

**SECTION 271533 - COAXIAL HORIZONTAL CABLING**

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data:
  - 1. Bill of Materials (BOM).
  - 2. Product Datasheets.
- B. Shop Drawings:
  - 1. Floor Plans
  - 2. Wall Elevations.
  - 3. System labeling schedules and schema.
  - 4. System Diagram.
- C. Closeout Submittals:
  - 1. Field Quality Control/Test Results.

1.2 WARRANTY

- A. Required warranty: The coaxial horizontal cabling system shall include a minimum 5 year extended product and workmanship warranty.

1.3 SYSTEM DESCRIPTION

- A. The coaxial horizontal cabling system shall be a system of permanently installed coaxial cable used in the distribution of radio frequency signals containing modulated audio, video, voice and/or data information.
- B. The system shall complement and work in concert with RF Broadband Video Distribution/MATV/CATV/SMATV electronics to distribute usable signals to the passives to the work area/station/RF/TV outlets and equipment designated in the Contract Documents.
- C. Provide custom length station cables fabricated from approved products for use at all station (drop) outlets. Coordinate custom length requirements to suit the needs of connected equipment.
  - 1. Where connected equipment is not included in the contract, coordinate the length of station cables to be furnished with the Designer. Average length shall not exceed 12 feet.
- D. The system shall pass common signals such as modulated NTSC, ATSC, QAM and DOCSIS compliant data signals as well as FM and HD digital radio programming

signals.

- E. The system shall be FCC compliant with regard to egress leakage from the system.
- F. The system shall pass signals in both forward and reverse directions.
- G. Cabling Topology – Distributed Star:
  - 1. The cabling system shall follow a distributed star topology, substantially similar to standardized Horizontal Copper Systems used for voice and data networks. Using this topology, a single dedicated cable shall be routed from each station (drop) outlet to a Communications Room (i.e., ER, TR, IDF, MDF) where it shall be terminated and landed on RF distribution passives and/or patch panels (as identified in the Contract Documents).
  - 2. Cabling shall substantially follow the same primary and secondary pathway routes as other horizontal cabling that serve the same space(s) but with adequate space between the cables.
  - 3. Cabling shall be routed to the Communications Room located on the same level and in the same building nearest station outlet, except where otherwise indicated in the Contract Documents.

#### 1.4 CABLE USE

- A. RG-6 grade cables shall be used:
  - 1. For horizontal distribution where length of cable does not exceed 45 meters .
  - 2. For station cables 6 feet to 25 feet in length.
  - 3. As patch cord used with patch cables.
  - 4. Where specifically indicated on the Drawings.
- B. RG-11 grade cable shall be used:
  - 1. For horizontal distribution where length of cable exceeds 90 meters.
  - 2. Where specifically indicated on the Drawings.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Products furnished of each Type shall be manufactured by a single manufacturer, bear the same brand name, be the same finish color and texture, and be from the same product model series, except where otherwise indicated.

2.2 CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Belden / CDT (Belden).
  2. Commscope, Inc. (Commscope).
  3. General Cable (General).
  4. West Penn / CDT (West Penn).
- B. General:
1. System cables shall be code compliant and UL/NEC rated for the location, manner, and environmental conditions in which the cables are installed.
    - a. Cables that are not installed in a totally enclosed pathway system shall be UL plenum rated.
  2. Designed for the transport of RF signals.
  3. 75-Ohm impedance.
  4. 100-percent shielding.
  5. No discontinuity between DC and 1000 MHz (1 GHz).
  6. Cables used for below grade applications, and cables used in pathways that may reasonably end up with standing water within them, shall be manufacturer rated for continuous contact with water without performance degradation or compromise in warranty.
  7. Cables used for direct burial applications, where permitted, shall be manufacturer rated for direct burial applications.
- C. RG-6 Grade:
1. RG-6/U Type.
  2. 75-Ohm Impedance.
  3. Quad-shielded design consisting of four alternating shield layers.
    - a. Two layers of aluminum braiding.
    - b. Two layers of 100% BiFoil aluminum wrap.
  4. 18-AWG solid bare-copper center conductor.
  5. Gas-injected polyethylene center conductor dielectric.
  6. Temperature rating: 75 degrees Celsius.
  7. DCR:  $\leq 6.5$  ohms per 1000 feet.
  8. Nominal Attenuation (per 100 feet):
    - a. 0.45 dB @ 5 MHz.
    - b. 1.60 dB @ 55 MHz.
    - c. 2.00 dB @ 100 MHz.

- d. 4.50 dB @ 400 MHz.
- e. 6.00 dB @ 700 MHz.
- f. 8.00 dB @ 1000 MHz.

