****
USACE / NAVFAC / AFCEC / NASA **UFGS-27 05 29.00 10 (August 2011)**

Preparing Activity: USACE **New**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
****

SECTION TABLE OF CONTENTS

DIVISION 27 - COMMUNICATIONS

SECTION 27 05 29.00 10

PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATION SYSTEMS

08/11

PART 1 GENERAL

1.1 RELATED REQUIREMENTS
1.2 REFERENCES
1.3 ADMINISTRATIVE REQUIREMENTS
1.3.1 Conditions
1.3.2 Construction Methods
1.3.3 PDS Design
1.3.4 PDS Design Technical Review
1.3.5 PDS Design Approval Request
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Manufacturer's Qualifications
1.5.2 Installer's Qualifications
1.5.3 Equipment
1.6 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 PDS CARRIER CONFIGURATION
2.1.1 Secure Raceway Carrier
2.1.1.1 Fittings and Components
2.1.1.2 Mounting Accessories
2.1.1.3 Through Wall Penetrating
2.1.1.4 Pull Points
2.1.2 Conduit Carrier
2.1.2.1 Conduit
2.1.2.2 Mounting Brackets
2.1.2.3 Fittings
2.1.2.4 Through Wall Penetrating
2.1.2.5 Pull Points
2.2 USER DROP BOX
2.3 ENCLOSURES

PART 3 EXECUTION

3.1 EXAMINATION

3.2 PDS CARRIER ROUTING
3.2.1 General
3.2.2 Distribution Topology
3.2.3 Mounting Location Considerations
3.2.4 Adjacent Infrastructure Considerations
3.3 INSTALLATION
3.3.1 Mounting PDS Carrier
3.3.2 Enclosures
3.3.2.1 User Drop Box (UDB)
3.3.2.2 Other Enclosures
3.3.3 Mechanical Security
3.3.4 Carrier Support
3.4 FIELD QUALITY ASSURANCE
3.4.1 Physical Inspection
3.4.2 Magnetic Test
3.5 CLEANING AND PROTECTION

-- End of Section Table of Contents --

****

USACE / NAVFAC / AFCEC / NASA **UFGS-27 05 29.00 10 (August 2011)**

Preparing Activity: USACE **New**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021

****

SECTION 27 05 29.00 10

PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATION SYSTEMS
08/11

****

NOTE: This guide specification covers the requirements for a protective distribution system used in conjunction with SIPRNET communication systems.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also

use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C80.3	(2015) American National Standard for Electrical Metallic Tubing (EMT)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

NATIONAL SECURITY TELECOMMUNICATIONS AND INFORMATION SYSTEMS SECURITY (NSTISS)

NSTISSAM TEMPEST/2-95	(1995; Am A 2000) RED/BLACK Installation Guidance
NSTISSI-7003	(1996) Protective Distribution Systems (PDS)

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-569	(2015d) Commercial Building Standard for Telecommunications Pathways and Spaces

1.3 ADMINISTRATIVE REQUIREMENTS

1.3.1 Conditions

Notify the Contracting Officer if it is impossible to install SIPRNET PDS that complies with this section and references.

1.3.2 Construction Methods

Methods of construction that are not specifically described or indicated in the Contract will be subject to the control and approval of the Contracting Officer.

1.3.3 PDS Design

Include separate plans, elevations, sections, details, and attachments to other work. Indicate PDS carrier route, PDS carrier mounting height above finished floor, user drop box mounting height, and user drop box locations. Submit the PDS design to the cognizant Central TEMPEST Technical Authority (CTTA), for a technical review prior to the acquisition of material, through the installation Network Enterprise

Center (NEC) or Directorate of Information Management (DOIM).

1.3.4 PDS Design Technical Review

Coordinate with the installation NEC/DOIM and submit PDS design for technical review to CTTA. Provide PDS carrier shop drawings, List of Material (LOM), and any other documentation required 90-days prior to PDS carrier installation (see NSTISSI-7003, Appendix C).

