

SECTION 271123 - CABLE MANAGEMENT AND LADDER RACK

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data:

1. Bill of Material.
2. Product Datasheets for any of the following:
 - a. Horizontal ladder rack.
 - b. Vertical ladder rack.
 - c. Fittings.
 - d. Stand-offs.
 - e. Spillways/waterfalls.
 - f. D-rings.
 - g. Finger duct.

B. Shop Drawings:

1. Communications Room plan(s) depicting the following:
 - a. Size and locations of ladder rack.
 - b. Size and locations of other cable management products.
 - c. Backboards.
 - d. Pathway and cable entry and exit points.
2. Communications Room wall elevation drawings depicting the following:
 - a. Sizes and locations of ladder rack.
 - b. Sizes and locations of other cable management products.
 - c. Backboards.
 - d. Pathway and cable entry and exit points.

C. Closeout Submittal:

1. Product Data.
2. As-Built Drawings:
 - a. Enlarged floor plans.
 - b. Wall elevations.

1.2 SYSTEM DESCRIPTION

- A. The cable management and ladder rack pathway system shall accommodate the support and orderly routing of cabling within communication rooms.

1. Communications systems served include but are not limited to:
 - a. Voice/telephone systems.
 - b. Network/data/information systems.
 - c. RF broadband video distribution systems.
 - d. Intercom and central sound systems.
 - e. Paging and sound masking systems.
 - f. Audio and video systems.
 - g. Teleconferencing systems.
 2. Security systems served include but are not limited to:
 - a. Video surveillance and CCTV.
 - b. Access control.
 - c. Intrusion detection.
- B. The system shall consist of horizontal ladder rack used for support of cables that need to traverse horizontally overhead within the room.
1. Within the restraints of the room, a perimeter layout with over-rack section is desired.
 2. Fill capacity (as designated by the manufacturer) shall not be exceeded;
 3. Utilize properly sized supports with adequate strength to exceed the maximum recommended weight capacity.
 4. Provide all manufacturer recommended hardware and accessories including, but not limited to, splice extension clamps, stand-off brackets, horizontal tee splice kits, corner support kits, adjustable vertical bend kits, adjustable vertical splice kits, runway drop-out at equipment racks, runway end caps, etc.
- C. The system shall consist of vertical ladder rack for support and dressing of cables that must traverse vertically between cable entry/exit points near the floor and entry/exit points near the ceiling of the room or ladder rack.
- D. The system shall consist of products to organize, dress and support cables that traverse the walls.

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 COMPONENTS

- A. Ladder Rack:

1. Manufacturers: Subject to compliance with requirements, provide products from one of the following manufacturers:
 - a. Chatsworth.
 - b. Cooper/B-Line.
 - c. Middle Atlantic
 2. Horizontally mounted:
 - a. 1-1/2 inch by 3/8 inch ASTM A513 compliant tubular steel construction.
 - b. Color: Black.
 - c. UL Classified for suitability as an equipment grounding conductor.
 - 1) Must remove paint or use ground straps.
 - d. Available in various widths from 12 to 24 inches wide.
 - e. Available in factory lengths of 10 feet (nominal) and longer.
 - f. Rung spacing shall be 9 to 12 inches on center.
 - g. Minimum linear cable bearing surface of 1-1/2 inches per linear foot of run.
 - h. Basis of Design: Chatsworth 10250-712.
 3. Vertically mounted:
 - a. 1-1/2 inch by 3/8 inch ASTM A513 compliant tubular steel construction.
 - b. White in color. (Matching white backboard).
 - c. Available in various widths from 12 to 24 inches wide.
 - d. Available in factory lengths of 10-feet (nominal) and longer.
 - e. Rung spacing shall be 9 to 12 inches on center.
 - f. Minimum linear cable bearing surface of 1-1/2 inches per linear foot of run.
 - g. Basis of Design: Chatsworth 10250-212.
 4. Spillways, Waterfalls, Cable Drop-outs:
 - a. Basis of Design: Chatsworth 12100-***.
- B. Vertical Cable Manager
1. Double sided front and rear.
 - a. Mounts to rack side.
 - b. Riveted and welded steel and plastic.
 - c. 1 RU T-shaped cable fingers with rounded edges.
 - d. 7' height (84")
 - e. Cable distribution spools (CPI 15008-001) and Distribution spool spacer kit (CPI 35505-001 (3 included with 12" widths),
 - f. Front and rear doors with easy-open knobs
 - g. 24.5" depth
 - h. Basis of Design
 - 1) Chatsworth Products 35521-703 (6" Width)

