

## SECTION 27 11 00

### COMMUNICATIONS - EQUIPMENT ROOM FITTINGS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section includes requirements for providing equipment and materials for TIA/EIA compliant communications equipment rooms and spaces including, but not limited to, telecommunications rooms, equipment rooms, entrance facilities, server rooms, data centers, etc. General requirements for equipment room fittings are covered in Division 27 Specification Section *Communications – General Requirements*.

##### 1.02 RELATED SECTIONS

- A. The requirements of Division 27 Specification Section *Electrical Technology - General Requirements* shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.
- B. The requirements of Division 27 Specification Section *Electrical Technology - Grounding and Bonding* shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

##### 1.03 SUBMITTALS

- A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section *Basic Communications Requirements*:
  - 1. Product Data
  - 2. Shop Drawings:
    - a. Provide the following for each Communication Room, if: a) Communications Rooms are not shown on the Drawings; b) Communication Rooms are only shown as “Typical” on the Drawings; c) or the Contractor is proposing a deviation to the Drawings:
      - 1) Wall elevations (all four walls)
      - 2) Plan view/layout
    - b. Provide the following only if elevations have not been shown on the Drawings, or if the Contractor is proposing a deviation.
      - 1) Wall Field Cable/Jumper Management Elevations, including designation of cable and pair terminations within the wall field.

#### PART 2 - MATERIALS

##### 2.01 GENERAL

- A. Manufacturer: Racks, frames, cabinets, enclosures, rack cable distribution hardware, cable runway (ladder rack), and other distribution and incidental components shall be manufactured by a single Manufacturer unless specifically stated otherwise. The manufacturer shall be:
  - 1. Chatsworth Products, Inc. (CPI)
  - 2. Cooper/B-Line
  - 3. Panduit
- B. Part Numbers: Refer to the Equipment Schedule(s) for specific manufacturers and part numbers.
- C. Color: Unless otherwise indicated, the color of all cable runway, equipment racks, frame, and cabinets, distribution hardware, and other distribution and incidental equipment shall be:
  - 1. Black
- D. Seismic Bracing: Equipment shall be seismically braced as required by code. Bracing shall be rigid – non-rigid bracing (chains, cables, etc.) is not acceptable, unless otherwise specified by code. Seismic bracing

hardware shall be provided by the manufacturer, or shall be approved or recommended by the manufacturer. Where no manufacturer hardware, approval, or recommendation is available, the seismic assembly shall be approved by a licensed structural engineer.

## **2.02 CABLE RUNWAY (LADDER RACK)**

- A. Cable runway system shall be complete with all fittings, miscellaneous hardware, and other incidental hardware required for a complete and fully fitted system, including but not limited to splice kits, support hangers, rods, and brackets, center supports, j-bolts, foot kits, vertical wall brackets, wall angles, support hardware, grounding hardware, and protective end caps for exposed cable runway ends. Provide as shown on the Drawings or as defined below:
1. Straight Section (Standard Rung Spacing): Cable runway shall be available in 18 inch widths and shall have runway cross-members (rungs) spaced at 12 inch intervals.
  2. Straight Section (Alternate Rung Spacing): Alternate Rung Spacing Cable runway shall be available 18 inch widths and shall have runway cross-members (rungs) spaced at alternating 12.5 inch and 13.81 inch intervals. Alternate rung spacing runway is used to simplify vertical alignment of cable runway installed across the top of equipment racks with standard 6 inch vertical cable management sections.
  3. Corner bracket: Corner brackets shall be used to create radii for T-junctions and corners.
  4. Triangular Support Brackets: Triangular Support Brackets shall be provided for all locations where cable runway is to be mounted on a wall. Triangular Support Brackets shall be sized and provided in quantities according to the width and fully loaded capacity of the cable runway to be supported.
  5. Radius Drop: Radius Drops shall be provided for all locations where cable is to drop from one section of cable runway to another lower section of cable runway, or is to drop from cable runway to equipment racks, frames, or cabinets. Radius Drops shall be either Cross Member or Stringer type according to their application, and sized in widths according required to support their application.
  6. Elevation Kits: Elevation kits shall be provided for all equipment racks and frames where cable runway is routed across the tops of equipment racks and frames and is not mounted at the same height as the tops of the equipment racks or frames. Elevation Kit height shall be sized per the distance between the top of the rack or frame and the cable runway.
  7. Rack-to-Runway Mounting Plate: Mounting Plates shall be provided for all equipment racks and frames where cable runway is mounted directly to the top of equipment racks or frame. Mounting Plate shall be 3 inches wide and sized according to the width of the cable runway to be attached.
  8. Vertical Wall Bracket: Vertical Wall Brackets shall be provided for all locations where cable runway is vertically mounted on the wall(s).
  9. Wall Angle Support: Wall Angle Supports shall be provided for all locations where cable runway stops at walls or where Triangular Support Brackets cannot be utilized due to field conditions. Wall angles shall be sized and provided in quantities according to the fully loaded capacity of the cable runway to be supported.