1.3.5 PDS Design Approval Request

PDS design approving authority is the installation NEC/DOIM Designated Approving Authority (DAA). Submit PDS design and CTTA technical review to the installation NEC/DOIM to obtained PDS design approval from the DAA prior to installation.

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will

review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

PDS Design; G[, [_____]]
PDS Design Technical Review; G[, [_____]]
PDS Design Approval; G[, [_____]]

SD-03 Product Data

PDS Hardened Carrier

SD-04 Samples

PDS Carrier Surface Mounted
Pull Boxes
Fittings

SD-11 Closeout Submittals

User Drop Box
Other Enclosures

1.5 QUALITY ASSURANCE

1.5.1 Manufacturer's Qualifications

Use firms regularly engaged in manufacture of secure raceway systems, boxes, and fittings of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

1.5.2 Installer's Qualifications

Installer is required to obtain certification from the manufacturer of secure raceway system and install secure raceway system in accordance with manufacturer's instructions.

1.5.3 Equipment

PDS Hardened Carrier shall meet or exceed guidelines as defined by NSTISSI-7003 and shall be approved for use by DHS, U.S. Army, U.S. Marine Corps, U.S. Navy, and U.S. Air Force. Submit manufacturer's descriptive data.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver secure raceways, conduit, fittings and components in factory labeled packages. Store and handle in strict compliance with manufacturer's written instructions and recommendations. Protect from damage due to weather, excessive temperature, and construction operations.

PART 2 PRODUCTS

2.1 PDS CARRIER CONFIGURATION

****

NOTE: Secure Raceway carrier system shall be used in office environments, for SIPRNET PDS, unless the

installation NEC/DOIM specifically specifies a Conduit Carrier system. Conduit carrier may be used in non-office environments, such as hangars, maintenance facilities, warehouse, BCTC, etc.
****

Use secure raceway carrier system in office environments, Use conduit carrier in Non-office environments, such as hangars, maintenance facilities, warehouse, training areas, industrial areas.

2.1.1 Secure Raceway Carrier

Provide secure raceway, fittings and components manufactured from ferrous material. Submit three 150 mm 6-inch lengths of exposed type PDS carrier surface mounted conduit material, including component and fitting samples from the manufacturer, along with a LOM to the NEC/DOIM. Show finishes available (if applicable). PDS carrier that is comprised of Secure Raceway systems shall be:

a. Square or rectangular design with removable top covers or solid construction

b. [50 by 50 mm 2 by 2 inch raceway][50 by 100 mm2 by 4 inch] raceway for horizontal backbone and vertical riser runs

c. [25 by 25 mm 1 by 1 inch][12 by 25 mm1/2 by 1 inch] raceway for vertical user drops from horizontal backbone

d. Utilize elbows, couplings, fittings and connectors constructed from the same type of ferrous material as the secure raceway

e. Do not exceed 70 percent cable fill capacity of secure raceway with removable top cover in horizontal runs. TIA-569 cable fill standards do not apply.

f. Do not exceed 60 percent fill capacity of secure raceway of solid construction. TIA-569 cable fill standards do not apply.

2.1.1.1 Fittings and Components

Fittings and components include flat internal and external elbows, tees, couplings for joining raceway sections, nipples, wire clips, blank end fittings, and device mounting brackets and plates as applicable. Provide full capacity corner elbows and fittings to maintain a controlled 50 mm 2-inch cable bend radius that meet the TIA-569 specification for Fiber Optic and UTP cabling and exceeding the requirements for communications pathways.

2.1.1.2 Mounting Accessories

Mount secure raceways to the wall partition using 25 mm 1-inch stand-off mounting brackets or spacers. Do not mount the secure raceways flush with the wall partition.

