Origination Form

Specifications

Name:	Richard Stepp	**Specification Number:**	992-1.2, 992-1.3, 992-1.7, 992-2.4.1, 992-3.2, 992-5.1, 992-7
Email:	richard.stepp@dot.state.fl.us	**Associated Specs:**	NA
Date:	2024-06-04T20:17:41Z	**Verified:**	VERIFIED

Summary:

992-2.4.1, 992-3.2, 992-5.1, 992-7.a; COLOR TEMPERATURE UPDATES: In recent years, the FDM was changed to employ "Color Temperature by Context", where the designer must choose the light color in the Plans. These revisions support that idea by specifying different requirements for APL approval versus what is shown in the Plans. This will make it clearer for contractors and designers that the Specifications do not define the final color temperature. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: Added an option for aluminum conductors to be used where called for in the Plans. Also added supporting splice information for dissimilar metals. 992-1.2, 992-7.j; WARRANTY: Increased warranty to 10 years from the date of shipping from the vendor.

Justification:

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: These revisions will make it clearer for contractors and designers that the Specifications do not define the final color temperature. Instead, they must look to the FDM and Plans. Note that High Mast Lighting only has one color temperature option per the FDM, so this only this one option will now be shown in the Specifications to avoid confusion. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: These revisions were added at the request of the Districts in order to address a challenge where copper conductor theft was occurring in certain areas. It is known that aluminum has far less scrap value than copper, so allowing designers to choose this aluminum option will help to discourage theft. 992-1.2, 992-7.j; WARRANTY: A private sector representative recommended increasing FDOT's warranty to 10 years based on common practice nationally. Also, the AASHTO Lighting Committee was polled, and it was learned that the majority of states use a 10 year warranty. This warranty extension ensures that FDOT receives quality light fixtures for a longer time period.

Do the changes affect other types of specifications?

Neither

List Specifications Affected:

Other Affected Documents/Offices	Contacted	Yes/No
Other Standard Plans		No
Florida Design Manual		No

Structures Manual		No
Basis of Estimates Manual	I will contact Ryan Gray if this conductor change is accepted	Yes
Approved Product List		No
Construction Office		No
Maintenance Office		No
Materials Manual		No
Traffic Engineering Manual		No

Are changes in line with promoting and making progress on improving safety, enhancing mobility, inspiring innovation, and fostering talent; explain how?

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: These revisions clarify designer and contractor usage of "color temperature by context", which is a street lighting method that provides the best product and is fairly unique to FDOT. This makes the innovative process clearer and more efficient for contractors and designers. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: These revisions help designers to create a theft deterrent where theft is expected. Preventing theft saves the Department substantial costs associated with repairing a lighting system after conductors are stolen. Also, this helps to ensure the safety benefit from street lighting remains in place by avoiding theft. 992-1.2, 992-7.j; WARRANTY: Increasing the light fixture warranty term from 5 to 10 years ensures a quality product is provided for a longer time period, with a guarantee of fixing malfunctioning lights for a longer time period. This increases value to the Department and lowers maintenance costs. This improvement was the result of researching modern practices nationally for new LED lighting technology.

What financial impact does the change have; project costs, pay item structure, or consultant fees?

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: This makes the innovative process clearer and more efficient for contractors and designers. Improved understanding decrease design and construction coordination time. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: These revisions help designers to create a theft deterrent where theft is expected. Preventing theft saves the Department substantial costs associated with repairing a lighting system after conductors are stolen. Also, this helps to ensure the safety benefit from street lighting remains in place by avoiding theft. 992-1.2, 992-7.j; WARRANTY: Increasing the light fixture warranty term from 5 to 10 years ensures a quality product is provided for a longer time period, with a guarantee of fixing malfunctioning lights for a longer time period. This increases value to the Department and lowers maintenance costs.

What impact does the change have on production or construction schedules?

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: This makes the innovative process clearer and more efficient for contractors and designers. Improved understanding decrease design and construction coordination time. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: These revisions help designers to create a theft deterrent where theft is expected. Theft of copper conductors has occurred several times during construction, and this causes construction delays. Using aluminum to avoid theft may also avoid these delays and improve construction time. This also saves design time by avoiding the need for a project-specific solution.

How does this change improve efficiency or quality?