## **2.03 EQUIPMENT RACKS, EQUIPMENT FRAMES, SERVER FRAMES AND CABINETS**

- A. Equipment shall be free standing and shall be complete and fully fitted with all miscellaneous and incidental hardware required, including but not limited to hardware required for assembly, securing to floor, grounding, and seismic bracing (as required by local codes). Height shall be as shown on the Drawings. Provide as shown on the Drawings and as follows:
1. Equipment Racks: Equipment racks shall be 19 inch wide with universal alternating hole patterns on both sides of the posts, 3 inch channels, 2 posts, top angles, self-supporting bases, and assembly hardware.
  2. Standard 19" frames with vertical wire management will be utilized in all MDF and IDF locations. However, if there is concern for space or security, a locking cabinet will be required. B-Line lockable, blue in color.

3. The Contractor shall assemble all Panduit 19" equipment racks (part number CMR19X84) and permanently mount them using the appropriate anchoring kits.
4. In the telecom rooms 19" Panduit racks shall have installed two-sided (front and rear) vertical managers of 12-inch width in between racks (Panduit part number PRV12) and 8- inch front and rear vertical cable managers on ends of rows (Panduit part number PRV8).
5. Contractor shall provide front doors for racks Panduit part number PRD8 for the 8-inch managers and PRD12 for the 12-inch managers. See "Attachment 1 - Materials" at the end of this document for part numbers.
6. Contractor shall confirm all cable managers are sized to have no more than 40% fill upon installation per manufacturer's fill charts, and bring to the attention of the DoTS any managers that are improperly sized for the application for resolution.
7. Large equipment rooms (data centers) and certain Telecommunications Rooms may require lockable cabinets for equipment mounting for security purposes.
8. Switch Cabinets shall be Panduit N series.
9. Server Cabinets shall be Panduit S series.

#### **2.04 RACK-MOUNT ACCESSORIES**

- A. Provide as shown on the Drawings and as follows:
  1. Horizontal Power Strip: Horizontal power strips shall be rack-mountable, 1.75 inches (1U) high by 19 inches wide, shall be rated at 20 amps, and shall have 6 outlets in the front and 6 outlets in the rear, a covered on/off switch, and shall be equipped with a power cord of sufficient length to route to the power receptacle serving the equipment rack/frame (Tripp Lite).
  2. Horizontal Power Strip: Provide as shown on Drawings
  3. Cabinets shall be supplied with a 10 port, 120 volt, 20 AMP POU with 20 AMP thermal breakers.

#### **2.05 CABLE MANAGEMENT**

- A. Provide as shown on the Drawings and as follows:
  1. Horizontal Cable Management Panels: Horizontal cable management panels shall be 19 inches wide, complete with section covers, and shall be provided in heights (rack units) as shown on the Drawings.
  2. Vertical Cable Management Sections: Vertical cable management sections shall be complete with double-hinged section covers, "finger" style side cable openings capable of accommodating up 48 patch cords or horizontal cables, shall be single or double sided as shown on the Drawings, and shall be provided in widths and heights as shown on the Drawings.
  3. Upper Transition Tray: Provide as shown on Drawings. Unless shown otherwise on Drawings, upper transition trays shall be mounted at the top of equipment racks, frames and enclosures to route patch cables and jumpers. Upper transition trays shall be 19 inches wide.
  4. Distribution Rings: Provide for all locations where cable or jumpers will be routed on backboards and similar surfaces. Size shall be appropriate to the quantity of cable to be supported, and shall be a minimum of 2 inches in diameter. Rings shall be manufactured by CPI, or equal. Type of ring shall be as follows:
    - a. C-Rings ("open" rings): Provide for those cables or jumpers which will likely be subjected to frequent moves, adds, or changes.
    - b. D-Rings ("closed" rings): Provide for those cables or jumpers not likely to be subjected to frequent moves, adds, or changes.