2.1.1.3 Through Wall Penetrating

a. Use trim plates threaded rigid pipe and locking rings on both the inside and outside of the raceway to secure the thru-wall penetration.

b. Provide dielectric breaks when penetrating secure room wall partitions.

c. Seal space between wall partition and through wall penetration using fire-stop material.

d. Fire-stop vertical risers and through wall penetrations of fire rated wall partitions after pulling cabling. Annotate firewall penetrations on PDS design.

2.1.1.4 Pull Points

a. Provide a pull point for secure raceway with removable top cover every 270 degree change in direction. Provide additional pull points in accordance with the manufacturer's instructions.

b. Provide a pull point for secure raceway of solid construction every 180 degree change in direction. Provide additional pull points in accordance with the manufacturer's instructions.

2.1.2 Conduit Carrier

Provide electrical metallic tubing (EMT) manufactured from ferrous material that meets ANSI C80.3. Use fittings, couplers, and connectors manufactured from ferrous material. Use of EMT, fittings, couplers, and connectors construction from non-ferrous material is not acceptable. TIA-569 cable fill standards do not apply. Do not exceed 60 percent cable fills capacity in horizontal or vertical runs.

2.1.2.1 Conduit

Use [25] [50] [75] [100] mm [1] [2] [3] [4]-inch EMT conduit for horizontal backbone or vertical riser runs; [19] [25] mm [3/4] [1]-inch EMT conduit for vertical runs from horizontal runs to secure user drop box. Use components (e.g. couplers, connectors, condulette, fittings, pull boxes, enclosures) constructed from ferrous metallic material. Use of components constructed from non-ferrous metallic material is not acceptable.

2.1.2.2 Mounting Brackets

Surface mount PDS conduit carrier on interior walls using [12] [25] mm [1/2] [1]-inch stand-off mounting brackets. Use of non-metallic pipe hangers is acceptable to mount PDS conduit carrier to wall partitions.

2.1.2.3 Fittings

****

NOTE: Condulettes do not provide a 50 mm 2 inch bend radius except in larger sizes and listed as Mogul Pulling Elbows.

****

PDS conduit carrier fittings include; flat internal and external elbows; tees; condulette; pulling elbows; couplings for joining conduit sections; wire clips; blank end fittings; device mounting brackets; trim plates as applicable.

a. Provide full capacity corner elbows and fittings to maintain a controlled 50 mm 2-inch cable bend radius that meets the TIA-569

specification for Fiber Optic and UTP/STP cabling for communications pathways.

b. Use EMT conduit compression fittings and couplers to connect EMT conduit carrier sections, fittings and components together. Use of set screw connectors or set screw couplers to connect EMT conduit sections together is prohibited.

2.1.2.4 Through Wall Penetrating

a. Provide dielectric breaks when penetrating secure room wall partitions.

b. Seal space between wall partition and PDS conduit using appropriate fill material or fire-stop material.

c. Fire-stop vertical risers and through wall penetrations of fire rated wall partitions after pulling cabling. Annotate firewall penetrations on PDS design.

2.1.2.5 Pull Points

Provide a pull point with a pull string between every pair of adjacent access/pull locations; for every 180 degree bends in EMT conduit carrier; and every 100 feet of continuous conduit run.

a. Size pull boxes according to the size of the conduit, not the number of cables or conduits that enter/exit the pull box. NFPA 70 conduit fill standards do not apply.

b. Leave pull string in place throughout the conduit carrier, even after cable is pulled, in each horizontal and vertical run.

2.2 USER DROP BOX

Provide User Drop Box (UDB) (aka Secure User Workstation Enclosure, Drop Box, or Lockbox) that is at least 175 mm 7-inch high by 150 mm 6-inch wide by 100 mm 4-inch deep, tamper-resistant design constructed from 16 gauge steel with welded internal hinges, without pre-punched knockouts; and has a single door that has a built-in steel hasp that accepts a GSA approved changeable combination padlock. UDB shall accommodate a complete line of open connectivity outlets; modular inserts for Category 6 UTP or STP cable; fiber optic cabling with matching faceplates. STP cabling shall use shielded connectors, jacks, and patch panels. UDB with exterior hinges, pre-punched knockouts, and built-in locks are not acceptable.

