water immersion electrical test*—(a) *Test sample selection.* The 10 meter (33 foot) section of length B must be tested.

(b) *Test sample preparation.* Prepare the sample by removing the jacket, shield or shield/armor, and core wrap for sufficient distance to allow one end to be accessed for test connections. Cut out a series of 6 millimeter (0.25 inch.) diameter holes along the test sample, at 30 centimeters (1 foot) intervals progressing successively 90 degrees around the circumference of the cable. Assure that the cable core is exposed at each hole by slitting the core wrapper. Place the prepared sample in a dry vessel which when filled will maintain a one meter (3 foot) head of water over 6 meters (20 feet) of uncoiled cable. Extend and fasten the ends of the cable so they will be above the water line and the pairs are rigidly held for the duration of the test.

(c) *Capacitance testing.* Measure the initial values of mutual capacitance of all odd pairs in each cable at a frequency of 1 kilohertz before filling the vessel with water. Be sure the cable shield or shield/armor is grounded to the test equipment. Fill the vessels until there is a one meter (3 foot) head of water on the cables.

(i) Remeasure the mutual capacitance after the cables have been submerged for 24 hours and again after 30 days.

(ii) Record each sample separately on suggested formats attached or on other easily readable formats.

(d) *Overall electrical deviation.* (i) Calculate the percent change in all average parameters between the final parameters after conditioning with the initial parameters in (III)(2)(c) of this appendix.

(ii) The average mutual capacitance must be within 5 percent of its original value.

(3) *Water penetration testing.* (a) A watertight closure must be placed over the jacket of length C. The closure must not be placed over the jacket so tightly that the flow of water through pre-existing voids of air spaces is restricted. The other end of the sample must remain open.

(b) Test per Option A or Option B—(i) *Option A.* Weigh the sample and closure prior to testing. Fill the closure with water and place under a continuous pressure of 10 ±0.7 kilopascals (1.5 ±0.1 pounds per square inch gauge) for one hour. Collect the water leakage from the end of the test sample during the test and weigh to the nearest 0.1 gram. Immediately after the one hour test, seal the ends of the cable with a thin layer of grease and remove all visible water from the closure, being careful not to remove water that penetrated into the core during the test. Reweigh the sample and determine the weight of water that penetrated into the core. The weight of water that penetrated into the core must not exceed 6 grams.

(ii) *Option B.* Fill the closure with a 0.2 gram sodium fluorscein per liter water solution and apply a continuous pressure 10 ±0.7 kilopascals (1.5 ±0.1 pounds per square inch gauge) for one hour. Catch and weigh any water that leaks from the end of the cable during the one hour period. If no water leaks from the sample, carefully remove the water from the closure. Then carefully remove the jacket, shield or shield/ armor, and core wrap one at a time, examining with an ultraviolet light source for water penetration. After removal of the core wrap, carefully dissect the core and examine for water penetration within the core. Where water penetration is observed, measure the penetration distance. The distance of water penetration into the core must not exceed 127 millimeters (5.0 inches).

(4) *Insulation compression test*—(a) *Test sample D*. Remove jacket, shield or shield/armor, and core wrap being careful not to damage the conductor insulation. Remove one pair from the core and carefully separate, wipe off core filler and straighten the insulated conductors. Retwist the two insulated conductors together under sufficient tension to form 10 evenly spaced 360 degree twists in a length of 10 centimeters (4 inches).

(b) *Sample testing*. Center the mid 50 millimeters (2 inches) of the twisted pair between 2 smooth rigid parallel metal plates that are 50 millimeters × 50 millimeters (2 inches × 2 inches). Apply a 1.5 volt direct current potential between the conductors, using a light or buzzer to indicate electrical contact between the conductors. Apply a constant load of 67 newtons (15 pound-force) on the sample for one minute and monitor for evidence of contact between the conductors. Record results on suggested formats in (V) of this appendix or on other easily readable formats.

(5) *Jacket slip strength test*—(a) *Sample selection*. Test Sample E from (III)(1)(a) of this appendix.

(b) *Sample preparation*. Prepare test sample in accordance with the procedures specified in ASTM D 4565–90a.

(c) *Sample conditioning and testing*. Remove the sample from the tensile tester prior to testing and condition for one hour at 50 ±2 °C. Test immediately in accordance with the procedures specified in ASTM D 4565–90a. A minimum jacket slip strength of 67 newtons (15 pound-force) is required. Record the highest load attained.

(6) *Humidity exposure*. (a) Repeat steps (III)(1)(a) through (III)(1)(c)(iii) of this appendix for separate set of samples B, C, D, and E which have not been subjected to prior environmental conditioning.