D. RG-11 Grade:

- 1. RG-11/U Type.
- 2. 75-Ohm Impedance.
- 3. Quad-shielded design consisting of four alternating shield layers.
  - a. Two layers of aluminum braiding.
  - b. Two layers of 100% BiFoil aluminum wrap.
- 4. 14-AWG solid bare-copper center conductor.
- 5. Gas-injected polyethylene center conductor dielectric.
- 6. Temperature rating: 125 degrees Celsius.
- 7. DCR: 2.6 ohms per 1000 feet.
- 8. Nominal Attenuation (per 100 feet):
  - a. 0.25 dB @ 5 MHz.
  - b. 1.00 dB @ 55 MHz.
  - c. 1.50 dB @ 100 MHz.
  - d. 3.30 dB @ 400 MHz.
  - e. 4.50 dB @ 700 MHz.
  - f. 5.50 dB @ 1000 MHz.
  - g. 5.50 dB @ 1000 MHz.

2.3 CONNECTORS AND TERMINATORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Amphenol.
  - 2. Thomas & Betts Co.
  - 3. Stirling / Ideal (Stirling).
  - 4. Gilbert / Corning (Gilbert).
- B. General:
  - 1. Connectors shall be designed and manufacturer recommended for the specific cable to which the connector is applied.
  - 2. Wet environment rated versions of cable connectors shall be supplied when the connector will reside outdoors or in other high moisture environments. Such connectors shall be equipped with water-tight O-ring seals to prevent moisture ingress.

3. Models furnished shall be matched to the cables to which they shall be applied. The exact connector supplied shall match the cable to which the connector is applied.

C. RG-6 Connectors:

1. F-Type male connector.
2. Designed for use with RG-6 grade cables.
3. Brass construction with nickel plated, cadmium or natural finish.
4. Designed for application using a non-crimping, 360-degree concentric compression process.
5. Cable retention strength: >40lbs.
6. Manufacturer rated for both indoor and outdoor environments.

D. RG-11 Connectors:

1. F-Type male connector.
2. Designed for use with RG-11 grade cables.
3. Integral tin-plated center-post conductor.
4. Brass construction with nickel plated, cadmium or natural finish.
  - a. Designed for application using a non-crimping, 360-degree concentric compression process.
  - b. Cable retention strength: >40lbs.
5. Manufacturer rated for indoor and outdoor environments

2.4 RF BROADBAND VIDEO BULKHEAD CONNECTOR (CATV, SMATV, AND MATV)

A. F-Type RF Bulkhead:

1. F-type female connectors on each end.
2. Integral 75 ohm terminating resistor that terminates the circuit when cable is removed from either end of bulkhead.
3. Frequency rated to 2GHz and beyond.
4. Designed for mounting within standard F-connector opening of a device plate or modular F-type connector module. Snaps into faceplate or mounting frame.
5. Integral fixed hex nut on one side, and threaded hex nut on the other for tightening.
6. Sized to match the cable connectors to be attached.

PART 3 - EXECUTION

3.1 GENERAL

- A. Review and coordinate cabling pathways prior to pathway and cabling installation.

1. Coordinate to resolve deviations, defects or other problems with pathways prior to installation. Allow adequate time for corrections so as to avoid delays to the Project completion date.
  2. Provide additional or supplemental TIA/EIA-569-B, or most current version, compliant pathways and cable support where required. Provide additional sleeves through walls/floors/ceilings, as necessary to route cables within buildings.
- B. Coordinate work of this Section with the Work of other sections.
- C. Comply with requirements for raceways and boxes specified in Section 270528 “Pathways for Communications.”
1. Comply with TIA-569-E, or most current version, for pull-box sizing and length of conduit and number of bends between pull points.
  2. Do not exceed the required fill capacity of raceways.
- D. Compliance
1. Comply with NECA 1.
  2. Comply with TIA-568-D., including TIA-568-D.0, Generic Telecommunications Cabling for Customer Premises; TIA-568-D.1, Commercial Building Telecommunications Cabling Standard; TIA-568-D.2, Balanced Twisted-Pair Telecommunication Cabling and Components Standard; and TIA-568-D.3, Optical Fiber Cabling Components Standard.
  3. Monitor cable pull tensions, and comply with BICSI ITSIMM, Chapter “Pulling Cable.”
  4. Comply with BICSI ITSIMM, Chapter “Cable Termination Practices.”
  5. Comply with requirements for raceways and boxes specified in Section 270528 “Pathways for Communications.”
    - a. Comply with TIA-569-E, or most current version, for pull-box sizing and length of conduit and number of bends between pull points.
    - b. Do not exceed the required fill capacity of raceways.

