Section 27 11 00

COMMUNICATION EQUIPMENT ROOM FITTINGS

Section 27 11 16

Communications Cabinets, Racks, Frames and Enclosures

PART 1 – GENERAL

1.1 WORK INCLUDED

    A.   Provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.

1.2 SCOPE OF WORK

    A.   This section includes the minimum requirements for cabinets, racks, frames and enclosures in data centers, computer rooms, and communications equipment rooms.

    B.   Included in this section are the minimum composition requirements and installation methods for the following:

        1.   Freestanding Cabinets.

1.3 QUALITY ASSURANCE

    A.   All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

    B.   Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

    C.   Material and work specified herein shall comply with the applicable requirements of:

        1.   ANSI/NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling

        2.   ANSI/TIA – 568-C Commercial Building Telecommunications Cabling Standard, 2009

        3.   TIA – 569-B Commercial Building Standard for Telecommunications Pathways and Spaces, 2004

4. TIA – 606-A Administration Standard for Commercial Telecommunications Infrastructure, 2007

5. ANSI-J-STD – 607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2002

6. NFPA 70 – National Electric Code, 2008

7. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers, 2005

1.4   SUBMITTALS

1.1   Provide product data for the following:

1.   Manufacturers data sheets/cut sheets, specifications and installation instructions for all products (submit with bid).

PART 2 – PRODUCTS

2.1   CABINETS

A.   Free-standing Equipment Cabinets (CPI F-Series TeraFrame® HD Cabinet System)

1.   [Cabinets] Provide freestanding equipment cabinets to store computer, data storage and networking equipment in the data centers, computer rooms and equipment rooms. Each cabinet enclosure shall have a rectangular frame with casters, and removable top panel, side panels and doors. Installed cabinets shall include thermal, power, and cable management accessories that control airflow through the cabinet and keep network and power cables separate and organized.

2.   [Cabinet Frame] The cabinet frame shall be rectangular with four corner posts, manufactured from steel and aluminum with welded and bolted frame construction. The sides of the cabinet frame shall have three supports located near the top, middle and bottom. The side supports shall be aluminum extrusion with grooves that accept captive hardware to allow attachment of equipment mounting rails and thermal, cable and power management accessories. The captive hardware will slide within the groove allowing rails and accessories to be adjusted in depth without removal from the cabinet. The slide extrusions will be marked with a scale that allows easy top-to-bottom alignment of mounting rails and other accessories when adjusted in depth. The cabinet frame shall support 3000 lb (1360 kg) of equipment and will include casters that allow the cabinet to be moved with equipment installed in the cabinet.

The cabinet shall be 82.5" (2096 mm) high by 23.6" (600 mm) wide by 46.1" (1172 mm) deep when casters, doors, top panel and side panels are installed.

Change cabinet height and depth to match job requirements. Refer to the TeraFrame HD DataSheets or the CPI Product Configurator to see all TeraFrame HD options. Cabinet Heights: 82.5" (2096 mm) with 42U mounting rails; 87.7" (2228 mm) with 45U mounting rails; or 91.2" (2316 mm) with 47U mounting rails; rack-mount units, U (2.1.A.3.) changes when

cabinet height changes. Cabinet heights include casters which add approximately 4.2" (107 mm) to the height of the cabinet.
Cabinet Depths: 46.1" (1172 mm) with 39.4" (1001 mm) max rail depth or 51.0" (1297 mm) with 44.3" (1126 mm) max rail depth; rail depth (2.1.A.3.) changes when cabinet depth changes.

3. [Equipment Mounting Rails] Each cabinet shall include two pairs of equipment mounting rails. Mounting rails shall bolt to the side of the cabinet frame at the top, middle and bottom of the frame and shall be adjustable in depth to provide front and rear support for equipment. Equipment Mounting Rails shall be spaced horizontally to support 19" (482.6 mm) wide EIA/ECA-310-E compliant rack-mount equipment and shall provide up to 39.4" (1001 mm) of rail-to-rail depth for equipment. Mounting rails shall be square-punched according to the EIA/ECA-310-E Universal hole pattern with equipment mounting holes on alternating 5/8" – 5/8" – 1/2" (15.9 mm – 15.9 mm – 12.7 mm) vertical hole centers. Square-punched holes shall accept cage nut hardware with various threads. Rack mount spaces or units (U) shall be 1-3/4" (44.45 mm) high and shall be marked and numbered on the mounting rails. Numbering shall start at the bottom of the rail. Mounting rails shall provide 42U for equipment.