(b) Immediately after completing the measurements, expose the test sample to 100 temperature cyclings. Relative humidity within the chamber must be maintained at 90 ±2 percent. One cycle consists of beginning at a stabilized chamber and test sample temperature of 52 ±1 °C, increasing the temperature to 57 ±1 °C, allowing the chamber and test samples to stabilize at this level, then dropping the temperature back to 52 ±1 °C.

(c) Repeat steps (III)(1)(d)(ii) through (III)(5)(c) of this appendix.

(7) *Temperature cycling*. (a) Repeat steps (III)(1)(a) through (III)(1)(c)(iii) of this appendix for separate set of samples B, C, D, and E which have not been subjected to prior environmental conditioning.

(b) Immediately after completing the measurements, subject the test sample to the 10 cycles of temperature between a minimum of −40 °C and +60 °C. The test sample must be held at each temperature extreme for a minimum of 1½ hours during each cycle of temperature. The air within the temperature cycling chamber must be circulated throughout the duration of the cycling.

(c) Repeat steps (III)(1)(d)(ii) through (III)(5)(c) of this appendix.

(IV) *Control sample*—(1) *Test samples*. A separate set of lengths A, C, D, E, and F must have been maintained at 23 ±3 °C for at least 48 hours before the testing.

(2) Repeat steps (III)(2) through (III)(5)(c) of this appendix except use length A instead of length B.

(3) *Surge test*. (a) One length of sample F must be used to measure the breakdown between conductors while the other length of F must be used to measure the core to shield breakdown.

(b) The samples must be capable of withstanding without damage, a single surge voltage of 15 kilovolts peak between conductors, and a 25 kilovolts peak surge voltage between conductors and the shield or shield/armor as hereinafter described. The surge voltage must be developed from a capacitor discharged through a forming resistor connected in parallel with the dielectric of the test sample. The surge generator constants must be such as to produce a surge of 1.5 × 40 microsecond wave shape.

(c) The shape of the generated wave must be determined at a reduced voltage by connecting an oscilloscope across the forming resistor with the cable sample connected in parallel with the forming resistor. The capacitor bank is charged to the test voltage and then discharged through the forming resistor and test sample. The test sample will be considered to have passed the test if there is no distinct change in the wave shape obtained with the initial reduced voltage compared to that obtained after the application of the test voltage.

(V) The following suggested formats may be used in submitting the test results to RUS:

ENVIRONMENTAL CONDITIONING______________

FREQUENCY 1 KILOHERTZ

Pair Number	Capacitance nF/km (nanofarad/mile) Initial	Final
1	________	________
3	________	________
5	________	________
7	________	________
9	________	________
11	________	________
13	________	________
15	________	________
17	________	________
19	________	________
21	________	________
23	________	________
25	________	________
Average x̄	________	________

Overall Percent Difference in Average x̄ ____________

ENVIRONMENTAL CONDITIONING______________

FREQUENCY 150 KILOHERTZ

Pair Number	Capacitance nF/km (nanofarad/mile)		Attenuation dB/km (decibel/mile)	
	Initial	Final	Initial	Final
1	_____	_____	_____	_____
3	_____	_____	_____	_____
5	_____	_____	_____	_____
7	_____	_____	_____	_____
9	_____	_____	_____	_____
11	_____	_____	_____	_____
13	_____	_____	_____	_____
15	_____	_____	_____	_____
17	_____	_____	_____	_____
19	_____	_____	_____	_____
21	_____	_____	_____	_____
23	_____	_____	_____	_____
25	_____	_____	_____	_____
Average x̄	_____	_____	_____	_____

Overall Percent Difference in Average x̄ Capacitance:__________ Conductance:__________

ENVIRONMENTAL CONDITIONING______________

FREQUENCY 772 KILOHERTZ

Pair Number	Capacitance nF/km (nanofarad/mile)		Attenuation dB/km (decibel/mile)	
	Initial	Final	Initial	Final
1	_____	_____	_____	_____
3	_____	_____	_____	_____
5	_____	_____	_____	_____
7	_____	_____	_____	_____
9	_____	_____	_____	_____
11	_____	_____	_____	_____
13	_____	_____	_____	_____
15	_____	_____	_____	_____
17	_____	_____	_____	_____
19	_____	_____	_____	_____
21	_____	_____	_____	_____
23	_____	_____	_____	_____
25	_____	_____	_____	_____
Average x̄	_____	_____	_____	_____

Overall Percent Difference in Average x̄ Capacitance:__________ Conductance:__________

ENVIRONMENTAL CONDITIONING______________

WATER IMMERSION TEST (1 KILOHERTZ)

Pair Number	Capacitance nF/km (nanofarad/mile) Initial	24 Hours	Final
1	_____	_____	_____
3	_____	_____	_____
5	_____	_____	_____
7	_____	_____	_____
9	_____	_____	_____
11	_____	_____	_____
13	_____	_____	_____
15	_____	_____	_____
17	_____	_____	_____
19	_____	_____	_____
21	_____	_____	_____
23	_____	_____	_____
25	_____	_____	_____
Average x̄	_____	_____	_____

Overall Percent Difference in Average x̄ ____________

WATER PENETRATION TEST

	Option A		Option B	
	End Leakage grams	Weight Gain grams	End Leakage grams	Penetration mm (in.)
Control.				
Heat Age.				
Humidity Exposure.				
Temperature Cycling.				

