SECTION 27 11 00 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 and Division 27 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Grounding.

1.3 DESCRIPTION, PSU TERMINAL CLOSETS

A. There shall be at least one terminal closet per floor. Additional closets should be provided when the floor area exceeds 10,000 sq. ft. or the horizontal distribution distance to the workstation exceeds 90 meter (300 ft). There are typically two size scenarios for terminal closets: 1) the ideal situation where there is ample space to provide a minimum closet size of 10 ft. by 8 ft. with (3) 19” racks and VCT tile as flooring. Telecom closet must have ingle door at least 30 inches wide and 80 inches tall, opening out; and 2) the limited space scenario where the closet size should be a minimum of 7 ft. wide and 30 inches deep with VCT Tile, both of which are inside dimensions, provided the closet is accessed via double doors which swing out away from the closet. In either scenario, the closet should be at least 8 feet high. Each closet shall have sufficient power and lighting.

B. PSU’s minimum power requirements are two dedicated 120V 20 amp quad power outlets per rack. Power supply (including lights) in the closet shall be on emergency power. Additionally, each closet shall have adequate airflow to ensure that operating temperatures do not drop below 50° F or exceed 80° F.

C. If applicable, the use of a lockable wall mounted cabinet must be approved by PSU Telecom. Minimum dimensions for a lockable wall mounted cabinet is as follows; 3 feet tall, 2 feet deep with 19 inch mounting.

D. Closets shall be “centrally located” on each floor, or located so that horizontal station wires runs to user work stations and phones do not exceed 200 feet. The preferred standard for station wire is 150 feet. Each closet shall have sufficient sleeves, slots, conduits, or similar floor penetrations necessary to allow for ease of installation of telecommunications cabling and wiring. Such penetrations shall be properly firestopped per the applicable building codes.

E. A minimum of two walls should be covered with rigidly fixed (3/4 trade size) A-C plywood preferably void free, 8ft. high, capable of supporting attached equipment. Plywood should be either fire rated or covered with two coats of fire retardant paint.

1.4 DEFINITIONS

A. See 270500, Common Work Results for Communications.

1.5 ACTION SUBMITTALS

A. Comply with submittal requirements in Section 270500, Common Work Results for Communications.

B. Shop Drawings: Comply with 270500, Common Work Results for Communications and provide specific for communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

1.6 QUALITY ASSURANCE

A. Comply with requirements of Quality Assurance in 270500.

PART 2 - PRODUCTS

2.1 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches.
1. Cover all walls in Communications Equipment Rooms from 6-inches to 8-foot, 6-inches above finished floor.

2.2 EQUIPMENT FRAMES

A. Disregard this article if all cross-connects and patch panels are mounted on backboards.

B. Products: Subject to compliance with requirements, provide the following:
1. Chatsworth Products, Inc.

C. General Frame Requirements:
1. Distribution Frames: Freestanding, modular units designed for telecommunications equipment mounting.
2. Module Dimension: Width compatible with EIA 310-D standard, 19-inch panel mounting.
3. Finish: Manufacturer's standard, baked-polyester powder coat.

D. Floor-Mounted Racks: Modular-type, high strength aluminum construction.
1. 84-inches in height.
2. UL Listed.
3. Two top angle, and two base angle mounts.
4. Side rails capable of vertical cable management channel attachment.
5. Epoxy-polyester hybrid powder coat finish, black in color.
6. 3-inch deep mounting channels punched in the front and rear flange with EIA-310-D hole pattern, 1-3/4-inch rack mount spaces marked and numbered on the mounting channel.
7. Chatsworth Products Inc., 55053-703.

E. Vertical Cable Management Channels:
1. The cable manager shall be sized to match cabling requirements. The initial quantity of cables within the cable manager shall not exceed a whole number value equal to 40% of the interior area of the cable manager.
2. Epoxy-polyester hybrid powder coat finish, black in color.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.
5. Double-sided 3.65-inch wide by 84-inches tall. Chatsworth Products Inc., 12096-703.
6. Double-sided 6-inch wide by 84-inches tall. Chatsworth Products Inc., 11729-703.

2.3 LADDER RACK, SUPPORTS, AND ACCESSORIES

A. Ladder Rack (Universal Cable Runway)
1. Ladder rack shall be manufactured from 3/8-inch wide by 1-1/2-inches high tubular steel with .065-inch wall thickness.

