

TELEVISION DISTRIBUTION SYSTEM

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PART 1 – GENERAL

1.01 CONDITIONS

- A. The General Conditions and Requirements, Detail Requirements and Products, and Execution parts of this section, outline the work and are further referenced or described throughout related specifications and drawings.
- B. Furnish and install Hybrid Fiber/Coaxial Broadband Television **CABLE ONLY**, as specified herein and as shown on plans or in other related sections. It is the intent that the fiber backbone cabling is complete and tested as herein required. This includes any infrastructure, backbone cable, or other items required to achieve the end result, shall be furnished whether or not such item or items are specified herein. The Cabling shall be tested, inspected by Owner or the Owner's CATV representative and documented in accordance with these specifications. The Guarantee/Warranty period shall not start until all required inspections and documentation have been received and approved by the Architect, the Owner or the Owner's CATV representative.

1.02 REQUIREMENTS

- A. Cabling Requirements:

The hybrid fiber cable has been specified in related sections (data) of the specification. It is not part of this television section. However, fusion splicing pigtailed on to the single mode strands and testing are part of this section. In addition, homerun RG6 drop cables shall be furnished, installed, coiled in the MDF/IDF/STC/term boxes etc., and terminated at the outlet only.

All of the various specified equipment components shall be complete with all appurtenant accessories required to meet the requirements herein specified; and provisions for expanding system to provide same facilities, and perform same functions in all future planned construction, including space and mountings in terminal cabinets, IDF closets and backboards.

- B. Submittals: Submittals will include six (6) copies of all required information as set forth in the following paragraphs:

Furnish catalog data, shop drawings and scaled plan drawings, one-line diagrams including fiber optic placement and a list of all performance tests to be done and test equipment proposed to perform the tests, and the proposed fiber optic fusion splicing machine manufacturer and model number.

Contractor shall submit name of firm he proposes to do work under this Section, addresses, phone numbers, CATV industry references, list of similar projects completed

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with project contacts, and name of firm's contact, for approval. Such firms shall have offices and service departments within a 100-mile radius of project and shall have been in the specific business of this type for at least (10) ten years, with no exceptions.

Also, refer to requirements for shop drawings, substitutions, materials, and submittals in other related sections of the overall specifications.

There will be two submittal reviews made by the Architect's representative and the Owner's CATV representative. Subsequent reviews will be charged to the Contractor. A rejection of a submittal or review of a partially presented submittal constitutes one submittal review.

C. Record Drawings:

Refer to General Conditions. Final Inspection will not be made until all required drawings are received and approved. Record Drawings shall include "Fiber Cabling and RG6 drop As-Built" one-line and wiring diagrams, with cable type, size and color-coding schedule, electronic components utilizing CATV industry standard symbols, testing results, pull-box locations, and conduit routing plans.

D. Industry Standards and Requirements:

Applicable FCC Code of Regulations, Part 76, CATV Rules and Regulations, shall be adhered to; Applicable SCTE Standards shall be met, including but not limited to Testing Methods, Procedures, and Single Mode Fiber Parameters, Fiber Cables, Coaxial Cables, etc.; TIA 568, fiber optic standards; and to follow any other government or higher industry accepted standard, guideline or requirement, not mentioned herein, that enhances the performance and future operation.

E. Contractor/Personnel Experience:

The contractor, or subcontractor, must demonstrate, prior to starting any work, that the person or persons responsible for this project have at least (10) ten years of CATV installation and CATV fiber optic testing experience (individual knowledge, not company personnel combined years of knowledge). *Industry references*, a *list of similar projects completed* and a *fiber optic journeyman* card in support of claims, must be supplied to the Owner's CATV representative prior to start of any work.

F. Guarantee/Warranty:

The General Contracting and Electrical Contracting firms will assume full responsibility for the overall performance of the cabling and testing in accordance with this section of the specification. It will be the General Contractor and Electrical Contractors responsibility to insure that the Contractor chosen to comply with this section of the specification is capable and responsible for all requirements. This includes all labor and

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equipment to correct installation errors in workmanship or replace defective parts, respectively, for a period of (2) two years starting from the date of final acceptance by the Owner, as further specified herein.

PART 2 – DETAIL REQUIREMENTS AND PRODUCTS

2.01 STANDARD PRODUCTS

A. Flexible Drop Cable:

Drop cable shall be RG6 bonded foil Super-Shield (Quad) construction, with PVC jacket. Cable used in underground applications shall have a self-sealing flooding compound between the PVC jacket and the aluminum tape. 18-gauge copper clad steel center conductor. Gas expanded polyethylene dielectric. Inner shield-aluminum polypropylene-aluminum laminated tape with overlap bonded to dielectric. Outer shield of 34 AWG bare aluminum braid wire. It has a black PVC jacket or polyethylene (for underground application use the flooded type); Maximum attenuation at 68 degrees F.; at 5 MHz, .58 dB/100ft; at 54 MHz, 1.60 dB/100 ft; at 750 MHz, 5.65 dB/100ft; at 865 MHz, 6.10 dB/100ft.