2) Chatsworth Products 35524-703 (12" Width)**C. D-Rings:**

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into work include, but are not limited to:
 - a. Panduit.
 - b. Middle Atlantic Products.
 - c. Hubbell Premise Wiring (Hubbell).
 - d. Great Lakes.
 - e. Erico/Caddy.
2. D-Shaped wall-mount loop designed for cable management.
3. Continuous loop for pull-through cable installation, or open slot alternate insertion of cables.
4. Size: Available in a variety of pre-manufactured sizes.
5. Mounting holes for secure attachment with screws.
6. Material: Rigid nylon, zinc covered steel.

D. Finger Duct:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into work include, but are not limited to:
 - a. Panduit.
 - b. Hubbell Premise Wiring (Hubbell).
 - c. Middle Atlantic Products.
2. Manufacturer designed for horizontal and vertical cable management on walls and other vertical surfaces.
3. Hinged or removable cover for accessing cables within.
4. Repetitive pattern of stiff flexible fingers and gaps that allow cables to enter the duct through the sides.
5. Size: Available in a variety of pre-manufactured sizes.
6. Size: Available in a variety of colors, including blue, white, gray.
7. Basis of Design: Panduit Panduct® family.

PART 3 - EXECUTION**3.1 COORDINATION**

- A. Review and coordinate the final size requirements of cable management and ladder rack with the supplier and installer of the cabling. Each shall be sufficiently sized for the cables that are to be installed.

- B. Coordinate the locations and products being installed as work of this Section with each party supplying work within the same space. Coordinate to ensure adequate headroom, capacities, working clearances and accessibility of the installed products.

3.2 LADDER RACK UTILIZATION

- A. Horizontal Ladder Rack shall be provided as follows:
 - 1. Where specifically indicated on the Drawings.
 - 2. Within each ER, TR, IDF, and MDF, as follows:
 - a. 12 inch (minimum) horizontal ladder rack around the entire perimeter of the room.
 - b. 12 inch (minimum) horizontal ladder rack directly above and parallel to floor mounted equipment racks below. This ladder rack shall intersect with and join to the perimeter ladder rack.
 - c. Target height for ladder rack is 96 inches above the finished floor (AFF), but not less than 12 inches below finished ceiling and not less than 86 inches above the finished floor. The installed height shall not interfere with doors, windows and other equipment within the room.
 - 3. Utilize as an equipment grounding conductor for bonding within the room.
 - a. Must remove paint or use ground straps.
- B. Vertical Ladder Rack shall be provided as defined below:
 - 1. Where specifically indicated on the Drawings.
 - 2. Within each ER, TR, IDF, and MDF, as follows:
 - a. 12 inch (minimum) vertical ladder rack on the wall at floor and ceiling cable penetrations. Ladder rack shall extend from the penetration to the perimeter ladder rack.
- C. Sizing:
 - 1. Ladder rack sizes shall be the larger of the following:
 - a. Size indicated on the Drawings.
 - b. 12 inches wide.
 - c. As required by the National or Local electric code.
 - d. Ladder rack manufacturer recommendations.
 - e. Sufficient that cable fill does not exceed 40% of its rated capacity, regardless of manufacturer rated capacity greater than this.

