

**DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS**

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SECTION [27 11 16]

COMMUNICATIONS CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation as required for the complete performance of the work, and as herein specified.
- B. The work specified includes, but shall not be limited to, requirements for cabinets, in data centers, computer rooms, and communications equipment rooms.
- C. Included in this section are the minimum composition requirements and installation methods for communications cabinets.

1.2 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. 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 the following standards and regulations:
 - 1. TIA – 569-B Commercial Building Standard for Telecommunications Pathways and Spaces, 2004
 - 2. ANSI/ TIA – 568-C Commercial Building Telecommunications Cabling Standard, 2009
 - 3. ANSI/ NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 - 4. TIA – 606-A Administration Standard for Commercial Telecommunications Infrastructure, 2007
 - 5. ANSI-J-STD – 607-A Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2002
 - 6. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers, 2005
 - 7. NFPA 70 – National Electric Code, 2008

1.3 SUBMITTALS

- A. Provide product data for the following:
 - 1. Manufacturer's data sheets/cut sheets, specifications and installation instructions for all products (submit with bid).

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
 - 1. The unit shall be shipped fully assembled as one orderable SKU.
 - 2. The unit shall ship on a wooden pallet. Optional packaging shall be available for shipping cabinets with 1250 lbs to 2000 lbs of installed equipment.
 - 3. The unit shall be bolted to the wooden pallet for stability during shipment.
 - 4. The unit shall be protected by corrugated corners, which are stretch-wrapped to limit damage during handling.
 - 5. The unit shall have unpacking instructions including manufacturer's contact information for customer support.
- B. The customer shall store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. The manufacturer shall offer an inside-delivery shipping option which includes reasonable delivery to the inside of a customer's building and removal and disposal of shipping material and packaging
 - 2. The 42U unit shall roll through a standard 2 meter or seven (7) foot office doorway.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Do not install equipment until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.6 WARRANTY

- A. The manufacturer shall warrant the unit to be free from defects in materials and workmanship for a minimum period of five years from the date of purchase. The manufacturer's obligation under this warranty shall be to repair or replace the unit, at its own sole option. This warranty shall not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way.
- B. The manufacturer shall warrant all accessories and options to be free from defects in materials and workmanship for a minimum period of two years from the date of purchase. The manufacturer's obligation under this warranty shall be to repair or replace the equipment, at its own sole option. This warranty shall not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way.

PART 2 – PRODUCT

2.1 DESIGN REQUIREMENTS

- A. Equipment cabinets to store computer, data storage and networking equipment in the data centers, computer rooms and equipment rooms. Each cabinet shall be designed to provide a secure, managed environment for server and networking equipment. Cabinets shall be designed to accommodate power and cable management accessories that keep network and power cables separate and organized.
- B. Physical Specifications:
1. Cabinet dimensions, equipment mounting compatibility and weight load ratings:

Internal Height	EIA-310	External Height	External Width	External Depth	Static Rating	Dynamic Rating
42U	19"	1991mm (78.40")	600mm (23.62")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
42U	19"	1991mm (78.40")	750mm (29.53")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
42U	19"	1991mm (78.40")	800mm (31.50")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
42U	19"	1991mm (78.40")	600mm (23.62")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
42U	19"	1991mm (78.40")	750mm (29.53")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
42U	19"	1991mm (78.40")	800mm (31.50")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
45U	19"	2124mm (83.62")	600mm (23.62")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
45U	19"	2124mm (83.62")	750mm (29.53")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
45U	19"	2124mm (83.62")	600mm (23.62")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
45U	19"	2124mm (83.62")	750mm (29.53")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	600mm (23.62")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	750mm (29.53")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	800mm (31.50")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	600mm (23.62")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	750mm (29.53")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
48U	19"	2258mm (88.90")	800mm (31.50")	1200mm (47.24")	1363 kg (3000lbs)	1022 kg (2250lbs)
24U	19"	1198mm (47.19")	600mm (23.62")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250)lbs

2. The 42U unit shall have exterior maximum height to allow passage through a standard 2 Meter or 7 Ft. (84 in) doorway without tipping.
3. The 42U, 45U, and 48U units shall support a static load (weight supported by the casters and leveling feet) of at least 1,364 kg. (3,000 lb) total installed equipment weight.
4. The 42U, 45U, and 48U units shall support a rolling load (rolling on the casters) of at least 1,023 kg. (2,250 lb) total installed equipment weight.
5. The units (42U, 45U, 48U) shall ship with a perforated front door, perforated split rear doors, four (4) half-height side panels, toolless roof, two (2) vertical frame posts, four (4) adjustable vertical mounting rails, minimum of two (2) and maximum of four (4) vertical PDU mount cable organizers, four (4) leveling feet and four (4) casters, baying and grounding hardware pre-installed by the manufacturer.

