



Florida Department of Transportation

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GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

September 15, 2022

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: **633**
Proposed Specification: **6330201 Communication Cable.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Matt DeWitt from the Traffic Engineering and Operations Office to provide updated labeling requirements for splice enclosures, cables and fiber cable termination. The changes also clarify that all fiber strands installed per the Plans be terminated (i.e., connectorized) in a patch panel.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on file

Daniel Strickland, P.E.
State Specifications Engineer

DS/ra

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

COMMUNICATION CABLE

(REV ~~97-1227-22~~)

SUBARTICLE 633-2.1.2.1 is deleted and the following substituted:

633-2.1.2.1 Splice Enclosures: Contain all optical fiber splices within a splice enclosure. Ensure that the enclosures provide storage for splices, fiber, and buffer tubes. Ensure that the splice enclosure restores the mechanical and environmental integrity of the fiber optic cable, encases the sheath opening in the cable, and organizes and stores optical fiber. Ensure all hinges and latching devices are stainless steel. Ensure that the enclosure is airtight and prevents water intrusion. Ensure that the splice enclosure can accommodate pressurization and has the ability to be reentered without requiring specialized tools or equipment. Ensure that the enclosure provides fiber and splice organizers including splice trays and strain relief.

Ensure that splice enclosures are hermetically sealed to protect internal components from environmental hazards such as moisture, insects, and UV light. Fiber optic splice enclosures shall also:

Comply with the Telcordia Technologies' GR-771-CORE standard and all applicable NEC requirements.

Provide space for future expansion equal to 100% of the initial utilization.

Provide fiber optic cable penetration end caps to accommodate a minimum installation of two trunk fiber optic cables and two fiber optic drop cables. Ensure that the enclosure end caps are factory-drilled to the proper diameter to accept and seal the fiber optic cable entries. Ensure that the cable entry locations can accommodate an assortment of cables with outside diameters ranging from 0.45 inches to 0.55 inches, plus 10%, without jeopardizing the waterproof characteristics of the enclosure.

Ensure that splice enclosures are permanently labeled using machine printed, waterproof labels suitable for outside plant applications.

Provide fiber optic splice enclosures meeting the following requirements:

Mechanical
Resist compression deformation to a maximum of 300 pounds.
Withstand an impact energy to a maximum of 40 foot-pounds at 0°F.
Axial Tension: 100 pounds for 30 minutes.
Cable Torsion: ten 90-degree rotations.
Cable Flexing: ten 90-degree bends.
Environmental
Hydrostatic Pressure Head: Up to 20 foot-pounds (-9 pounds per square inch).
Withstand 40 freeze/thaw temperature cycles.
Ultraviolet resistant during a maximum 30-day exposure in compliance with the requirements detailed in the ASTM B117 standard.
Chemical

Withstand a 90-day exposure to solutions of 3% sulfuric acid, 0.2 normal of sodium hydroxide, 10% Igepal®, kerosene, and be fungus resistant as required in the ASTM G21 standard.

SUBARTICLE 633-2.1.3 is deleted and the following substituted:

633-2.1.3 Cable Terminations: Use Type LC connectors for all new network installations. Use Type ST, SC, or FC connectors only for connections to existing equipment or as specified in the Plans or by the Engineer. Use ultra physical contact (UPC) pre-terminated cable assemblies with factory-installed connectors for all new network installations. Use UPC field-installed connectors only for connections or temporary repairs to existing equipment as specified in the Plans or by the Engineer. Ensure that all connectors include a ceramic ferrule and provide a strain relief mechanism when installed on a single fiber cable that contains strength elements. Ensure that ST and FC connectors include a metallic body. Ensure that all connectors provide a minimum 11 pound pullout strength. Ensure that the optical fiber within the body of all connectors is mechanically isolated from cable tension, bending, and twisting.

Ensure that all connectors are compliant with the TIA/EIA-604 standards, as applicable, and are tested according to the Telcordia/Bellcore GR-326-CORE standard. When tested according to the TIA and EIA's Fiber Optic Test Procedure (FOTP)-171 (TIA/EIA-455-171B) at the manufacturer, ensure that the connectors have an ~~average~~ insertion loss, as reflected on the manufacturer data sheet, ~~of less than or equal to 0.15 decibel and a maximum loss of less than or equal to 0.30~~ ~~0.20~~ decibel for pre-terminated cable assemblies with factory-installed connectors and a maximum loss of less than or equal to 0.50 decibel for field-installed temporary connectors. Test the connectors as detailed in FOTP-107 (TIA -455-107A) to reflectance values of less than or equal to minus ~~50~~ 45 decibels.

SUBARTICLE 633-3.1 is deleted and the following substituted:

633-3 Installation Requirements.

633-3.1 Fiber Optic Cable Installation: Install all materials and equipment according to the latest version of the manufacturer's installation procedures. Ensure that all materials and installation practices are in accordance with the applicable OSHA requirements as found in 29 CFR Part 1926, Safety and Health Standards for Construction. In addition, perform the following:

1. Ensure conduit and inner-duct is clean and free from damage prior to installing fiber optic cable.

2. Document the sequential cable length markings at each splice box and pull box wall that the cable passes through, and include the information with the as-built documentation.

Provide all incidental parts needed to complete the installation, but not specified in the Plans, as necessary for a complete and properly operating system.

SUBARTICLE 633-3.1.1 is deleted and the following substituted:

633-3.1.1 Cable Identification: Develop a nomenclature plan for identification of fiber optic cable. Submit the nomenclature plan to the Engineer for approval. Use approved

cable nomenclature to create cable tags for the identification of fiber optic cable. Provide cable tag identification on all test results or fiber related documents submitted to the Engineer.