#### **2.06 BACKBOARDS**

- A. Provide backboards as shown on the Drawings. Backboards shall be ¾ inch exterior grade Douglas Fir A-C plywood, void free, 2440-mm (8 feet) high unless otherwise noted, capable of supporting attached equipment. Width shall be as required to fully cover walls. Backboards shall be as follows:
  - 1. Backboards shall be treated on all sides with a minimum of two coats of fire retardant, non-conductive, paint (to match the color of the room).
  - 2. Backboards shall be fire-rated. Do not paint over fire retardant label.
  - 3. Backboards shall be fire-rated or treated on all sides with a minimum of two coats of fire retardant, non-conductive, light colored semi gloss paint (to match the color of the room).

## **2.07 GROUNDING AND BONDING**

- A. Bonding Conductor for Telecommunications (BCT): Provide #6 AWG insulated solid copper conductor (green) to bond all non-current-carrying metal telecommunications equipment and materials to the nearest TGB.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Work shall comply with the Governing Requirements as defined in Division 27 Specification Section *Basic Communications Requirements*. Governing Requirements of particular relevance to this Section include, but are not limited to:
  - 1. TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
  - 2. ANSI/EIA 310-D: Cabinets, Racks, Panels and Associated Equipment
  - 3. TIA/EIA 606-A: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
  - 4. ANSI/NECA/BICSI 607: Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - 5. ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
  - 6. TIA/EIA 607: Commercial Building Grounding and Bonding Requirements for Telecommunications
- B. Seismic Bracing: Install seismic bracing as required by code.

### **3.02 CABLE RUNWAY (LADDER RACK)**

- A. Cable Runway shall be installed per manufacturer's instructions and shall be installed with flat (rung) side up/out. Install with ends cut square, and reamed to remove burrs and sharp edges. Cap cut ends with manufacturer's recommended caps. Affix cable radius drop outs wherever cable will "waterfall" from one runway elevation to another, or from runway to equipment.
- B. The Contractor in accordance with the manufacturer's instructions and installation guidelines contained in TIA 569-B, shall install ladder rack. The Contractor will utilize a black 18" ladder rack in all telecommunications rooms. The ladder rack shall be utilized for routing and support of the communications cables within the TRs.
- C. Ladder rack shall be properly anchored to the racking structure in order to support the weight of the ladder rack and the cable within.
- D. Ladder rack routing should avoid changes in elevation, direction, other building utilities and structural obstructions. Wherever possible, 12 inches of headroom shall be provided above the ladder rack.

- E. The Contractor will attach to the top rear section of each Panduit frame an 18” black ladder rack. In addition, the Contractor will install a section of 18” black ladder rack spanning wall to wall at right angles to the Panduit frame.
- F. The Contractor will bundle together the workstation cable on the ladder rack in bundles of 24 -48 cables. These bundles shall be held together with Velcro cable wraps and placed in neat alignment with the ladder rack.