    Change rail-to-rail depth and number of U to match job requirements.
    Maximum Rail-to-Rail Depth (depth) varies with cabinet depth and cabinet depth changes when rail depth changes (see the note under 2.1.A.2). (Note that actual rail depth will be less. Reduce Maximum Rail Depth by mounting rail setbacks required by cable, power and thermal management accessories to determine actual rail depth. Vertify that the cabinet has sufficient depth for the required rail depth and accessory setback.)
    U (Height): 42U, 45U or 47U; cabinet height (2.1.A.2) changes when U changes.

4. [Top Panel] *Choose one top panel [a. or b.] and make [4.]*
    a. [Server Top Panel – solid panel with two cable access ports] The cabinet shall include a solid top panel with two 3" x 11.5" (76 mm x 292 mm) cable access ports located near the front corners of the frame and a covered opening for the Vertical Exhaust Duct at the rear of the frame. Each cable access port shall be plastic with a brush seal to allow easy addition and removal of cables while limiting bypass airflow.
    b. [Vertical Exhaust Duct System – top-mount duct and Server Top Panel with two cable access ports.Use with a solid rear door.] The cabinet shall include a solid top panel with two 3" x 11.5" (76 mm x 292 mm) cable access ports located near the front corners of the frame and a Vertical Exhaust Duct located at the rear of the frame. Each cable access port shall be plastic with a brush seal to allow easy addition and removal of cables while limiting bypass airflow. The Vertical Exhaust Duct shall be rectangular and shall extend between 20" (508 mm) and 34" (863 mm) high or 34" (863 mm) and 60" (1523 mm) high to touch the overhead drop ceiling. A curved airflow director shall be included at the bottom rear of the cabinet to guide airflow towards the top of the cabinet. The cabinet frame shall have a seal around the rear door opening to limit bypass airflow around the closed door.
    Duct is available in two height ranges, pick one and delete the other from the spec.

5. [Side Panels] The cabinet shall include two locking solid side panels with spring loaded latches for easy installation and removal. The cabinet shall be designed to allow baying with side panels installed. The side panel latches and door latches shall use the same key.

6. [Front Door] The cabinet shall include a single front door with a perforated metal panel, hidden tamper-resistant hinges with quick-release hinge pins and a swing handle. The door shall be removable and reversible to open

from the right or left. The door shall open to 150° when the cabinet is bayed with other cabinets. The front door shall have a single-point cam latch with a keyed lock.

7.   [Rear Door] The cabinet shall include a single solid metal rear door with a swing handle. The door shall be removeable and reversible to open from the right or left. The door shall open to 175° when the cabinet is bayed with other cabinets. The rear door shall have a single-point cam latch with a keyed lock.

   Choose the Rear Door style. If the cabinet has a Vertical Exhaust Duct Top Panel, use a solid rear door. Use the copy below for double perforated doors.
   Rear Door styles: single solid, single perforated, double perforated

   [Rear Door] The cabinet shall include a double perforated metal rear door with a swing handle. The doors shall be removeable. The doors shall open to 175° when the cabinet is bayed with other cabinets. The double rear door shall have a two-point cam latch with a keyed lock.

8.   [Material/Construction] The cabinet frame and door frames shall be manufactured from steel and aluminum. The top panel and side panels shall be manufactured from steel. Door panels shall be steel. The door handle, side panel latches, rear door hinges and top panel cable access ports shall be plastic. The cabinet frame and front door shall be welded and bolted. The rear door shall be welded. Cabinet components shall assemble with hardware.

9.   [Grounding/Bonding] The mounting rails, top panel, side panels and doors shall be electrically bonded to the cabinet frame. The cabinet frame shall have a prepared location for attaching a grounding lug.

10. [Certifications] The cabinet shall pass the requirements of Telecordia Technologies Generic Requirements GR-63-CORE, Issue 3, March 2006, Paragraph 5.4.3, Curve 1; ISTA 3E 2006, Test #3; and ISTA 3E 2006, Test #4.