Drop cable length shall not exceed 150', measured from the distribution location to the outlet.

Flexible Drop Cable shall be CommScope 6 Series, part #F6SSVV, the same as the local CATV provider uses, or equivalent.

B. "F" Fitting/Connector:

"F" type fittings shall be environmentally sealed, have 360-degree compression, and radiation proof to meet FCC Title 47, code of regulations, part 76, CATV rules and Regulations.

The cable center conductor shall not protrude further than manufacturers recommended specifications, approximately 1/16" past the threaded end of the "F" fitting. The cable dielectric shall not protrude past the base of the beveled portion on the interior (the threaded portion) of the "F" fitting. Special care shall be taken to avoid any braid from touching the center conductor of the cable when preparing the connection. Also, all connectors/fittings must be matched to the cable being used by manufacturer color code. A cable preparation tool must be used to prepare the cable for the fitting/connector. The best preparation tool is manufactured by CablePrep having a part# CPT-6590. The proper LRC compression tool shall be used to secure plastic portion to the main fitting body manufactured by LRC Part# LRC63900010. Special care shall be taken not to exceed 20-ft lbs. of torque when tightening fitting on barrel splice on the wallplate or at tap port.

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“F” fittings/connectors shall be LRC Snap-N-Seal type sized appropriately with the cable manufacturer and cable type. If CommScope RG6 cable is chosen, as specified above, then the appropriate LRC Part# SNS6QS is to be used.

No manufacturer substitutions will be allowed. Again, match LRC fitting to the cable manufacturer and type with the appropriate LRC fitting/connector.

C. Housing Connectors:

All tap ports and wallplate barrels shall be terminated to eliminate RF leakage.

“F” port terminators shall be Gilbert Part# GTR-59-A

D. Television Outlet Wallplate:

Wallplates shall be flush mount stainless steel having a barrel splice “F” female both ends 3/8”-32 threads per inch mounted in the center.

A washer and nut, matched specifically to the barrel, shall secure the barrel splice to the stainless steel wallplate. When attaching cable to barrel, special care shall be taken to avoid over tightening fitting (not more than 20-ft lbs.).

E. Single Mode Fiber Optic Pigtails:

All single mode fiber strands shall be *Fusion* spliced to pre- made fiber optic pigtails manufactured by the manufacturer following TIA 568-B.3 standards. They will be connected to the back plane bulkhead of the fiber patch panels designated/specified in related sections of this specification. They should be matched to the specified bulkhead and or patch panel regardless of the part number listed below.

The pigtails shall be Leviton part # PCPST-S03 or equivalent.

F. Rigid Cable:

Rigid cable may not be required in the design of the system. In the event that it becomes necessary to use rigid/hardline cable, then the cable listed will be required.

Rigid or Hard-line cable shall be a .625 diameter seamless tubular aluminum, with polyethylene outer jacket. Cable used in underground applications shall have a self-sealing flooding compound between the PVC jacket and the aluminum outer conductor. Center conductor shall be copper clad aluminum with nominal outer dimension 0.137. The impedance, 75 ohms; Velocity of propagation, 87%; Minimum bending radius, 7 inches. Maximum D.C. loop resistance at 68 degrees F, 1.68 ohms/1,000 ft; Maximum

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attenuation at 68 degrees F, at 5 MHz, .16 dB/100 ft; at 54 MHz, .46 dB/100 ft; at 750 MHz, 1.78 dB/100 ft; and at 865 MHz, 1.93 dB/100 ft.

Great care shall be taken during installation not to dent, kink or otherwise damage the cable. Contractor will be required to replace damaged cable. While installing the cable, the pulling tension shall not exceed 475 lbs.

Please note that the system backbone design, electronic design and/or the campus layout, may warrant the use of rigid or hardline cables i.e., .500, .625, .750, or .875. It is highly unlikely that hardline cable will be required, however, in the unlikely event that rigid cable is employed, the “rule of thumb” shall be .625 jacketed and flooded type.

- G. The products listed above may have been replaced with new updated part numbers or may have been replaced with the latest “state of the art” part. It is the Contractors responsibility to research the correct part numbers and find the latest most recent products that meet the requirements of this specification. In all cases, only products that are equal to or better than, above noted products, will be acceptable. In no way, should this statement be misunderstood to allow product substitutions if “no substitutions are allowed”.
- H. All system components shall be new and free from defects.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Electrical Contractor shall retain the services of a qualified low voltage contractor representative, who shall furnish all equipment and perform all technical work as specified herein. All technician and workman involved in the installation of fiber optic components shall be particularly skilled in this specific type of work for at least 10 years. See PART 1 – General, Conditions and Requirements Sections for additional specific requirements.
- B. All cables entering terminal cabinet, IDF closets or backboard, and at each outlet shall be identified/labeled with wire markers in accordance with requirements set forth in related sections of this specifications. Upon completion of installation, six (6) copies of one-line “as-built” wiring diagram shall be furnished to Architect.
- C. Each cable run, on wiring diagram, shall be identified with exact wire marker code, on both ends, (numerical or alphabetical) as appears in terminal cabinets.
- D. TV outlet locations shall be identified by architectural room numbers and in all ways, one-line wiring diagram shall relate as closely as possible to architectural drawings in accordance with Owners requirements.

