



Florida Department of Transportation

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GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JIM BOXOLD
SECRETARY

December 23, 2015

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 Amy Tootle of the State Construction Office to require all construction-related documentation to be submitted by electronic means for consistency with the State Construction Office e-Construction initiative.

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

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

Sincerely,

Signature on file

Daniel Scheer, P.E.
State Specifications Engineer

DS/dt

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

COMMUNICATION CABLE.
(REV 10-14-15)

SUBARTICLE 633-2.1.5.3 is deleted and the following substituted:

633-2.1.5.3 Packaging, Shipping and Receiving: Ensure that the packaging and delivery of fiber optic cable reels comply with the following minimum requirements:

1. Ensure cable is shipped on reels of marked continuous length.
2. Ensure each cable is shipped on a separate, strongly constructed reel designed to prevent damage to the cable during shipment and installation.
3. Ensure each reel has a minimum of 6 feet on each end of the cable available for testing.
4. Ensure that all fiber optic cable is continuous and free from damage.
5. Ensure no point discontinuities greater than 0.1 decibel per reel.
6. ~~Submit~~~~Provide a copy of~~ the transmission loss test results as required by the EIA/TIA-455-61 standard, as well as results from factory tests performed prior to shipping.
7. Ensure that the manufacturer ~~submits~~~~provides~~ the date of manufacture; product and serial numbers; cable data, including the reel length; refraction index; the project name and location; type of fiber and quantity of strands used; technical product data sheets; and reel numbers.

SUBARTICLE 633-2.1.6 is deleted and the following substituted:

633-2.1.6 Manufacturer Testing and Certification: ~~Submit~~~~Provide~~ documentation of all factory tests performed by the manufacturer for all fiber optic cable, splicing material, cable terminations, and patch panels.

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~~~~provided~~ 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 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 633-3.1.2 is deleted and the following substituted:

633-3.1.2 Pulling: Install the fiber optic cable by hand or by using a mechanical pulling machine. If a mechanical pulling machine is used, equip the machine with a monitored or recording tension meter. Ensure that at no time the manufacturer's recommended maximum pulling tension is exceeded. Ensure that the central strength member and aramid yarn are attached directly to the pulling eye during cable pulling. Use pulling attachments, such as "basket grip" or "Chinese finger" type, to ensure that the optical and mechanical characteristics are not degraded during the fiber optic cable installation.

Ensure that excess cable is coiled in a figure eight and fed manually when pulling through pull boxes and splice boxes by hand. If pulleys and sheaves will be used to mechanically pull through pull boxes and splice boxes, ~~submit~~provide a drawing of the proposed layout showing that the cable will never be pulled through a radius less than the manufacturer's minimum bend radius. Use large diameter wheels, pulling sheaves, and cable guides to maintain the appropriate bend radius. Provide tension monitoring at all times during the pulling operation. Ensure that cable pulling lubricant used during installation is recommended by the optical fiber cable manufacturer.

SUBARTICLE 633-3.1.5 is deleted and the following substituted:

633-3.1.5 Fiber Optic Connection - Splicing: Perform all optical fiber splicing using the fusion splicing technique, and according to the latest version of the manufacturer's cable installation procedures; industry accepted installation standards, codes, and practices; or as directed by the Engineer. Ensure that all splices match fiber and buffer tube colors unless shown otherwise in the Plans. Where a fiber cable is to be accessed for lateral or drop signal insertion, only open the buffer tube containing the fiber to be accessed and only cut the actual fiber to be accessed. If a fiber end is not intended for use, cut the fiber to a length equal to that of the fiber to be used and neatly lay it into the splice tray. Treat any fibers exposed during splicing with a protective coating and place in a protective sleeve or housing to protect the fiber from damage or contaminants. Neatly store all splice enclosures within a splice box. Attach the splice enclosure to the splice box interior wall to prevent the enclosure from lying on the bottom of the splice box.

633-3.1.5.1 Splice Plan: ~~Submit~~Provide a splice plan showing the location and configuration of splices in the system for approval by the Engineer. Perform all splicing according to the splice plan. Document each splice location and identify the source and destination of each fiber in each splice tray. Document all fiber colors and buffer jacket colors used during installation, and develop a sequential fiber numbering plan as required in the TIA/EIA-598-A standard for color-coding in the documentation.

633-3.1.5.2 Splice Equipment: Use a fusion splice machine to splice all optical fiber. Ensure that splice equipment is new from the factory, or serviced and certified by the factory or its authorized representative within the previous 6 months from the commencement of its use. ~~Submit to~~Provide the Engineer ~~with documentation a letter~~ from the manufacturer or his authorized representative certifying compliance. Clean all splicing equipment and calibrate according to the manufacturer's recommendations prior to each splicing session at each location.

SUBARTICLES 633-3.1.6 is deleted and the following substituted:

633-3.1.6 Cable Termination Installation: Ensure that cables, buffer tubes, or strands are neatly routed, secured and terminated in a patch panel. Ensure all cable termination points include documentation regarding the identification, route, and function of each fiber installed at that location. Ensure that ~~at least one~~ 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. Ensure all installed patch panels include documentation regarding the identification, route, and function of each patch panel connector at that location. Ensure that ~~at least one~~ a copy of this information is placed alongside the installed equipment.

SUBARTICLE 633-3.1.8 is deleted and the following substituted:

633-3.1.8 Installation Testing: Notify the Engineer of cable testing at least 14 calendar days in advance. ~~Submit~~ Provide the testing procedures to the Engineer for approval prior to commencement of testing. Perform all tests at 1,310/1,550 nanometer wavelengths, and include the last calibration date of all test equipment with the test parameters set on the equipment in the test documentation. Test all installed fibers (terminated and un-terminated) using methods approved by the Engineer.

633-3.1.8.1 End to End Attenuation Testing: Perform testing on all fibers to ensure that end to end attenuation does not exceed allowable loss (0.4 db/km for 1310 nanometer wavelength, 0.3 db/km for 1550 nanometer wavelength, plus 0.5 db for any connectors and 0.1 db for splices). Repair or replace cable sections exceeding allowable attenuation at no cost to the Department.

633-3.1.8.2 OTDR Tracing: Test all fibers from both cable end points with an optical time domain reflectometer (OTDR) at wavelengths of 1310 and 1550 nanometer. Test the fibers that are not terminated at the time of installation using a bare fiber adapter. Present the results of the OTDR testing (i.e., traces for each fiber) and a loss table showing details for each splice or termination tested to the Engineer in an approved electronic format. Ensure all OTDR testing complies with the EIA/TIA-455-61 standard.

633-3.1.8.3 Splice Loss Testing: Ensure that the splice loss for a SMF fusion splice does not exceed a maximum bidirectional average of 0.1 decibel per splice. Repair or replace splices that exceed allowable attenuation at no cost to the Department.

633-3.1.8.4 Connector Loss Testing: Ensure that the attenuation in the connector at each termination panel and its associated splice does not exceed 0.5 decibel. Repair or replace connectors exceeding allowable attenuation at no cost to the Department.

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5. Ensure no point discontinuities greater than 0.1 decibel per reel.
6. Submit the transmission loss test results as required by the EIA/TIA-455-61 standard, as well as results from factory tests performed prior to shipping.
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