2.3 ENCLOSURES

Provide equipment and pull-box enclosures constructed from 16 gauge steel; have a single door with a built-in steel hasp or multi-point security hasp that accepts a GSA approved changeable combination padlock; without pre-punched knockouts; and a tamper-resistant design with welded internal hinges.

PART 3 EXECUTION

3.1 EXAMINATION

Examine the route and mounting locations of the raceways, boxes,

distribution systems, supporting structure and accessories, to determine if conditions exist that will inhibit or prevent proper PDS installation. Notify the Contracting Officer in writing of conditions detrimental to proper completion of the work (i.e. that would render the distribution system non-compliant with governing security regulations). Do not proceed with work until unsatisfactory conditions are corrected.

3.2 PDS CARRIER ROUTING

3.2.1 General

Route the PDS carrier in a tree type fashion.

a. Start the PDS horizontal backbone at the TR (SIPRNET TR or at IPS container location) with a single raceway or conduit sized accordingly (70 percent cable fill for secure raceway with removable top cover, 60 percent cable fill for EMT conduit and solid construction secure raceway) to contain CAT6 UTP, CAT6 STP, or fiber optic cable runs.

b. Extend the PDS carrier from the PDS horizontal backbone throughout the facility to areas where SIPRNET access is required. Branch off the PDS horizontal backbone with a horizontal run to an area where the UDB is located.

c. Use vertical carrier runs from the horizontal run to the UDB. TIA-569 change in direction standard does not apply.

d. Use standard under-floor cable distribution methods to distribute SIPRNET cabling within Secure Room and SCIF spaces with raised flooring.

e. Maintain RED/BLACK cable separation in accordance with NSTISSAM TEMPEST/2-95.

f. Remove all burrs from carrier segments prior to installation.

3.2.2 Distribution Topology

Use a distributed topology when designing the PDS carrier. Locating a small secondary network switch in an equipment enclosure mounted in an Uncontrolled Access Area (UAA) space or in a relay or equipment rack within a Controlled Access Area (CAA) space (i.e. SCIF, NOC/BOC, etc.) that has a high concentration of users is acceptable. Interconnect network switches using single-mode fiber optic cable. Increase the capacity of the network switch to provide service to adjacent spaces as required.

3.2.3 Mounting Location Considerations

a. Route the PDS carrier so that it does not cross windows or doorway openings; does not cross ceiling or wall mounted lighting fixtures; does not obscure EXIT signs or fire alarms; and maintains a minimum 1000 mm 3-foot separation from fire sprinkler heads.

b. Bend (saddle or offset) conduit to follow wall contours and avoid wall obstacles (columns, pipes, etc.).

c. Use offset raceway to route secure raceway systems around columns and other wall partition obstacles.

d. Route PDS carrier so that it is surface mounted on interior walls wherever possible. Obtain exceptions from NEC/DOIM prior to installation to mount PDS carrier on exterior wall partitions.

e. Route PDS carrier to maximized cable fills in horizontal runs and reduce the number of horizontal runs within the same space.

f. Use all-thread rod to mount the PDS carrier to true ceiling structure when routing across open areas (e.g. large hallways, open office areas, large rooms) that exceed 2400 mm 8 feet. Mounting the PDS carrier directly from suspended ceiling framework is not acceptable.

3.2.4 Adjacent Infrastructure Considerations

Keep conduit a minimum of 150 mm 6 inches from parallel runs of flues and steam or hot water pipes. A minimum separation of 150 mm 6-inches is required between the PDS carrier and water pipes, electrical wires, electrical pipes, plumbing, air conditioning, etc.

3.3 INSTALLATION

Strictly comply with manufacturer's installation instructions and recommendations and approved shop drawings. Coordinate installation with adjacent work to ensure proper clearances and compliance with project site manager and NEC/DOIM.