### 3.2 INSTALLATION OF CABLES

- A. Install cables within specified pathways. Install cables that are not otherwise required to be installed within raceway in such manner as to conceal them from view. Conceal conductors and cables in accessible ceilings, walls and floors.
- B. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between terminations or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- C. Do not splice cable between terminations or junction points. Cable runs shall be continuous. Wiring shall be free from grounds, shorts, opens and reversals.

- D. Maintain complete protection of cabling. Cabling shall not be left hanging or coiled where it potentially obstructs the Work of other trades.
- E. Terminate every conductor. Install connector on each end of each cable. Make terminations at locations indicated in the Contract Documents.
- F. Route cable following building structural lines (parallel and perpendicular).
- G. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- H. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
- I. Open-Cable Installation:
  - 1. Install cabling with horizontal and vertical cable guides in communications spaces with terminating hardware and interconnection equipment.
  - 2. Suspend coaxial cable not in a wireway or pathway, a minimum of 8 inches (200 mm) above ceilings by discrete cable supports not more than 60 inches (1524 mm) apart. Bridle rings are not permitted.
  - 3. Cable shall not be run through structural members or in contact with conduits, pipes, ducts or other similar or potentially damaging items.
- J. Provide conduit sleeves for penetrations.
  - 1. Provide conduit sleeves for cables where cables pass through walls, floors and ceilings.
  - 2. Patch and firestop around sleeves.
  - 3. Firestop the interior of the sleeves after cable installation.
  - 4. Provide the appropriate bushings on each end. Split bushings shall not be used.
  - 5. Provide waterproof sealant for penetrations in humidity controlled areas.
- K. Comply with requirements in Section 270502 “Basic Materials and Methods for Communications.”
  - 1. Bundle cables within racks, ladder racks, cable trays and in discrete cable supports. Utilize reusable cable bundling hardware. Utilize plenum-rated hardware in plenum spaces.
- L. Separation from Sources of Interference
  - 1. Route cables at least 2 feet away from fluorescent light fixtures and other electrical devices and cables that are potential sources of EMI and RFI interference that could negatively impact the usability of the cables installed under this section.

2. Provide a minimum separation of 48 inches (1200 mm) from electrical motors and transformers.
- M. Separate cabling by service and type (i.e., voice, data, control, coaxial) prior to terminating.
1. Terminate cabling on specified termination hardware in alpha-numerical order.
  2. Group connecting hardware for cables into separate logical fields.
  3. Neatly dress and securely attach cabling to the backboard and/or cabinet/rack.
  4. Provide adequate cable lengths to reach any location on the backboard or within the cabinet/rack.
  5. Bundle and support cables of this System separately from the cables of other systems.
  6. Maintain separation between cables carrying different signal types and different signal levels.
    - a. Where cables from different systems or cables with different signal types are expressly permitted by the Designer to share a common pathway, each of these cable groups shall be kept segregated to the maximum degree physically possible. Cables from different systems shall not be mixed or intertwined.
- N. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Use lacing bars and distribution spools.
- O. Cabling on Backboards and in Equipment Racks: Neatly dress, support, and attach all cabling. Install cables using horizontal and vertical cable management products.
- P. Install cables of the appropriate length and with sufficient service loops and offset bends to facilitate installation, removal and service of RF passives, electronics and connectors. Sufficient cable length shall be installed to permit replacement or re-termination of the connectors without need for extension.
1. Terminate each end of every cable using connectors specifically designed for the cables being terminated.
  2. Prep cable for termination using tools manufactured expressly manufactured for this purpose. Use only the models of tools recommended by the cable and connector manufacturers.
  3. Do not nick the center conductor of cables. Re-terminate all cables where a nick has occurred.
  4. Connectors shall be applied to cables in a manufacturer approved manner so as to achieve the connector-to-cable mechanical retention strength indicated by the manufacturer.
- Q. At final termination, excess cable and the service loop shall be supported and stored neatly in the cable tray or ladder rack within the communications rooms.

1. Proper strain relief shall be applied to cables after installation to lessen the risk of physical damage and to provide proper aesthetic value.
- R. Land station-end of cable on connectorized faceplate.
- S. Label each end of the cable and each patch point on each patch panel.
- T. Identify system components and cabling in compliance with TIA-606-D, or most current version.

3.3 FIELD QUALITY CONTROL

- A. Comply with Section 270810 “Verification Testing of Structured Cabling.”
- B. Prepare and submit test and inspection reports.

END OF SECTION 271533