2. Ladder rack (side stringers) will be 9-feet-11½-inches long. Cross members will be welded in between stringers on 12-inches intervals/centers beginning 5-3/4-inches from one end so that there are 10 cross members per ladder rack. There will be 10-1/2-inches of open space in between each cross member.
3. Ladder rack will be delivered individually boxed, and available in the width(s) specified below.
4. Ladder rack will be UL Classified for suitability as an equipment grounding conductor only (the installer must remove paint or use ground straps at splices and intersections).
5. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
6. Manufacturer: Chatsworth Products, Inc. (CPI), Universal Cable Runway:
7. Part Number 10250-712, Universal Cable Runway, 12-inches Wide, Black finish

B. Horizontal 90° Turns (Cable Runway E-Bend)
1. Horizontal 90° turns shall be manufactured from 3/8 wide by 11/2-inches high tubular steel with .065-inches wall thickness.
2. Stringers (sides) will be formed in a 90° arc. Cross members will be welded in between stringers on approximate 23° increments so that there are 5 cross members per turn. The welded assembly will have a 15-inches inside radius and will create a smooth horizontal 90° turn.
3. Horizontal 90° turns will be available in the width(s) specified below.
4. Black finish

C. Vertical-To-Horizontal 90° Turns (Cable Runway Outside Radius Bend)
1. Vertical-to-horizontal 90° turns shall be manufactured from 3/8-inch wide by 1-1/2-inches high tubular steel with .065-inch wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2-inches outside radius. Cross members will be welded in between stringers on approximate 23° increments so that there are 3 cross members per turn. The welded assembly will create a smooth 90° vertical-to-horizontal turn.
3. Vertical-to-horizontal 90° turns will be available in width(s) specified below.
4. Black finish

D. Horizontal-To-Vertical 90° Turns (Cable Runway Inside Radius Bend)
1. Horizontal-to-vertical 90° turns shall be manufactured from 3/8-inch wide by 1-1/2-inches high tubular steel with .065-inch wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2-inches outside radius. Cross members will be welded in between stringers on approximate 23° increments so that there are 3 cross members per turn. The welded assembly will create a smooth 90° horizontal-to-vertical turn.
3. Horizontal-to-vertical 90° turns will be available in the width(s) specified below.

E. Corner Brackets (Cable Runway Corner Bracket)
1. Corner brackets shall be manufactured from 3/8-inch wide by 1-1/2-inches high tubular steel with .065-inch wall thickness.
2. The inside stringers of the corner bracket will be formed at 90° with a small chamfer at the vertex. The outside stringer of the corner bracket will be formed in a 90° arc that is either 15-inches or 24-inches in radius. A single cross member will connect the chamfered portion of the inside stringer to the outside stringer. The welded assembly will create a smooth 90° turn within the L-shaped corner created by two intersecting ladder racks.
3. Corner brackets will be available in the size(s) specified below. Installation hardware will be included with the corner bracket. Corner bracket installation hardware does not include the junction splice kit required to form the L-shaped intersection between two ladder racks.

F. Ladder Rack Splices
1. Splice kits will provide a method of mechanically connecting ladder rack sections and turns together end-to-end or side-to-end to form a continuous pathway for cables.
2. Grounding kits will provide a method of bonding ladder rack sections and turns together that is independent of the pathway splices. The grounding kit should be constructed of UL Listed components. The preferred solution is a #6 AWG green insulated stranded copper conductor connected on both ends to ladder rack using two-hole compression lugs and stainless steel hardware.
3. An insulator bar kit will provide a means of electrically isolating individual ladder rack sections through an end-to-end splice separated with a non-conductive material. The preferred solution is a 3/8-inch wide by 1-1/2-inches high by 5-1/2-inches long insulator bar made of Delrin® (by DuPont, Delrin is a registered trademark of E.I. du Pont de Nemours and Company).
4. Splices (splice plates) will be manufactured from steel. Splice, grounding and insulator bar kits will include installation hardware.
5. Finish (of splice plates and hardware) shall be zinc plate in the color(s) specified below. Colors are applied as a chem. film over the zinc plate.
6. Manufacturer: Chatsworth Products, Inc. (CPI), Cable Runway Splices:
   a. Part Number 11301-701, Butt-Splice Kit, Black. Compression splice for end-to-end connections.

b. Part Number 11302-701, Junction-Splice Kit, Black. Compression splice for T- or L-connections.

