Facility Design Guidelines: Workplace, Architecture & Engineering

Telecommunications Rooms
MasterFormat Section 27 11 00

The guidelines described herein shall be used on all projects, unless USAA’s Project Variance Request process has been used to secure an approved, project-specific variance.

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1.0 DEFINITIONS:
A. Telecommunications equipment room – TER
B. Telecommunications room – TR
C. Entrance Facilities – ER
D. Telecommunications enclosures – TE
E. Telecommunications outlets – TO
F. Above finished floor – AFF

2.0 GENERAL:
A. The design of telecommunications rooms must consider the size of building, number of floors, tenant characteristics, telecommunications service required, new construction or renovation, etc.
B. There must be at least one TER in a single-story building.
C. For multi-story buildings, one TER on the first floor (or basement) is required and at least one smaller TR is required on each floor above.
D. TERs and TRs must be designed so that they are within 295 "cable feet" (90 meters) of every TO on that floor. If this is not possible then more than one TR per floor is required. (295 cable feet include cable lengths through vertical walls, conduits, cable trays and other pathways between the patch panels in the TR and the TO.)
E. The best location for TERs or TRs is the building core. The rooms should be vertically aligned or stacked.
F. TERs and TRs must not be located inside office spaces, class rooms or auditoriums.
G. TERs and TRs must be dedicated to telecommunications. They may not contain electrical and mechanical equipment; fire alarm panels, slop sinks for janitors, etc.
H. Equipment not related to the TER and TR such as piping, duct work, building column and distribution of building power must not be located in or pass through the TER or TRs.

3.0 Telecommunication Room Design Requirements
A. Minimum ceiling height is 8 feet, 6 inches AFF. Drop ceiling or suspended ceiling is not
permitted in all telecommunications spaces. Ceiling should be unobstructed to provide space over the equipment racks for suspended cable trays or horizontal ladder racks. Sprinkler heads must be provided with cages to prevent accidental operations. Drainage troughs must be provided under the sprinkler pipes to prevent leakage onto the equipment. Pipe & troughs must be as high as possible to avoid accidental operation from cable pulling activities.

B. Avoid dust and static electricity by; Installing tile instead of carpet, Treating floors, walls, and ceiling to minimize dust

C. Walls of TC should be covered with ☺‘ AC plywood, with two coats of fire retardant paint. A plan indicating walls requiring plywood.

D. Provide fire protection

E. Locate telecommunication closets above any threat of flooding

F. The TC for this project will house active electronic equipment for network operations.

G. In general, one TC is required for each 10,000 sq. ft. of workstation area. However, if cable distances can be kept within limits, a single room of sufficient size may serve a larger area.

H. Multiple telecommunication closets on the same floors will be interconnected with a minimum of one three-inch conduit (trade size 3") or equivalent. A cable tray system in the ceiling space may suffice.

I. All walls must be lined with ☻‘ void free A-C grade (or better) plywood. The plywood must be fire retardant or treated with at least two coats of fire retardant paint on all sides. Use light colored paint to aid with lighting in the rooms. The bottom of the plywood should be mounted 6" above finished floor (AFF). No electrical conduits, junction boxes or any other equipment may be mounted on or across any backboard.

J. Carpet is not permitted in any telecommunications spaces. Floors-- also walls and ceilings should be treated and sealed to eliminate dust. Static-controlled vinyl tiles are the preferred floor cover.

4.0 Access

A. Telecommunication closets will have fully-opening, lockable doors which are 3.0’ x 7.0’ with no door sills.

B. For security reasons, doors must be equipped with lockable hardware that meet building code requirements and card access.

C. Doors should have same fire rating as the room.

D. Telecommunications rooms must not have windows.

E. They must be accessible either from the building exterior, public hallway or other common areas.

5.0 SIZING

A. TR serving 50 WAs or 5000 sq. ft. must be at least 10'x 8' in size. (A typical WA is 10'X10' or 100 sq. ft.)

B. TR serving an area larger than 5000 sq. ft. and less than or equal to 8000 sq. ft. must be at least 10'x 9'.

C. TR serving an area larger than 8000 sq. ft. and less than or equal to 10,000 sq. ft. must be at least 10'x 11'.

6.0 ELECTRICAL

A. Emergency lighting is recommended

B. Power to support planned and future active equipment. See attached information sheets
outlining load requirements for the active equipment.

C. For convenience and maintenance purposes, two, general purpose, 120 volt circuits should be supplied to a TR. These circuits may be placed around the perimeter of the room at 18” AFF.

D. Power for telecommunications equipment should be supplied from a dedicated source, with surge suppressor protection on circuits serving rack or cabinet mounted switches.

E. A minimum of two dedicated emergency power, non-switched receptacles for equipment power, each on individual branch circuits.

F. Adjacent or shared walls with Electrical equipment rooms should not have motors, transformers or any other high EMI generating devices placed along the shared walls.

G. Lighting must have uniform intensity of 50 foot candles when measured 3 feet from the finished floor. Indirect lighting is not permitted. Lighting fixtures must be on separate electrical circuits separate from the circuit the feeds the electrical outlets in the room. Do not place light fixture above equipment racks, cabinets, frames or other freestanding equipment to avoid blocking of light. Emergency lighting is recommended

H. Three, 120 volt, 20 amp circuits should be placed on each set of racks as depicted in the detail drawings.

I. A minimum of four 4-inch vertical riser conduits are required between TCs. Enclosures for floor mounted TOs must have 1-1/4” knock-outs to accept the station conduits and must accommodate standard TO faceplates.

7.0 Bonding and Grounding

A. Per NEC and ANSI/EIA/TIA- 607 requirements, the telecommunications grounding and bonding infrastructure shall be designed and routed through each telecommunications space.