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- E. No splices shall occur in any flexible coaxial RG6 drop cables. Drop cables shall be continuous from the distribution location to the outlet, no exceptions. Special care shall be taken not to kink, flatten, twist or damage drop cables during installation. All interior pull-boxes shall be accessible and locations shall be recorded on “as-built” drawings.
- F. RG6 drops shall have a coil long enough to place anywhere in the area designated for CATV, in the MDF and all IDF closets/cabinets, and shall be labeled as required.
- G. Installation of all coaxial cable types must not exceed minimum bending radius published by the manufacturer. This includes drop cable. If the concentricity of coaxial cable is changed, an impedance mismatch might occur which could cause picture distortion and/or channel degradation.
- H. The center conductors of RG6 shall not extend beyond the “F” fitting more than 3/16”. The dielectric shall not extend beyond the inside beveled edge of the ferule. Special care shall be taken to eliminate any metal strands or foil that may lay across the dielectric, at the ferule, between the outer conductor/bonded foil and the center conductor. Special care must also be taken, in the preparation of the cable before the fitting is pushed on the cable, to fold back both braids and the second foil over the jacket, clearing the path for the ”F” fitting to more easily fit between the bonded foil (outer conductor) and the remaining two braids and second foil (additional radiation protection) with the inner sleeve of the “F” fitting.
- I. Fiber strands installed by others shall be spliced using a *Fusion Splice Machine*.
- J. Pre-made fiber optic pigtails, listed in the products section 2.01.F, shall be spliced to the fiber strands with factory assembled fiber connectors.
- K. The fusion splice machine shall be capable of storing splice attenuation information for documentation purposes.
- L. All unused tap ports or outlet barrel ports, not being used, shall be terminated with “F” port terminators listed in the products section 2.01.C above.
- M. If cables are to be run in open space, attachment every 10 feet shall be the standard, unless more stringent requirements are noted in related sections within this specification.
- N. Maximum CATV drop run shall not exceed 150’. If a drop exceeds this distance, the Contractor must request in writing for the Owners CATV representative written approval.
- O. Other installation requirements are throughout this section and other related sections of the specifications. Please read carefully and thoroughly.

3.02 SYSTEM TESTING AND DOCUMENTATION

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- A. General: All testing shall be scheduled and performed with the Owner's CATV representative present. Please refer to section 1.02.C for submittal requirements in reference to performance testing and test equipment to be used for required system testing according to FCC and SCTE testing requirements and procedures.

All testing shall be conducted with "state of the art" test equipment that has been recently calibrated, in the past 12 months, and can internally store data in a format that will provide the data base for acceptance documentation purposes. It shall be submitted in both written form and electronic format. It shall provide at a minimum the following information:

1. Time and Date of the Test
2. Name of Project
3. Technician Name
4. Cable Identification under Test
5. Applicable Measurement of Attenuations, Losses, Signal levels, Distances, etc

- B. Coaxial Cable testing:

All coaxial distribution cables shall be tested in accordance with FCC requirements and common SCTE standards.

1. Coaxial cables shall be tested with a TDR (time domain reflectometer) to insure that no damage has been caused by the installation. Cables noting damage shall be replaced with new cables.
2. Coaxial cables shall be tested with a TDR for distance confirmation and documentation.

- C. Single Mode Fiber Testing:

Physical Plant fiber testing shall be conducted at 1300nm or 1310nm and at 1550nm.

1. The fiber cable shall be OTDR tested and documented from the factory. These test results shall be included in the final acceptance documentation.
2. All fiber strands shall be OTDR tested for continuity after installation and prior to splicing. Test results shall be included in the final documentation.

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3. All fusion splices shall be OTDR tested for splice attenuation (loss in dB/km), fiber length, distance to faults, splices, connectors and stresses placed on fiber and documented. All test results shall be included in the final acceptance documentation.
4. All fiber strands shall be tested in both directions with a power meter that has been recently calibrated against National Institute of Standards & Technology. Power meter must have zeroing functions (dB), .01 dB resolution, selectable wavelengths, and power measurements (dBm). Applications such as continuity check, transmit power level, receivable power, and end-to-end performance testing (dB).
5. TIA standards on testing fiber shall be adhered to.
6. All testing will be conducted while the owner's CATV representative is present to witness testing.
7. Documentation of the test must be recorded and submitted to Owner in both written form and in electronic format.

3.03 CONSTRUCTION MEETINGS

- A. The contractor shall schedule construction meetings at the jobsite with the Architect and the Owner's CATV representative as follows:
 1. Pre-project startup system architecture/configuration. Before approval to commence installation occurs, this meeting shall take place. This meeting will take place after submittals have been approved.
 2. Pre-testing meeting shall occur after wire/ cable has been installed, spliced and terminated.
 3. Post-testing and documentation for final proof of performance.