11. [Color/Finish] The metal components of the cabinet frame, top panel, side panels, and doors shall be painted black with epoxy-polyester hybrid powder coat paint. The mounting rails shall be zinc-plated and silver-colored. Plastic components shall be black.

12. [Included Hardware] The cabinet shall include (4) leveling feet and a grounding lug for bonding the cabinet frame to the Telecommunications Grounding Busbar. The manufacturer of the cabinet shall sell compatible equipment mounting hardware and a floor installation/bolt-down kit as an accessory.

13. [Packaging] The cabinet shall ship on a shock pallet with reusable carton so that it can be shipped to a factory integration site to be loaded with equipment, then repackaged and shipped to the data center for installation. The shock pallet shall be rated for 3,000 lb (1360 kg) of payload excluding the cabinet weight.

14. Design Make shall be:
     Chatsworth Products, Inc. (CPI),
     F-Series TeraFrame® HD Cabinet System:

     Part Number **FHDC1M-113B-C42**, TeraFrame HD Cabinet, 82.5"

(2096 mm) high x 23.6" (600 mm) wide x 46.1" (1172 mm) deep cabinet, 42U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel, Two Solid Side Panels, Single Perforated Metal Front Door, Double Perforated Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

Part Number **FHDF1M-113B-C42**, TeraFrame HD Cabinet, 87.7" (2228 mm) high x 23.6" (600 mm) wide x 46.1" (1172 mm) deep cabinet, 45U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel, Two Solid Side Panels, Single Perforated Metal Front Door, Double Perforated Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

Part Number **FHDH1M-113B-C42**, TeraFrame HD Cabinet, 91.2" (2316 mm) high x 23.6" (600 mm) wide x 46.1" (1172 mm) deep cabinet, 47U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel, Two Solid Side Panels, Single Perforated Metal Front Door, Double Perforated Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

Other depths and door styles are available. The following part numbers include a Vertical Exhaust Duct.

Part Number **FHDC1U-111B-C62**, TeraFrame HD Cabinet with Vertical Exhaust Duct System, 82.5" (2096 mm) high x 23.6" (600 mm) wide x 51.0" (1297 mm) deep cabinet, 42U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel and 34"-60" (863 mm – 1523 mm) high Vertical Exhaust Duct, Two Solid Side Panels, Single Perforated Metal Front Door, Single Solid Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

Part Number **FHDF1U-111B-C62**, TeraFrame HD Cabinet with Vertical Exhaust Duct System, 87.7" (2228 mm) high x 23.6" (600 mm) wide x 51.0" (1297 mm) deep cabinet, 45U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel and 34"-60" (863 mm – 1523 mm) high Vertical Exhaust Duct, Two Solid Side Panels, Single Perforated Metal Front Door, Single Solid Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

Part Number **FHDH1U-111B-C62**, TeraFrame HD Cabinet with Vertical Exhaust Duct System, 91.2" (2316 mm) high x 23.6" (600 mm) wide x 51.0" (1297 mm) deep cabinet, 47U x 19" EIA, Square-Punched Equipment Mounting Rails, Server Top Panel and 34"-60" (863 mm – 1523 mm) high Vertical Exhaust Duct, Two Solid Side Panels, Single Perforated Metal Front Door, Single Solid Metal Rear Door, Cam Latch, Keyed Locks, Casters, Black.

The listed part numbers are examples of cabinet descriptions. Select one cabinet description. Change variables to match cabinet requirements. Use the TeraFrame HD DataSheets or the CPI Product Configurator to choose your TeraFrame HD Cabinet. Product Configurator lets you choose product features and pick accessories, then creates a detailed Bill of Material based on your cabinet and accessory selections. You can substitute part numbers from the Bill of Material into this specification and change descriptions to match the selected items.

B.   Cable Management (F-Series TeraFrame™ HD Cabinet System)

1.   [Cable Lashing Bracket] Each installed cabinet shall be equipped with one vertical cable lashing bracket to secure and organize network cables. The cable lashing bracket shall be 5.125" (130 mm) wide, shall include three vertical columns of U-shaped attachment points for securing cable bundles with Velcro straps or tie-wraps, shall attach to the side of the cabinet frame

and shall adjust in depth front-to-rear independent of the equipment mounting rails. The cable lashing bracket requires a minimum 5" (127 mm) equipment mounting rail setback when located in the corner of the cabinet between the equipment mounting rails and cabinet frame.

