

**SECTION 271333 - COAXIAL BACKBONE CABLING**

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data:

1. Bill of Materials (BOM).
2. Product Datasheets.

B. Shop Drawings:

1. Labeling Schema.
2. System Diagram.

C. Closeout Submittals:

1. Field Quality Control/Test Results.

1.2 COORDINATION

A. Review and coordinate the sizes, quantity, routing and spacing of pathways to ensure they shall adequately support the Work of this Section.

1. Confirm that cables to be installed shall not exceed maximum fill capacities of raceways and shall meet the minimum requirements of Local, State and Federal laws and requirements.

1.3 DELIVERY, STORAGE AND HANDLING

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Do not deliver or install product(s) in conditions that jeopardize the performance or manufacturer life expectancy and service life of the product.

1.4 WARRANTY

A. Required warranty: The coaxial backbone cabling system shall include a minimum 20 year extended product and workmanship warranty.

1.5 SYSTEM DESCRIPTION

- A. The coaxial backbone cabling system shall be a system of permanently installed coaxial cables used in the distribution of radio frequency signals containing modulated audio, video, voice, data and/or control signals.
- 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. 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.
- D. The system shall be FCC compliant with regard to egress leakage from the system.
- E. The system shall pass signals in both forward and reverse directions.
- F. The system shall transport signals between:
  - 1. Main equipment communications rooms and outlying/remote communications rooms.
  - 2. Communications rooms.
  - 3. RF distribution passives that are used to feed station outlets.
  - 4. Communications utility service entrance demarcation points and RF communications equipment.
  - 5. Antenna(s) and tuning, processing and distribution equipment.
  - 6. Other locations identified in the Contract Documents.

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 shall be manufacturer rated for direct burial applications.

C. RG-11 Type (above grade, dry environment):

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.  $\leq 0.25$  dB @ 5 MHz
  - b.  $\leq 1.00$  dB @ 55 MHz
  - c.  $\leq 1.50$  dB @ 100 MHz
  - d.  $\leq 3.30$  dB @ 400 MHz
  - e.  $\leq 4.50$  dB @ 700 MHz
  - f.  $\leq 5.50$  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-11 Connectors:

1. F-Type male connector.
2. Designed for use with RG-11 type 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.

D. Terminators:

1. Impedance: 75-Ohm.
2. Engineered to mate with companion connector or fitting.
3. Moisture-tight seal on versions used in moisture prone areas.

## 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-C, 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/EIA-569-B, 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/EIA-568-D., including TIA/EIA-568-D.0, Generic Telecommunications Cabling for Customer Premises; TIA/EIA-568-D.1, Commercial Building Telecommunications Cabling Standard; TIA/EIA-568-D.2, Balanced Twisted-Pair Telecommunication Cabling and Components Standard; and TIA/EIA-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/EIA-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 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by the communications service providers.

### 3.3 INSTALLATION OF CABLES

- A. Install cables within approved 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 within 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 others trades, or where it is subject to damage.

- E. Terminate every conductor. Install connector on each end of each cable. Make terminations at locations indicated in the Contract Documents.
- F. Cable routing shall follow building structure 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, fiber) 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 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.

3.4 FIRESTOPPING

- A. Comply with requirements in Section 270550 “Firestopping for Communications.”

3.5 GROUNDING

- A. Comply with requirements in Section 270526 “Grounding and Bonding for Communications” for grounding conductors and connectors.

3.6 IDENTIFICATION

- A. Label cables and other components in compliance with Section 270553 “Identification for Communications” for labeling requirements.
- B. Label each end of the cable and each patch point on each patch panel.
- C. Identify system components and cabling in compliance with TIA/EIA-606-D, or most current version.

3.7 FIELD QUALITY CONTROL

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

END OF SECTION 271333