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: This makes the innovative process clearer and more efficient for contractors and designers. Improved understanding decrease design and construction coordination time. This also ensures that the FDM requirements for lighting and color temperature are understood, so communities and wildlife benefit from optimum color temperature usage, increasing quality. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: Avoiding theft of the lighting conductor ensures that lighting is provided more consistently, enhancing quality and safety. 992-1.2, 992-7.j; WARRANTY: Increasing the light fixture warranty term from 5 to 10 years ensures a higher quality product is provided for a longer time period, with a guarantee of fixing malfunctioning lights for a longer time period. This increases value to the Department and lowers maintenance costs.

Which FDOT offices does the change impact?

This improves the efficiency of these general needs for design, construction, and maintenance. Also, Pay Items may receive modifications to accommodate.

What is the impact to districts with this change?

This improves the efficiency of these general needs for design, construction, and maintenance. Also, Pay Items may receive modifications to accommodate.

Does the change shift risk and to who?

992-2.4.1, 992-3.2, 992-5.1, 992-7 COLOR TEMPERATURE UPDATES: No change. 992-1.3, 992-1.7; ALUMINUM CONDUCTORS: Lowers risk of theft and costs to the Department. 992-1.2, 992-7.j; WARRANTY: Shifts risks away from the Department and more towards the lighting vendor.

Provide summary and resolution of any outstanding comments from the districts or industry.

Comments and Responses are available on the Track the Status of Revisions hyperlink located on the Specifications landing page: https://www.fdot.gov/programmanagement/Specs.shtm

What is the communication plan?

Through the established specification revision process (e.g., Internal and Industry Review)

What is the schedule for implementation?

The Standard Specifications eBook and Workbook are effective July 1st every year.

HIGHWAY LIGHTING MATERIALS.
(REV 4-18-24)

SUBARTICLE 992-1.2 is deleted and the following substituted:

992-1.2 Luminaires, Driver, etc.: All luminaires shall be one of the products listed in the Department's Approved Product List (APL). Manufacturers seeking evaluation of their product shall submit an application and sample luminaire in accordance with Section 6.

The light source for luminaires shall be either light emitting diodes (LED), magnetic induction or plasma induction.

The luminaire housing shall be constructed of precision cast aluminum with a corrosive resistant polyester powder coat finish. The standard color shall be gray. The housing shall have an electrical terminal block to attach the luminaire cable and a hinged door which provides direct access to internal parts. Hinged doors are not required for high mast luminaires and underdeck luminaires. All hardware on the exterior of the housing shall be stainless steel. The refractor and lens shall consist of glass or an optical grade polymer. The manufacturer shall place a permanent tag in the luminaire housing imprinted with: the manufacturer name, luminaire voltage, lamp wattage, and provide a blank area for the Contractor to inscribe the installation date.

Luminaires shall meet the following requirements: UL 1598 listed and labeled for installation in wet locations by an OSHA recognized "Nationally Recognized Testing Laboratory" (NRTL), be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80) and have IESNA light distribution curves (IES LM-79) by an EPA recognized laboratory.

The driver shall be rated for 100,000 hours and have a power factor greater than or equal to 90% at full load with a total harmonic distortion less than or equal to 20% at full load. The fixture shall accommodate a circuit voltage of 480V.

Luminaires shall be provided with a minimum 10kV/10kA internal surge suppression module meeting UL 1449/ANSI C62.41.2 Category C.

The manufacturer shall submit a ~~five~~ten-year non-prorated full warranty on all components of the luminaire to the Department. The warranty shall begin on the date the luminaire is shipped from the vendor. ~~project acceptance date and include all components of luminaire.~~

SUBARTICLE 992-1.3 is deleted and the following substituted:

992-1.3 Conductors: All conductors shall be color-coded stranded copper meeting the requirements of NEMA WC 70. All conductors shall be tested and listed by a NRTL. Where specified in the Plans, aluminum conductors may be substituted for copper conductors.

Service and circuit conductors shall be single-conductor cable Type THWN-2 and shall not be smaller than No. 6 AWG unless specified elsewhere in FDOT publications.

Bonding ground conductor shall have a green jacket and shall not be smaller than No. 6 AWG.