*Cable Lashing Bracket supports three 1.5" (38 mm) diameter cable bundles. Choose the number of Cable Lashing Brackets to include in each cabinet and list the correct Part Number in 2.1.B.5 below. Cable Lashing Brackets **must** match the height of the cabinet frame.*

Cable Lashing Bracket requires a rail setback (a reduction in rail-to-rail depth or the overall equipment mounting depth, see 2.1.A.3 above) of 5" (127 mm) when placed in the corner of the cabinet between the equipment mounting rails and cabinet frame. If Cable Lashing Brackets are used at the front and rear of the cabinet, there will be a rail setback at the front and the rear of the cabinet.

Omit 2.1.B.1. and the Cable Lashing Bracket Part Number if it is not used.

2. [Cable Lashing Bar] Each installed cabinet shall be equipped with one vertcical cable lashing bar to secure network cables. The cable lashing bar shall be 1.5" (38 mm) wide, shall include attachment points for securing a cable bundle with Velcro straps or tie-wraps, shall attach to the side of the cabinet frame and shall adjust in depth front-to-rear independent of the equipment mounting rails. The cable lashing bar requires a minimum 2.5" (63 mm) equipment mounting rail setback when located in the corner of the cabinet between the equipment mounting rails and cabinet frame.

    *Cable Lashing Bar is an alternative to Cable Lashing Bracket for applications with fewer cables Cable Lashing Bar supports one 1.5" (38 mm) diameter cable bundle. Choose the number of Cable Lashing Bars to include in each cabinet and list the correct Part Number in 2.1.B.5 below. Cable Lashing Bars **must** match the height of the cabinet frame.*

    Cable Lashing Bar requires a minimum equipment mounting rail setback (a reduction in rail-to-rail depth or the overall equipment mounting depth, see 2.1.A.3 above) of 2.5" (63 mm) when placed in the corner of the cabinet between the equipment mounting rails and cabinet frame. If Cable Lashing Bars are used at the front and rear of the cabinet, there will be a rail setback at the front and the rear of the cabinet.

    Omit 2.1.B.2. and the Cable Lashing Bar Part Number if it is not used.

3. [Vertical Cable Ring Manager] Each installed cabinet shall be equipped with one vertical cable ring manager to organize network cables. The vertical cable ring manager shall attach to the side of the equipment mounting rail in the cabinet. The vertical cable ring manager shall be a pair of brackets each with several plastic D-rings for securing cables. The D-rings shall be approximately 1.4" (36 mm) wide by 4" (100 mm) deep. The vertical cable ring manager requires a minimum 4.8" (122 mm) equipment mounting rail setback when the rings are located in the corner of the cabinet between the equipment mounting rails and cabinet frame.

    Vertical Cable Ring Managers are an alternative to Cable Lashing Bracket for applications with fewer cables. Choose the number of Vertical Cable Ring Managers to include in each cabinet and list the correct Vertical Cable Ring Manager Part Number in 2.1.B.5 below. Vertical Cable Ring Managers must match the height of the cabinet frame. Each cabinet can support up to four Vertical Cable Ring Managers - one per mounting rail.

    Vertical Cable Ring Managers require a rail setback (a reduction in rail-to-rail depth or the overall equipment mounting depth, see 2.1.A.3 above) of 4.8" (122 mm) when the rings are located in the corner of the cabinet between the equipment mounting rails and cabinet frame. If Vertical Cable Ring Managers are used on the front and rear mounting rails with rings located in the corners of the cabinet, there will be a rail setback at the front and the rear of the cabinet.

    Omit 2.1.B.3. and the Vertical Cable Ring Manager Part Number if it is not used.

4.   [Rack-Mount Cable Shelf] Each installed cabinet shall be equipped with a rack-mount shelf with brush-sealed cable pass-through ports along the front surface to create a front-to-back pathway for cables. The shelf shall be 1U high and 19" EIA rack-mount. The shelf shall attach to the front and rear pair of equipment mounting rails. The shelf shall adjust to attach to mounting rails located between 22" (558 mm) and 40" (1016 mm) apart. The brush-sealed cable pass-through ports shall be sized to hold 48 patch cords.