3.3.1 Mounting PDS Carrier

Surface mount PDS Conduit on the wall using conduit clamps, brackets, or mounts with 12 to 25 mm 0.5 to 1-inch offset spacer from the wall surface. Mount PDS carrier to a wall partition every 1500 mm 5 feet and/or within 450 mm 18 inches of a section or component connection. Do not mount the PDS Carrier directly to the wall surface.

a. Where wall mounting is unavailable, use appropriately sized all thread rods to mount PDS carrier to ceiling structure.

b. Do not mount PDS carrier to acoustical tile ceiling (ATC) framework.

c. Fasten PDS carrier and component items to building wall partitions using appropriate anchor and fastener for wall partition type.

d. Mount PDS carrier so that is is level and plumb along its route. The top edge of the carrier is horizontally level. Whenever possible maintain a minimum of 50 mm 2-inches below the suspended ceiling line or the true ceiling line, whichever is lower.

e. Use appropriate hanger type to mount PDS Conduit carrier from ceiling structure.

f. Struts are not allowed to be used to mount secure raceway or conduit to wall partitions.

g. No more than 6 mm 1/4 inch play is allowed on TOP CAP (top cover) and span cut per segment span.

h. Install the PDS carrier to permit visual inspections of its entire run.

i. Do not block doorways or access to emergency exits and do not inhibit the operation of windows.

j. Do not paint or cover the PDS carrier with wallpaper or other covering unless the paint is applied by the carrier manufacturer.

k. Bond PDS carrier to TGB or TMGB at point of origin.

3.3.2 Enclosures

Use of enclosures with pre-punched knockouts or external hinges is not acceptable. Fasten UDB, pull boxes, and enclosures to the wall partition using fasteners appropriate for the wall partition type.

3.3.2.1 User Drop Box (UDB)

****
NOTE: Up to 6 cable connections may be terminated within the drop box as long as it is within 3.6 m 12 feet of the classified workstations and/or printers located in the same room.
****

a. Indicate UDB locations in the PDS Plan and on as-built drawings.

b. Size the UDB to terminate up to 6 cables.

c. Coordinate drop box location with furniture, fixtures and equipment that will be used in the vicinity[(provided by others)]. Surface mount drop boxes on the wall partition approximately 1.2 to 1.5 m 4 to 5 feet above final floor line depending on room furniture height and layout.

3.3.2.2 Other Enclosures

Indicate enclosure type (user drop box, equipment, or pull-box) on shop and as-built drawings.

3.3.3 Mechanical Security

Comply with site specific epoxy standards obtained from the installation NEC/DOIM. Apply a continuous bead of epoxy at all component, coupling, and fitting connection joints of an EMT conduit PDS carrier system. Seal pull box covers to the pull boxes around the mating surfaces after installation if they cannot be secured with GSA approved changeable combination padlock.

3.3.4 Carrier Support

Support carrier with mounting brackets at intervals [not to exceed 1.5 m 5 feet] [in accordance with manufacturer's installation sheets].

3.4 FIELD QUALITY ASSURANCE

3.4.1 Physical Inspection

Physically inspect all interfaces to ensure that they are tight and cannot turn. Also, physically inspect lock covers to ensure that the lock cap is properly sealed inside the locking mechanism.

3.4.2 Magnetic Test

Perform magnet test on all components (e.g. carrier conduit, carrier raceway, pull boxes, enclosures, conduit bodies, cover plates, etc) and fittings used to construct the carrier. Place a magnet on the carrier component or fitting to verify that construction is from ferrous material. Some alloys will fail the magnet test (e.g. 309 stainless steel) but meet the ferrous material requirements. Provide alloy material property list for components that fail magnet test to the Contracting Officer for approval. Use of components and fittings that fail the magnet test and are not made from ferrous material is not acceptable.

3.5 CLEANING AND PROTECTION

Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer. Protect raceways and boxes until acceptance.

-- End of Section --