**3.03 EQUIPMENT RACKS, EQUIPMENT FRAMES, SERVER FRAMES AND CABINETS**

- A. Install equipment complete with all required incidental hardware and materials.
- B. Bond all non-current carrying metal telecommunications equipment and materials to the nearest TGB. Ensure that grounding is provided across all cable runway splices and between cable runway and all equipment racks/frames, etc.
- C. Free Standing Equipment Racks and Frames:
  - 1. Secure cable runway to equipment racks/frames and to walls as shown on the Drawings. Secure racks/frames to floor per manufacturer’s instructions.
    - a. Rack-to-Runway Mounting Plate: Secure to cable runway and equipment racks and frames. Mounting plates shall be mounted either parallel or perpendicular, depending upon the orientation of the ladder rack
  - 2. When installing Vertical Cable Management Sections between equipment racks/frames, install management such that the management trough is as far back as possible between the racks/frames, to ensure a clean/even front side of the rack/frame.
  - 3. When installing multiple adjacent equipment racks/frames, bolt adjacent racks (and management, where shown) together per manufacturer’s instructions to ensure a stable, rigid frame.
- D. Wall Mount Equipment:
  - 1. Install and anchor equipment according to manufacturer’s instructions, and as shown on the drawings. Ensure that the installation can fully support the equipment to be installed within.
  - 2. Vertical Cable Management Rings/Loops: Mount Jumper rings/loops at 12-inch intervals along each vertical rack rail.

**3.04 CABLE MANAGEMENT**

- A. Distribution rings: Mount at minimum 1 foot intervals.

**3.05 BACKBOARDS**

- A. Mount backboards on walls in locations shown on the Drawings with base of backboard at +12 inches AFF (unless otherwise noted on the Drawings), with the “A” side exposed. Securely fasten plywood to wall-framing members to ensure that it can support attached equipment.
  - 1. The Fire-Rated Stamp on the Plywood Backboard shall remain visible and shall not be painted over.

**3.06 GROUNDING AND BONDING**

- A. Bonding Conductor for Telecommunications (BCT): Bond all non-current carrying metal telecommunications equipment and materials to the nearest TGB with a bonding conductor.
  - 1. Route along the shortest and straightest path possible with minimal bends.
  - 2. Bends shall be sweeping.
  - 3. Bonding conductors shall be continuous (without splices) and shall be insulated from their support.
  - 4. Ensure that bonding breaks through paint to bare metallic surface of all painted metallic hardware.

**PART 4 EQUIPMENT SCHEDULE**

<b>27 11 00 - EQUIPMENT ROOM FITTINGS (ER)</b>				
<b>DESCRIPTION</b>	<b>Manufacturer/Part Number</b>			
	<b>CPI</b>	<b>Cooper B-Line</b>	<b>Panduit</b>	<b>Special Rqmt/Notes</b>
CABLE RUNWAY STRAIGHT SECTION (STANDARD RUNG SPACING)	10250-xxx	SB-17-xx-xx		
CABLE RUNWAY STRAIGHT SECTION (ALTERNATE RUNG SPACING)	31472-xxx	See Special Rqmt		CPI 31472-xxx
TRIANGULAR SUPPORT BRACKET (STANDARD)	See Special Rqmt	SB-213-xx-Kx		B-Line SB-213-xx-Kx
RADIUS DROP	1210x-xxx	SB-2129-xx-xx		
ELEVATION KIT	10506-xxx	SB227R3xx		
RACK-TO-RUNWAY MOUNTING PLATE	10595-xxx	SB-2133-xx-YZN		
WALL ANGLE SUPPORT	11421-xxx	SB-2113-xx-xx		
VERTICAL WALL BRACKETS (PAIR)	10608-xxx	SB2114Axx		
EQUIPMENT RACK (7' 2-POST)	55053-X03	SB-556-084-XU	CMR19X84	
HORIZONTAL POWER STRIP (1U)	See Special Rqmt	See Special Rqmt	See Special Rqmt	TrippLite RS-1215-20
HORIZONTAL CABLE MGMT PANEL (1U)	30339-x19	SB-870-19S-1xx		CPI 30339-x19
HORIZONTAL CABLE MGMT PANEL (2U)	30330-x19	SB-870-19S-2xx		CPI 30330-x19
PATCH RUNNER 12" DUAL HINGE DOOR			PRD12	
PATCH RUNNER 8" DUAL HINGE DOOR			PRD8	
PATCH RUNNER VERTICAL CABLE MANAGER			PRV12	
PATCH RUNNER VERTICAL CABLE MANAGER			PRV8	
CROSSOVER TROUGH			CMUT19	
BACKBOARD	See Specifications	See Specifications		

**END OF SECTION 27 11 00**