Choose the number of Rack-Mount Cable Shelves to include in each cabinet. Rack-Mount Cable Shelves are used in cabinets equipped with the Thermal Management Accessory Air Dam Kit to provide a front-to-rear pathway for cables.

Omit 2.1.B.4 and the Rack-Mount Cable Shelf Part Number if it is not used.

5.   Design Make shall be:
Chatsworth Products, Inc. (CPI),
F-Series TeraFrame™ HD Cabinet,
Cable Management Accessories:

Part Number **16273-C02**, Cable Lashing Bracket, for 42U F-Series TeraFrame HD Cabinet, 5.125" (130 mm) Wide, Black.
Part Number **16273-C05**, Cable Lashing Bracket, for 45U F-Series TeraFrame HD Cabinet, 5.125" (130 mm) Wide, Black.
Part Number **16273-C07**, Cable Lashing Bracket, for 47U F-Series TeraFrame HD Cabinet, 5.125" (130 mm) Wide, Black.
Match the height of the cabinet. Bracket attaches to the cabinet frame and requires a minimum 5" (127 mm) equipment mounting rail setback when placed in the corner of the cabinet between the equipment mounting rails and cabinet frame.

Part Number **16272-C02**, Cable Lashing Bar, for 42U F-Series TeraFrame HD Cabinet, 1.5" (38 mm) Wide, Black.
Part Number **16272-C05**, Cable Lashing Bar, for 45U F-Series TeraFrame HD Cabinet, 1.5" (38 mm) Wide, Black.
Part Number **16272-C07**, Cable Lashing Bar, for 47U F-Series TeraFrame HD Cabinet, 1.5" (38 mm) Wide, Black.
Match the height of the cabinet. Bar attaches to the cabinet frame and requires a minimum 2.5" (63 mm) equipment mounting rail setback when placed in the corner of the cabinet between the equipment mounting rails and cabinet frame.

Part Number **16275-C02**, Vertical Cable Ring Manager with Small Rings, for 42U F-Series TeraFrame HD Cabinet, 1.4" (36 mm) Wide x 4" (100 mm) Deep Rings, Black.
Part Number **16275-C05**, Vertical Cable Ring Manager with Small Rings, for 45U F-Series TeraFrame HD Cabinet, 1.4" (36 mm) Wide x 4" (100 mm) Deep Rings, Black.
Part Number **16275-C07**, Vertical Cable Ring Manager with Small Rings, for 47U F-Series TeraFrame HD Cabinet, 1.4" (36 mm) Wide x 4" (100 mm) Deep Rings, Black.
Match the height of the cabinet. Manager attaches to the equipment mounting rail and requires a minimum 4.8" (122 mm) equipment mounting rail setback when rings are located in the corner of the cabinet between the equipment mounting rails and cabinet frame.

Part Number **13517-701**, Rack-Mount Cable Shelf, 1U x 19" EIA, Extends 22" (558 mm) to 40" (1016 mm) Deep, Black.
Use with rails spaced 22" (558 mm) to 40" (1016 mm) apart.

C.   Power Management (F-Series TeraFrame™ HD Cabinet System)

1. [PDU Lashing Bracket] Each installed cabinet shall be equipped with a vertical power distribution unit lashing bracket to store PDUs and secure power cord slack. The vertical PDU lashing bracket shall be 8.375" (213 mm) wide, shall attach to the side of the cabinet frame, shall include mounting points for up to two vertical rack-mount PDUs and have a recessed surface with attachment points for securing cable bundles with Velcro straps or tie-wraps, and shall adjust in depth front-to-rear independent of the equipment mounting rails. The PDU mounting points on the bracket will be spaced vertically 36.75" (934 mm) and 64.75" (1645 mm) apart. The bracket will support two vertical rack-mount PDUs that are up to 2.3" (58 mm) wide each or one PDU that is up to 3.5" (89 mm) wide. The mounting points shall orient PDUs so that the outlets on the PDUs face the center of the cabinet frame. Locate the power strip lashing bracket in the rear left corner of the cabinet. The power strip lashing bracket requires a minimum 5" (127 mm) equipment mounting rail setback. An 8.5" (216 mm) equipment mounting rail setback is required for full access to the recessed surface where cable bundles are secured.