C. Material Requirements

1. All weight bearing components shall be constructed from steel with a thickness no less than 0.9mm (20 gauge).
2. All sheet metal parts shall be painted using a powder coat paint process.
3. Plastic materials shall meet or exceed Underwriters Laboratory's UL94 standard HB rating.
4. All interior components of the cabinets shall not have electroplated zinc coating to minimize zinc whiskers near active equipment.

D. Access and Installation:

1. The unit shall provide 42U, 45U, or 48U of equipment vertical mounting space.
2. The vertical mounting rails shall be easily adjustable to allow different mounting depths.
 - a. Each vertical mounting rail shall be marked on both sides with lines showing the top and bottom of each U and the number U space next to the middle hole. Each U consists of three square holes and is 1.75 inches (44.45 mm) high.
3. The unit shall include M6 caged nuts, bolts and cup washers, and caged nut tool for the mounting of equipment inside the unit.
4. Both the front and rear doors shall be designed with lift-off hinges allowing for quick and easy detachment without the use of tools.
 - a. The front and rear doors shall open a minimum of 120 degrees to allow easy access to the interior.
 - b. The front door of the unit shall be reversible so that it can be mounted on either side.
 - c. Split rear doors are provided for increased service clearance.
 - d. The front door of the unit shall be capable of being installed on the rear of the unit and the rear doors shall be capable of being installed on the front of the unit.
5. The unit shall include half-height side panels that are removed without tools using easy finger latches for fast access to cabling and equipment.
 - a. The side panels on the unit shall double as privacy panels when the units are bayed together.
 - b. Side panels shall be flush with the frame so the overall width of the unit does not change with the side panels installed.
 - c. Baying brackets must provide two sets of mounting holes for standard cabinet spacing of 24" or 600mm.

6. Grounding:
 - a. All cabinet components such as doors, side panels, roofs, etc. shall be bonded directly to the frame.
 - b. Grounding points shall be provided on the cabinet's frame to externally bond each unit to the building ground.

2.2 VENTILATION

- A. The unit shall have ventilated front and rear doors to provide adequate airflow required by the major server manufacturers.
- B. The unit shall have a minimum total ventilation area for the front door, split rear doors, and roof as specified in the table below:

Internal Height	External Width	Perforated Front Door	Perforated Rear Doors
42U	600mm (23.62")	5930 cm ² (919 in ²)	6689 cm ² (1036 in ²)
42U	750mm (29.53")	7889 cm ² (1222 in ²)	8669 cm ² (1343 in ²)
42U	800mm (31.50")	8571 cm ² (1328 in ²)	9346 cm ² (1449 in ²)
45U	600mm (23.62")	6348 cm ² (984 in ²)	7154 cm ² (1109 in ²)
45U	750mm (29.53")	8470 cm ² (1313 in ²)	9290 cm ² (1440 in ²)
48U	600mm (23.62")	6758 cm ² (1047 in ²)	7626 cm ² (1182 in ²)
48U	750mm (29.53")	9004 cm ² (1395 in ²)	9892 cm ² (1533 in ²)
42U	800mm (31.50")	9779 cm ² (1516 in ²)	10663 cm ² (1653 in ²)
24U	600mm (23.62")	3458 cm ² (536 in ²)	3759 cm ² (583 in ²)

- C. The unit shall provide the means to mount optional cooling accessories for high-density applications.
- D. The manufacturer shall offer an optional toolless blanking panel kit to prevent the recirculation of hot exhaust air.

2.3 CABLE ACCESS

- A. Top cable management openings provided in the cabinet roof.

Internal Height	External Width	External Depth	Openings Located on Roof	Opening with Roof Removed
42U/ 45U/ 48U	600mm (23.62")	1070mm (42.13")	Two 75mm (2.96") x 164mm (6.44"), One 240mm (9.45") x 92mm (3.61"), and Five 171mm (6.75") x 54mm (2.14") Rectangular Openings	567mm (22.31") x 892mm(35.10")
42U/ 45U/ 48U	750mm (29.53")	1070mm (42.13")	Two 75mm (2.96") x 164mm (6.44"), One 240mm (9.45") x 92mm (3.61"), and Five 171mm (6.75") x 54mm (2.14") Rectangular Openings	717mm (28.20") x 892mm (35.10")
42U/ 48U	800mm (31.50")	1070mm (42.13")	Two 75mm (2.96") x 164mm (6.44"), One 240mm (9.45") x 92mm (3.61"), and Five 171mm (6.75") x 54mm (2.14") Rectangular Openings	767mm (30.19") x 892mm (35.10")
42U/ 45U/ 48U	600mm (23.62")	1200mm (47.24")	Two 66mm (2.60") x 252mm (9.93") and nine 171mm (6.75") x 54mm (2.14") Rectangular Openings	567mm (22.32") x 1023mm (40.28")
42U/ 45U/ 48U	750mm (29.53")	1200mm (47.24")	Two 66mm (2.60") x 252mm (9.93") and nine 171mm (6.75") x 54mm (2.14") Rectangular Openings	716mm (28.20") x 1023mm (40.28")
42U/ 48U	800mm (31.50")	1200mm (47.24")	Two 66mm (2.60") x 252mm (9.93") and nine 171mm (6.75") x 54mm (2.14") Rectangular Openings	767mm (30.19") x 1023mm (40.28")
24U	600mm (23.62")	1070mm (42.13")	Three 60mm (2.36") Diameter Circular Openings	567mm (22.31") x 892mm (35.10")