3.3 INSTALLATION

- A. Ladder Rack:

1. General:
 - a. Install as a complete system in accordance with manufacturer's written installation instructions.
 - b. Install with sufficient support to carry the weight of the ladder rack system, fully loaded with cables, with a minimum safety factor of 5. In addition, each individual vertical support point above the floor shall be selected and installed to achieve a capacity to support not less than 200 lbs. of vertical load.
 - c. Furnish and install using manufacturer recommended hardware and accessories including, but not limited to: splice extension clamps; horizontal tee splice kits; corner support kits; adjustable vertical bend kits; adjustable vertical splice kits; runway support kits designed for ceiling support from all-thread rod; runway drop-out at equipment racks; and runway end caps.
 - d. Provide protective caps on the exposed ends of rungs and rails.
 - e. Paint accessories and fittings to maintain the aesthetic integrity of the installation using paint recommended and approved by the manufacturer.
 - f. Install the system free of sharp edges, burrs or projections that could harm cables or humans.
 - g. Install using such accessories, means and methods that ensure electrical continuity of the entire system.
 - h. Install runs using the maximum standard-length segments of ladder rack currently available from the manufacturer. Lesser length segments shall not be used except where a full size standard-length segment of ladder rack is not of sufficient length for the run (e.g., do not use two 5-foot pieces end-to-end for a 10-foot span where a single standard 10-foot length is available from the manufacturer). Do not piece together segments to make longer runs unless necessary.
2. Horizontally Mounted:
 - a. Horizontal runs of ladder rack that terminate at a wall shall be attached to the wall using manufacturer accessories for this purpose.
 - b. Horizontal runs of ladder rack that terminate at a crossing segment of ladder rack shall be attached to the crossing segment using manufacturer accessories for this purpose.
 - c. Rails of ladder rack that run parallel to and abut the wall shall be attached to the wall.
 - d. Stand-off brackets (Runway elevation kits) shall be utilized to support above every rack.
 - e. Provide side posts at increments of 2 feet on center on both sides of the ladder rack lengths as an aid to contain cables.
 - f. Ceiling supports attached to structure shall be used to carry the weight of the ladder rack system.
 - g. Provide support for the ladder rack at increments not less than 4 feet 6 inches on center and additionally at splices tees, elbows, bends, intersections, and transitions.

- 1) Support with threaded rod and U-channel supports systems
 - a) 12 inches width: 1/2 inch ATR; 24 inches width: 5/8 inch ATR.
 - 2) Rod lengths over 6 feet shall require a “Rod Stiffener” installation.
 - a) A section of U-Channel stock is placed around the rod and stiffener clamp assemblies used to clamp to rod.
 - b) Place clamps a minimum of 6 inches from the top and bottom of the rod and every 18 inches in between.
 - h. Install smooth metal tubes over threaded support rods to protect cables from potentially sharp threaded edges of the support rod.
 - i. Install waterfall fittings at each location where a cable exits the ladder rack downward.
3. Vertically Mounted:
- a. Install ladder rack rails flush and flat against the backboard with rungs facing outwards. Mount using wall mounting clamps designed for this purpose.
 - b. Rest and secure one end of the ladder rack on the floor.
 - c. Extend and attach the upper limit of the ladder rack to the intersecting horizontal ladder rack.
 - d. Provide support for the ladder rack at increments of 3 feet (or less) on center along the entire length.
 - e. Trim out rectangular slot of appropriate size in ceilings, where applicable, to enable cable passage to above ceiling pathways.
- B. Spillways, Waterfalls, Cable Drop-outs:
1. Securely mount to ladder rack rails.
 2. Provide sizes that ensure compliance with the manufacturer minimum bend radius specifications of the cables entering or exiting the ladder rack.
- C. D-Rings:
1. Securely mount to communications room wall linings or other approved mounting surface.
 2. Space rings at intervals of 12 inches along the path of the cables served.
 3. Provide rings of sufficient size and quantity that no ring is utilized more than 40% of the rated capacity.
 4. Provide multiple sets of rings to form separate pathways for cables that require physical separation.
 5. Provide D-Rings for routing and management of cables on communication room walls, except where another type is identified for use on the Drawings.
- D. Finger Duct:
1. Securely mount to communications room wall linings or other approved mounting surface.

2. Mount duct runs plumb and level.
3. Provide duct of sufficient capacity that no more than 40% of the rated capacity.
4. Provide multiple ducts to form separate pathways for cables that require physical separation.

3.4 GROUNDING AND BONDING

- A. Comply with Section 270526 “Grounding and Bonding for Communications.”

END OF SECTION 271123