    *PDU Lashing Brackets supports two 2.3" (58 mm) wide or one 3.5" (89 mm) wide CPI PDUs P/Ns 356XX-XXX and 358XX-XXX or eConnect PDUs. List the correct Power Strip Lashing Bracket Part Number in 2.1.C.5 below. The PDU Lashing Bracket **must** match the height of the cabinet frame. The PDU Lashing Bracket is usually used at the rear of a Server Cabinet. A minimum 5" (127 mm) mounting rail setback is required, but an 8.5" (216 mm) mounting rail setback is recommended to allow easy access to bundled power cables.*

    Omit item 2.1.D.1. if no PDUs are included in the cabinet.

2. [Dual Vertical Power Strip Manager] Each installed cabinet shall be equipped with a dual vertical power strip manager to store two vertical rack-mount power strips. The vertical power strip lashing bracket shall be 4.6" (118 mm) wide, shall attach to the side of the cabinet frame, shall include mounting points for up to two vertical rack-mount power strips and shall adjust in depth front-to-rear independent of the equipment mounting rails. The power strip mounting points on the bracket will be spaced vertically 28" (838 mm), 61.25"" (1556 mm) and 64.75" (1645 mm) apart. The bracket will support two vertical rack-mount power strips that are up to 2.2" (56 mm) wide each. The mounting points shall orient power strips so that the outlets on the power strips face the center of the cabinet frame. Locate the dual vertical power strip manager in the rear left corner of the cabinet. The dual vertical power strip manager requires a minimum 6.3" (160 mm) equipment mounting rail setback.

    *Dual Vertical Power Strip Managers support CPI Power Strips For Cabinets P/Ns 128XX-XXX. PDU P/Ns 356XX-XXX and 358XX-XXX and eConnect PDUs must be supported on the Power Strip Lashing Bracket listed in 2.1.D.1. Choose the number of power strips to include in the cabinet and list the correct Part Number in 2.1.C.5 below. The Dual Vertical Power Strip Manager **must** match the height of the cabinet frame. The Vertical Power Strip Manager is usually used at the rear of a Server Cabinet. A 6.3" (160 mm) deep mounting rail setback is required.*

    Omit item 2.1.D.2. if no power strips are included in the cabinet.

3. Design Make shall be:
    Chatsworth Products, Inc. (CPI),
    F-Series TeraFrame™ HD Cabinet,
    Power Managers and Vertical Rack-Mount Power Strips/PDUs:

    Part Number **34595-C02**, Dual Vertical Power Strip Manager, for 42U

TeraFrame HD Cabinet, 4.3" Wide x 1" Deep (110 mm Wide x 25 mm Deep), Black.
Part Number **34595-C05**, Dual Vertical Power Strip Manager, for 45U TeraFrame HD Cabinet, 4.3" Wide x 1" Deep (110 mm Wide x 25 mm Deep), Black.
Part Number **34595-C07**, Dual Vertical Power Strip Manager, for 47U TeraFrame HD Cabinet, 4.3" Wide x 1" Deep (110 mm Wide x 25 mm Deep), Black.

Part Number **16274-C02**, Power Strip Lashing Bracket, for 42U TeraFrame HD Cabinet, 8.375" Wide x 1.7" Deep (213 mm Wide x 42 mm Deep), Black.
Part Number **16274-C05**, Power Strip Lashing Bracket, for 45U TeraFrame HD Cabinet, 8.375" Wide x 1.7" Deep (213 mm Wide x 42 mm Deep), Black.
Part Number **16274-C07**, Power Strip Lashing Bracket, for 47U TeraFrame HD Cabinet, 8.375" Wide x 1.7" Deep (213 mm Wide x 42 mm Deep), Black.

D.   Thermal Management (F-Series TeraFrame™ HD Cabinet System)

1.   [Air Dam Kit] Each installed cabinet shall be equipped with an internal airflow baffle to block airflow around the top, bottom and sides of equipment in the cabinet. The airflow baffle shall seal the space at the front of the cabinet between the equipment mounting rails and the top, sides and bottom of the cabinet enclosure and shall allow the front pair of equipment mounting rails to be positioned (setback) between 1.7" (43 mm) and 2.5" (63 mm) in depth.