G. Ladder Rack Supports
1. Supports will be sized to match the width of the ladder rack that is supported. Some supports will work with multiple or all widths of ladder rack.
2. Each support will include a means of mechanically securing ladder rack to the support.
3. Supports will be manufactured from steel or aluminum.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below or zinc plate with a gold chem. finish specified gold. Included hardware shall be zinc plated with a gold chem. finish.
5. Manufacturer: Chatsworth Products, Inc. (CPI), Cable Runway Supports:
   a. Part Number 11421-712, Wall Angle Support Kit, For 12-inches Wide Cable Runway (Ladder Rack), Steel, Black. NOTE: Wall support for end of cable runway. Installation requires (2) 5/16-inches lag bolts and (2) flat washers or concrete wall hardware (ordered separately).
   b. Part Number 10595-712, Rack-To-Runway Mounting Plate, For 9-inches to 12-inches Wide Cable Runway (Ladder Rack), for Standard and Universal Racks with 3-inches Deep Equipment Mounting Channels, Steel, Black. NOTE: Rack-To-Runway Mounting Plate attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes J-bolt installation hardware for 1-1/2-inches High cable runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.

H. Ladder Rack Accessories
1. Cable straps used for attaching cable bundles to the ladder rack cross members must be reusable with a hook and loop-style closure, at least 3/4-inch wide, and sized for cable bundles that are 2-inches, 3-inches or 4-inches in diameter.
2. Cable retaining posts used to keep cable from falling off of the side of the ladder rack shall be manufactured from 1-inch by ½-inch tubular steel with .065-inch wall thickness. Cable retaining posts will be 8-inches high and will attach to the side stringer of the ladder rack with included hardware. The top of the cable retaining posts will be fitted with a rubberized end cap to protect cables.
3. End caps used to cover the ends of ladder rack will be manufactured from a black fire-retardant rubberized material. End caps will be sized for 3/8-inch wide by 1-1/2 -inches high side stingers and will be sold in pairs.
4. End closing kits used to cover the end of ladder rack will be manufactured from 3/8-inch wide by 1-1/2-inches high tubular steel with .065-inch wall thickness. Kits will consist of a bar cut to match the width of the ladder rack and the hardware required to attach the bar to the end of a length of ladder rack.
5. Radius drops used to create a radius to form cables over as the cables exit or enter the ladder rack will be manufactured from aluminum extrusion. The extrusion will be formed in a 90° arc with a minimum bend radius of 3-inches. Radius drops will attach to either the side stringer or the cross member of the ladder rack using a clevis pin. Radius drops will include 11/2-inch high cable spools that attach to the top of the radius drop to guide cables.
6. Movable cross members used to support cross member radius drops in between welded cross members on ladder rack will be manufactured from 3/8-inch by 1-1/2-inches aluminum bar. Movable cross members will attach to ladder rack at the side stringers with included hardware so that the location of the movable cross member can be adjusted. Moveable cross member will support a cross member radius drop.
7. Cable spools used to separate ladder rack into multiple cable pathways will be made from a black flame retardant ABS. Cable spools will attach to the cross members with a clip that allows the width of the ladder rack to be divided into any proportion. The spools will be 3.94-inches tall, with a 1.94-inches diameter top cap, and a body that tapers from .88-inch diameter at the top to .62-inch diameter at the bottom.
8. Auxiliary support brackets used to support cables that should be physically separated from the cables in the ladder rack will be made from 1/8-inch by 1-inch steel bar. The bracket will be L-shaped and will attach to the side stringer of the ladder rack. The bracket will hang below the ladder rack a minimum of 4-inches. The bracket support surface will be 4-inches long. The bracket will be zinc plated with a gold chem. finish.
9. Touch-up paint used on ladder rack and ladder rack system components will be color-matched to the finish on the ladder rack or component. A spray on and brush on option will be available.
10. Unless otherwise noted, finish on all metal components shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below. Hardware will be zinc plated with a gold chem. finish.
11. Manufacturer: Chatsworth Products, Inc. (CPI), Cable Runway Accessories:
    a. Part Number 10596-706, Cable Retaining Post, 6-inches High, Black.
    b. Part Number 10642-001, Cable Runway Protective End Caps, 1 Pair, Black.

2.4 LABELING

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and housing when so directed by service provider.

B. Comply with requirements in Section 270528 "Pathways for Communications Systems" for materials and installation requirements for entrance pathways.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

D. Coordinate layout and installation of communications equipment with PSU's Telecom Department. Coordinate service entrance arrangement with local exchange carrier.
1. Meet jointly with PSU Telecom Department, local exchange carrier representatives to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and networking equipment.
4. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.

E. Coordinate location of power outlets, raceways and receptacles with locations of communications equipment requiring electrical power to operate. Power outlets are to be installed above each equipment rack to support communications equipment.

3.3 FIRESTOPPING

A. Comply with TIA-569-B, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground. Use table in the J-STD-607-A to calculate conductor size based on distance, with any distance over 66-feet requiring a 3/0 conductor.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.5 IDENTIFICATION

A. Comply with requirements in specification 270500, Common Work Results for Communication.

END OF SECTION 271100