INSULATION COMPRESSION

	Failures
Control	____________
Heat Age	____________
Humidity Exposure	____________
Temperature Cycling	____________

JACKET SLIP STRENGTH @ 50 °C

	Load in newtons (pound-force)
Control	____________
Heat Age	____________
Humidity Exposure	____________

JACKET SLIP STRENGTH @ 50 °C—Continued

	Load in newtons (pound-force)
Temperature Cycling	______________

FILLER EXUDATION (GRAMS)

Heat Age	______________
Humidity Exposure	______________
Temperature Cycling	______________

SURGE TEST (KILOVOLTS)

Conductor to Conductor	______________
Shield to Conductors	______________

[58 FR 29328, May 20, 1993, as amended at 60 FR 1711, Jan. 5, 1995; 69 FR 18803, Apr. 9, 2004]

§ 1755.900 Abbreviations and Definitions.

The following abbreviations and definitions apply to §§ 1755.901 and 1755.902:

(a) *Abbreviations.*
(1) ADSS All dielectric self-supporting;
(2) ASTM American Society for Testing and Materials;
(3) °C Centigrade temperature scale;
(4) dB Decibel;
(5) CSM Central strength member;
(6) dB/km Decibels per 1 kilometer;
(7) ECCS Electrolytic chrome coated steel;
(8) EIA Electronic Industries Alliance;
(9) EIA/TIA Electronic Industries Alliance/Telecommunications Industry Association;
(10) FTTH Fiber-to-the-Home;
(11) Gbps Gigabit per second or Gbit/s;
(12) GE General Electric;
(13) HDPE High density polyethylene;
(14) ICEA Insulated Cable Engineers Association, Inc.;
(15) Km kilometer(s;)
(16) LDPE Low density polyethylene;
(17) m meter(s;)
(18) Max. Maximum;
(19) Mbit Megabits;
(20) MDPE Medium density polyethylene;
(21) MHz-km Megahertz-kilometer;
(22) Min. Minimum;
(23) MFD Mode-Field Diameter;
(24) nm Nanometer(s;)
(25) N Newton(s;)
(26) NA Numerical aperture;
(27) NESC National Electrical Safety Code;
(28) OC Optical cable;
(29) O.D. Outside Diameter;
(30) OF Optical fiber;
(31) OSHA Occupational Safety and Health Administration;
(32) OTDR Optical Time Domain Reflectometer;
(33) % Percent;
(34) ps/(nm · km) Picosecond per nanometer times kilometer;
(35) ps/(nm^2 · km) Picosecond per nanometer squared times kilometer;
(36) PMD Polarization Mode Dispersion;
(37) RUS Rural Utilities Service;
(38) s Second(s);
(39) SI International System (of Units) (From the French *Système international d'unités*); and
(40) µm Micrometer.

(b) *Definitions*—(1) *Accept; Acceptance* means Agency action of providing the manufacturer of a product with a letter by mail or facsimile that the Agency has determined that the manufacturer's product meets its requirements. For information on how to obtain Agency product acceptance, refer to the procedures listed at *http://www.usda.gov/rus/telecom/listing_procedures/index_listing_procedures.htm*, as well as additional information in RUS Bulletin 345–3, *Acceptance of Standards, Specifications, Equipment Contract Forms, Manual Sections, Drawings, Materials and Equipment for the Telephone Program*, available for download at *http://www.usda.gov/rus/telecom/publications/bulletins.htm*.

(2) *Agency* means the Rural Utilities Service, an Agency which delivers the United States Department of Agriculture's Rural Development Utilities Programs.

(3) *Armor* means a metal tape installed under the outer jacket of the cable intended to provide mechanical protection during cable installation and environmental protection against rodents, termites, etc.

(4) *Attenuation* means the loss of power as the light travels in the fiber usually expressed in dB/km.

(5) *Bandwidth* means the range of signal frequencies that can be transmitted by a communications channel with defined maximum loss or distortion. Bandwidth indicates the information-carrying capacity of a channel.

(6) *Birefringence* means the decomposition of a pulse of light entering the fiber into ''two polarized pulses'' traveling at different velocities due to the different refractive indexes in the polarization axes in which the electric fields oscillate. Different refractive indexes in the fiber may be caused by an