2.   [Snap-In Filler Panels] Each installed cabinet shall be equipped with filler (blanking) panels that seal any open rack-mount spaces (U spaces not occupied by other equipment). The filler (blanking) panels shall be made of plastic and shall be designed to attach to square-punched equipment mounting rails without hardware. The filler (blanking) panel design shall allow the panels to be installed and removed from the equipment mounting rails without tools. Panels shall be sized to fit 1U x 19" EIA and 2U x 19" EIA rack-mount panel spaces.

Air Dam Kit (airflow baffles) **must** *match the height of the cabinet frame. Vertical Cable Managers and Power Managers cannot be placed on the front rails or at the front of the cabinet frame when Air Dam Kit is used. However, a Rack-Mount Cable Shelf can be used with Air Dam Kit to route cables front-to-back or back-to-front (see section 2.1.B.4., Rack-Mount Cable Shelf).*

Air Dam Kit and Snap-In Filler Panels should be used in all server cabinets that support rack-mount servers and require front-to-rear or front-to-top, cold-to-hot airflow. Air Dam Kit and Snap-In Filler Panels help control airflow through cabinets by blocking the space around equipment so that cold air goes through equipment and so that hot air does not re-circulate to the front of the cabinet and recycle through equipment.

Use Air Dam Kit with perforated front and rear doors for cabinets in conventional hot aisle/cold aisle environments. Use Air Dam Kit with perforated front door and solid rear door and the Vertical Exhaust Duct System top panel (2.1.A.4b) for cabinets with high heat loads over 7 kW. (The Vertcal Exhaust Duct System attaches to a drop ceiling to isolate and remove hot air from the room.) Air Dam Kit requires a 1.7" (43 mm) to 2.5" (63 mm) front rail setback. Vertical Exhaust Duct System requires an 8.7" (221 mm) rear rail setback.

3.   [Bottom Panel] Each installed cabinet that is supported on leveling feet or casters (elevated above the floor) shall be equipped with a bottom panel to block airflow into and out of the base of the cabinet. The bottom panel shall

have a 3" x 11.5" (76 mm x 292 mm) cable access port. Each cable access port shall be plastic with a brush seal to allow easy addition and removal of cables while limiting bypass airflow.

4. Design Make shall be:
    Chatsworth Products, Inc. (CPI),
    F-Series TeraFrame™ HD Cabinet,
    Thermal Management Accessories:

    Part Number **16270-C02**, Air Dam Kit, for 42U F-Series TeraFame HD Cabinet, Black.
    Part Number **16270-C05**, Air Dam Kit, for 45U F-Series TeraFame HD Cabinet, Black.
    Part Number **16270-C07**, Air Dam Kit, for 47U F-Series TeraFame HD Cabinet, Black.
    Match the height of the cabinet.

    Part Number **34537-000**, Snap-In Filler Panel, 1U x 19" EIA, Black
    Part Number **34538-000**, Snap-In Filler panel, 2U x 19" EIA, Black

    Part Number **16278-C01**, Bottom Panel, for F-Series TeraFame HD Cabinet, Black.

E. Installation Hardware (F-Series TeraFrame™ HD Cabinet)

1. [Unloading Ramp] Provide a minimum of one unloading ramp for each customer site. The unloading ramp shall provide a way to remove a fully-loaded cabinet from the shipping pallet. The ramp shall bolt to the shipping pallet, shall be 78" (1981 mm) long with a 5-degree incline, shall have narrow U-shaped tracks to capture casters and maintain straight travel.

2. [Bolt-Down Kit] Provide bolt-down kits to secure each cabinet to the floor. The bolt-down kits will be a pair of two-piece brackets. Each bracket will have an L-shaped component that bolts to the floor and a plate that bolts to the front or rear of the cabinet. The design will allow the L-shaped components to be pre-installed so that the cabinet can be rolled into place and quickly secured by connecting the front and rear plates. The front and rear plates will also cover the space between the bottom of the cabinet frame and the floor so that the casters are hidden and to minimize air recirculation.