B. Grounding shall consist of a Telecommunications Ground Bar (TGB) mounted in the TC. The TGB is connected to the main electrical building ground via one 1-1/2” conduit with a #3/0 AWG, at the nearest accessible point. All racks and frames will be grounded individually to the TGB with a # 6 AWG.

C. Each telecommunications room shall be equipped with a Telecommunications Grounding Busbar (TGB) bonded directly to the Telecommunications Bonding Backbone (TBB).

D. The busbars shall be a minimum of 6” in length, 2” in width and 1/4 thick. They shall be drilled and tapped to accommodate standard NEMA compliant grounding hardware.

E. The TBB shall be a minimum of #6 AWG stranded copper grounding conductor and should be in conduits. All TBBs must be tied to the telecommunications main grounding busbar (TMGB) located in the equipment room (or main telecommunications room).

F. The TMGB must be bonded to the building system ground with a minimum of 3/0 AWG stranded copper bonding conductor (BC).

G. The ohmic resistance to ground from any point in the telecommunications grounding system must not be more than 3 ohms.

8.0 Environmental Control

A. The temperature inside telecommunications rooms must be maintained between 64 ºF-75 ºF and relative humidity between 35%-55%.

B. There must be at least one air exchange per hour in the rooms to maintain positive pressure inside the rooms.

C. Continuous environmental control (24 hours per day, 365 days per year).

D. Maintain positive pressure with a minimum of one air change per hour.
E. HVAC supplying the room should be on emergency power.
F. HVAC unit supplying the room should not be located in the room, locate outside the room.

9.0 Flooring
A. Raised floors of telecommunication closet must have a minimum floor loading of 100 lb/sq. ft.
B. Antistatic flooring is required and do not use carpeting.
C. The rating for distributed floor loading for telecommunications room must be greater than 100 lbs/sq. ft. Concentrated loading must be greater than 2000 lbs in areas that will support telecommunications equipment.

10.0 Telecommunications Equipment Room (TER)
A. A telecommunications equipment room (TER) is where the entrance conduits terminate. It is usually located on the ground floor but may also be located in the basement.
B. A TER typically functions as the main cross-connect (MCC). It is the main telecommunications serving point for the building. It will contain telecommunications equipment, much of it mounted on 19" racks.
C. Cables will be spliced and terminated on the walls. It is important that the entrance conduits stub up in the TER as close to a corner as possible.
D. TER dimensions should be 12’ x 12-1/2’ (minimum) for a building serving fewer than 200 work areas --a typical work area (WA) is 10’x10’ or 100 sq. ft. A larger building will require a larger TER.

11.0 Telecommunications Rooms (TRs)
A. TRs are smaller than TERs. They are the cabling hubs for floors within a building. They also contain network electronics, typically mounted in 19" racks.
B. If floor area served is much less than 5000 sq. ft., a small 8’x 6’ TR is adequate.
C. A minimum of four 4-inch vertical riser conduits or sleeves are required between TRs. They must be installed as close to a corner in the TR as much as possible.

12.0 Horizontal Pathways
A. The Horizontal Pathway System is the pathway through which cables are pulled from the TER or TR to the outlets on that floor. Outlets must be connected to a TR on the same floor. Wiring pathways shall be at least 12 inches from unshielded power lines of <480 volts and at least 5” from fluorescent lighting fixtures.

13.0 Cable Trays
A. It is important that the path for the cable tray is clear of obstructions, such as HVAC ducts, large pipes and structural beams within the building.
B. Where fire or smoke barriers are penetrated by the cable tray, they shall be fire stopped to maintain the rating of the barrier. Alternatively, conduit sleeves may be used through the penetrations. They must be fire stopped as well.
C. The number of sleeves required depends on the number of cables and size of tray. Use 50% fill ratio to determine the number of sleeves. Two additional spare sleeves should be installed to accommodate future cable placement.
D. Place cable trays above drop ceilings in corridors. Do not place them above offices or inaccessible spaces.
E. There must be at least 4 inches of vertical space between the suspended ceiling tile and the bottom of the cable tray; 12 inches of vertical clearance from the top of the cable tray to the true ceiling; and 2' total side clearance (meaning, if the cable tray is wall mounted and there is no clearance on one side, then minimum clearance on the other side should be 2').

F. It is desirable that the cable tray originates from the TR. If it does not originate from the TR then 4" conduits may be used to connect the TR to the cable tray. The number of 4" conduits required depends on the number of cables and size of tray. Use 50% fill ratio to determine the number of 4" conduits. Two additional spare conduits should be installed to accommodate future cable placement.

G. Access ceiling panels must be installed at 5-foot interval if cable tray is passing though a hard-lid ceiling. The panels should be within 2 feet from the cable tray. They shall not be mounted directly underneath the cable tray.

H. All metallic cable trays must be grounded but should not be used as grounding conductor for equipment.

14.0 Perimeter Raceway System
   A. In a perimeter raceway, power and telecommunications cables must be in separate compartments and must comply with applicable electric codes. When metallic barrier is provided, it must be bonded to ground. The barrier must run continuously throughout the length of the raceway.
   B. A double-gang pull box must be placed in the wall at 10-foot interval along the length of the raceway. Each box must have a 1-1/4 conduit to the cable tray.

15.0 Miscellaneous
   A. Audio-visual (AV) systems, intercoms and similar in-house paging devices are the responsibility of the architect. They may not be located in any TR

16.0 Elevator Phones
   A. Elevator phones are cabled to elevator equipment room. Phones are provided by Facilities Management. There must be at least one TO in the elevator equipment room that is cabled to the nearest TR. There must be adequate number of jacks on the TO in order to accommodate all elevators in the building.