Install cable tags within 1 foot of each splice and/or termination point indicating the cable type, fiber count, and each fiber optic cable origination and termination points. Ensure that the cable tags are machine printed, waterproof, and ~~are~~ permanent labels suitable for outside plant applications and are affixed to all fiber optic cables. Ensure that lettering is in permanent ink and displays the phrase “FDOT FIBER OPTIC CABLE”.

SUBARTICLE 633-3.1.6 is deleted and the following substituted:

633-3.1.6 Cable Termination Installation: Ensure that fiber optic cables, buffer tubes, ~~or~~ and strands are neatly routed, secured, and terminated in a patch panel. Ensure every fiber strand within all fiber drops terminating in field cabinets are terminated in a connector panel using LC connectors unless otherwise shown in the Plans. Ensure all cable termination points include documentation regarding the identification, route, and function of each fiber installed at that location. Ensure that a copy of this information is placed alongside the installed equipment (for instance, in a document pouch or drawer within a field cabinet).

SUBARTICLE 633-3.1.7 is deleted and the following substituted:

633-3.1.7 Patch Panel Installation: Ensure that patch panels are neatly installed and secured in a weather-proof enclosure. Ensure all patch panel connectors are clearly and permanently labeled using machine printed, waterproof labels suitable for outside plant applications. Ensure all installed patch panels include documentation regarding the identification, route, and function of each patch panel connector at that location. Ensure that a copy of this information is placed alongside the installed equipment in a document pouch or drawer within the cabinet.

**COMMUNICATION CABLE
(REV 9-12-22)**

SUBARTICLE 633-2.1.2.1 is deleted and the following substituted:

633-2.1.2.1 Splice Enclosures: Contain all optical fiber splices within a splice enclosure. Ensure that the enclosures provide storage for splices, fiber, and buffer tubes. Ensure that the splice enclosure restores the mechanical and environmental integrity of the fiber optic cable, encases the sheath opening in the cable, and organizes and stores optical fiber. Ensure all hinges and latching devices are stainless steel. Ensure that the enclosure is airtight and prevents water intrusion. Ensure that the splice enclosure can accommodate pressurization and has the ability to be reentered without requiring specialized tools or equipment. Ensure that the enclosure provides fiber and splice organizers including splice trays and strain relief.

Ensure that splice enclosures are hermetically sealed to protect internal components from environmental hazards such as moisture, insects, and UV light. Fiber optic splice enclosures shall also:

Comply with the Telcordia Technologies' GR-771-CORE standard and all applicable NEC requirements.

Provide space for future expansion equal to 100% of the initial utilization.

Provide fiber optic cable penetration end caps to accommodate a minimum installation of two trunk fiber optic cables and two fiber optic drop cables. Ensure that the enclosure end caps are factory-drilled to the proper diameter to accept and seal the fiber optic cable entries. Ensure that the cable entry locations can accommodate an assortment of cables with outside diameters ranging from 0.45 inches to 0.55 inches, plus 10%, without jeopardizing the waterproof characteristics of the enclosure.

Ensure that splice enclosures are permanently labeled using machine printed, waterproof labels suitable for outside plant applications.

Provide fiber optic splice enclosures meeting the following requirements:

Mechanical
Resist compression deformation to a maximum of 300 pounds.
Withstand an impact energy to a maximum of 40 foot-pounds at 0°F.
Axial Tension: 100 pounds for 30 minutes.
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Hydrostatic Pressure Head: Up to 20 foot-pounds (-9 pounds per square inch).
Withstand 40 freeze/thaw temperature cycles.
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Withstand a 90-day exposure to solutions of 3% sulfuric acid, 0.2 normal of sodium hydroxide, 10% Igepal®, kerosene, and be fungus resistant as required in the ASTM G21 standard.

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Ensure that all connectors are compliant with the TIA/EIA-604 standards, as applicable, and are tested according to the Telcordia/Bellcore GR-326-CORE standard. When tested according to the TIA and EIA's Fiber Optic Test Procedure (FOTP)-171 (TIA/EIA-455-171B) at the manufacturer, ensure that the connectors have an insertion loss, as reflected on the manufacturer data sheet, less than or equal to 0.30 decibel for pre-terminated cable assemblies with factory-installed connectors and a maximum loss of less than or equal to 0.50 decibel for field-installed temporary connectors. Test the connectors as detailed in FOTP-107 (TIA -455-107A) to reflectance values of less than or equal to minus 45 decibels.

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1. Ensure conduit and inner-duct is clean and free from damage prior to installing fiber optic cable.

2. Document the sequential cable length markings at each splice box and pull box wall that the cable passes through and include the information with the as-built documentation.

Provide all incidental parts needed to complete the installation, but not specified in the Plans, as necessary for a complete and properly operating system.

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SUBARTICLE 633-3.1.6 is deleted and the following substituted:

633-3.1.6 Cable Termination Installation: Ensure that fiber optic cables, buffer tubes, and strands are neatly routed, secured, and terminated in a patch panel. Ensure every fiber strand within all fiber drops terminating in field cabinets are terminated in a connector panel using LC connectors unless otherwise shown in the Plans. Ensure all cable termination points include documentation regarding the identification, route, and function of each fiber installed at that location. Ensure that a copy of this information is placed alongside the installed equipment (for instance, in a document pouch or drawer within a field cabinet).

SUBARTICLE 633-3.1.7 is deleted and the following substituted:

633-3.1.7 Patch Panel Installation: Ensure that patch panels are neatly installed and secured in a weatherproof enclosure. Ensure all patch panel connectors are clearly and permanently labeled using machine printed, waterproof labels suitable for outside plant applications. Ensure all installed patch panels include documentation regarding the identification, route, and function of each patch panel connector at that location. Ensure that a copy of this information is placed alongside the installed equipment in a document pouch or drawer within the cabinet.