- B. Cable opening edges shall be protected with plastic grommets or radiused edges.
- C. Bottom cable management opening provided in the cabinet base:

Internal Height	External Width	External Depth	Main Base Opening
24U/42U/45U/48U	600mm (23.62")	1070mm (42.13")	567mm (22.31") x 831mm (32.71")
42U/45U/48U	750mm (29.53")	1070mm (42.13")	717mm (28.25") x 832mm (32.74")
42U/48U	800mm (31.50")	1070mm (42.13")	767mm (30.19") x 831mm (32.71")
42U/45U/48U	600mm (23.62")	1200mm (47.24")	567mm (22.32") x 962mm (37.87")
42U/45U/48U	750mm (29.53")	1200mm (47.24")	717mm (28.23") x 962mm (37.87")
42U/48U	800mm (31.50")	1200mm (47.24")	767mm (30.19") x 962mm (37.87")

- D. Side cable management opening shall be provided in the cabinet base. A minimum of two and maximum of four vertical PDU mount cable organizers shall be offered.

2.4 ENVIRONMENTAL

- A. The unit shall have a minimum of IP 20 rating for protection against touch, ingress of foreign bodies, and ingress of water.
- B. The cabinet shall both protect the user from mechanical hazards and generally meet the requirements (stability, mechanical strength, aperture sizes, etc.) as defined in IEC 60950 Third Edition.

2.5 STABILIZATION

- A. The unit shall ship with provisions for stabilization in the field using the pallet mounting brackets.
- B. The manufacturer shall offer an optional stabilizer kit that can be attached to the cabinet frame. The frame can then be bolted to the floor.
- C. The manufacturer shall offer an optional bolt down kits, consisting of brackets and mounting hardware that attach to the cabinet frame and which must be anchored to the sub-floor for compliance with the International Building Code (IBC).
- D. The manufacturer shall supply structural calculations by a professionally registered engineer showing compliance with the IBC for floor anchoring.
- E. The unit shall have four (4) adjustable leveling feet to help provide a stable base in the event of an uneven floor surface and to prevent rolling.

2.6 OPTIONAL ACCESSORIES

- A. The manufacturer shall offer the following optional accessories as required to accommodate customer requirements.
 - 1. RM LCD Monitor/Keyboard drawer: The manufacturer shall offer a 1U high, rack-mounted LCD monitor/keyboard drawer to maximize space in a data center environment.
 - 2. Cooling: The manufacturer shall offer roof-mounted fan trays, door mounted fan trays, monitoring devices, and stand alone cooling units for maintaining a cool environment.
 - 3. Rack Power Distribution Units: The manufacturer shall offer a variety of single-phase and three-phase rack mount power distribution units with current monitoring outlet switching, and remote management capabilities.
 - 4. Cable Management: The manufacturer shall offer a variety of cable management accessories to neatly organize the routing of data and power cables within the cabinet.
 - 5. Shelving: The manufacturer shall offer as optional accessories various fixed and sliding shelves with the ability to support up to 250 lbs of non-rack mount equipment.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect/Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Beginning the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

- A. Equipment Cabinets
 - 1. Provide all components of the cabinet system (including any optional accessories).
 - 2. Install and adjust to position all cabinet components including accessories. Install vertical cable managers, power distribution and equipment-mounting rails, using the manufacturer's installation instructions prior to baying and/or placing the cabinet for attachment to the building and before installing any rack-mount equipment into the cabinet. Shelves, horizontal cable managers and filler panels, if used, may be installed after the cabinet is placed.
 - 3. When attached to the structural floor, the installer shall provide installation hardware.
 - 4. When used in a multi-cabinet bay, cabinets shall be attached side-by-side using included baying kits according to the manufacturer's instructions.
 - 5. Attach overhead ladder rack or cable tray to the ceiling or the top of the cabinet. The ladder rack/cable tray shall be positioned so that it does not interfere with the hot air exhaust through the cabinet's top panel.
Note: Seismic installations require additional bracing of cabinets and overhead cable runways to the building structure as advised by and certified by a licensed structural engineer.
 - 6. Cabinets shall be securely bonded to a common ground. 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 common ground and the cabinet. Attach the bonding conductor to the cabinet using a ground terminal block 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 common ground.

3.3 FIELD QUALITY CONTROL

- A. MANUFACTURER FIELD SERVICE
 - 1. Replacement parts: Parts shall be available through the worldwide service organization 24 hours a day, 7 days a week, and 365 days a year.

END OF SECTION