3. [Side Skirt] Provide a side skirt at the ends of cabinet rows to cover the space at the bottom of the cabinet between the cabinet frame and the floor so that the casters are hidden and to minimize air recirculation.

4. [Baying Kits] Provide baying kits when cabinets connect together side-by-side to form multi-cabinet rows. Use a fascia between cabinets when the cabinets are centered over 24" wide raised access floor tiles to cover the small gap between the cabinets.

5. Provide additional equipment mounting hardware to attach equipment to the equipment mounting rails in the cabinet.

6. Design Make shall be:
    Chatsworth Products, Inc. (CPI),
    F-Series TeraFrame™ HD Cabinet:

Part Number **16279-C01**, Bolt-Down Kit, Black.
Cabinets must be secured to the floor.

Part Number **16277-C11**, Side Skirt, For 46.1" (1172 mm) Deep Cabinet [42.3" (1075 mm) Deep Cabinet Frame], Black.
Part Number **16277-C16**, Side Skirt, For 51.0" (1297 mm) Deep Cabinet [47.2" (1200 mm) Deep Cabinet Frame], Black.
Match cabinet/frame depth. Side Skirt attaches to the Bolt-Down Kit. Sold individually, use two per cabinet row.

Part Number **35079-C02**, Narrow Baying Kit, Black
Part Number **16271-C02**, Baying & Fascia Kit, 42U, Black.
Part Number **16271-C05**, Baying & Fascia Kit, 45U, Black.
Part Number **16271-C05**, Baying & Fascia Kit, 47U, Black.

Narrow Baying Kit are two C-shaped brackets and installation hardware used to bay cabinets that are the same height side by side.
Baying & Fascia Kit is only used to bay and align two cabinets over 24 in (610 mm) wide raised floor tiles. Match to cabinet height.

Part Number **12637-001**, Cage Nuts and Screws, M6, 25 Pack, Gold.
Part Number **12638-001**, Cage Nuts and Screws, #10-32, 25 Pack, Zinc.
Part Number **12639-001**, Cage Nuts and Screws, #12-24, 25 Pack, Black.
Use in cabinets with square punched equipment mounting rails.

3.1   INSTALLATION

A.   Free-standing Equipment Cabinets (F-Series TeraFrame™ HD Cabinet)

1.   Provide all components of the cabinet system (cabinet, mounting rails, cable managers, power managers, power strips/PDUs, and thermal management accessories) from a single manufacturer.

2.   Install and adjust to position all accessories including vertical cable and power strip/cord managers, vertical power strips/PDUs, equipment-mounting rails, airflow baffles, bottom panel and the vertical exhaust duct using the manufacturer's installation instructions prior to baying and/or placing the cabinet for attachment to the building. Filler panels, if used, may be installed after the cabinet is placed.

3.   Cabinets shall be secured to the structural floor using manufacturer's installation instructions and appropriate hardware as defined by local code or the authority having jurisdiction (AHJ). Installers shall provide installation hardware. When placed over a raised floor, secure the cabinet to the structural floor through the raised floor panels using threaded rod.

4.   When used in a multi-cabinet bay, cabinets shall be attached side-by-side using accessory baying kits according to the manufacturer's installation instructions.

5.   Attach overhead ladder rack or cable tray to the ceiling, independent of the cabinet. Maintain a 3" (75 mm) minimum clearance between the top of the cabinet and the bottom of the ladder rack/cable tray. Ladder rack/cable tray shall be positioned so that it does not interfere with hot air exhaust through

the cabinet's top panel. Use radius drops where cable enters/exits the ladder rack/cable tray.

Note: Seismic installations require additional bracing of cabinets and overhead cable runways to building structure as advised by and certified by a licensed structural engineer.

6. Cabinets shall be securely bonded to the Telecommunications Grounding Busbar (TGB). Attach a bonding conductor sized as defined in J-STD-607-A and as defined by local code or the authority having jurisdiction (AHJ) between the Telecommunications Grounding Busbar and the cabinet. Attach the bonding conductor to the cabinet using included hardware according to the manufacturer's installation instructions. The installer shall provide the bonding conductor and other necessary hardware required to make the connections between the cabinet and the Telecommunications Grounding Busbar.