SUBARTICLE 992-1.7 is deleted and the following substituted:

992-1.7 Conductor Splices: Unless otherwise shown in the Standard Plans or authorized by the Engineer, splices shall meet the following requirements:

a. Copper Splices: Use ~~be made with~~ compression sleeves or split bolt connectors. The connector ~~shall~~must be coated~~sealed~~ in ~~silicone~~oxide inhibitor gel per the manufacturer's instructions. ~~that easily peels away leaving a clean connection~~. This gel may be pre-filled in splice connectors or applied during installation. For split bolts, ~~T~~the gel shall be contained in a UV, impact, and abrasion resistant enclosure that, when snapped around the ~~split bolt~~connector, will provide a waterproof connection without the use of tools or taping.

b. Aluminum Splices: Use a splice connector type per the approval of the Engineer. The connector must be coated in oxide-inhibitor gel per the manufacturer's instructions. This gel may be pre-filled in splice connectors or applied during installation.

c. Dissimilar Metal Splices: In addition to the requirements for Aluminum Splices, use a connector type identified for differing conductor materials following the manufacturer's instructions. Conductors having dissimilar metals must not touch each other directly. Conductors also must not touch device terminals with dissimilar metals.

SUBARTICLE 992-2.4.1 is deleted and the following substituted:

992-2.4 Luminaires: Provide luminaires in accordance with the following requirements.

992-2.4.1 Luminaires for Conventional Lighting: Luminaires shall meet the following additional requirements:

a. ~~A~~ For APL qualification, the luminaire must have ~~maximum~~ correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A ~~(3985°K, plus or minus 275°K)~~. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slipfitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) arm or a pole top mounting assembly designed to accommodate a 2-3/8 inch pole top tenon.

For APL qualification, the manufacturer must have a fixture with an IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, meeting a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool with the following settings:

Table 992-1

Setting	Requirement
Roadway Standard	IES RP-8-18
R-Table	R3 (Q0=0.07)
Roadway Layout	Two Rows Opposite, With Median, 2R OPP w/M
Roadway Width	40 feet

Table 992-1	
Setting	Requirement
Median Width	22 feet
Number of Lanes in Direction of Travel	3
Driver's Side of Roadway	Right
Calculation Area	Bottom
Mounting Height	As per manufacturer's recommendation
Setback	12 feet
Tilt	0°
Optimization Criteria	Avg. Illuminance = 1.5 fc Avg./Min. Ratio = 4 Max./Min. Ratio= 10 Lv Max./L Avg. Ratio= 0.3
Arm Length	Pole top fixtures – as provided by the IES file Arm mounted fixtures – 12 feet

SUBARTICLE 992-3.2 is deleted and the following substituted:

992-3.2 Luminaires: The luminaires shall meet the following requirements.

a. A ~~maximum~~ correlated color temperature (CCT) of ~~4000~~3000°K meeting ANSI C78.377A (~~3985~~3045°K, plus or minus ~~275~~175°K).

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slip fitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) connection. For qualification, the manufacturer must have a fixture with a Type V IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, capable of providing photometrics similar to a 1000 W HPS fixture when mounted on 80 to 120 foot poles.

SUBARTICLE 992-5.1 is deleted and the following substituted:

992-5 Underdeck Lighting.

992-5.1 Luminaires: The luminaires shall meet the following requirements.

a. ~~A maximum correlated color temperature (CCT) of 4000°K meeting ANSI C78.377A (3985°K, plus or minus 275°K).~~For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 55 rating.

Underdeck fixtures shall be wall mounted fixtures.

ARTICLE 992-7 is deleted and the following substituted:

992-7 Luminaire Retrofit Kits for Conventional Lighting.

Luminaire retrofit kits shall meet the following requirements:

a. ~~The light source for luminaire retrofit kits shall be light emitting diodes (LEDs) meeting ANSI C78.377A with a maximum correlated color temperature of 4000ºK (3985ºK ± 275ºK).~~For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The luminaire retrofit kit shall be UL 1598C listed by an OSHA "Nationally Recognized Testing Laboratory" (NRTL).

c. The optics shall have an IP 66 rating. Submit testing report.

d. LEDs shall be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80). Submit testing report.

e. Luminaire retrofit kits shall have a IESNA light distribution curve (IES LM-79) designated by an EPA-recognized laboratory. Submit testing report.

f. Luminaire retrofit kits shall meet a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool in accordance with the settings shown in Sub-article 992-2.4. Submit IES file.

g. Luminaire retrofit kits shall have a driver rated for 100,000 hours with a power factor greater than or equal to 90% at full load and a total harmonic distortion less than or equal to 20% at full load. Submit driver information that documents these requirements, including the operational temperature of the driver at 25ºC.

h. Luminaire retrofit kits shall accommodate a circuit voltage of 480V.

i. Luminaire retrofit kits shall be provided with a minimum 10kV/10kA internal surge protection device (SPD) meeting UL 1449 and ANSI C62.41.2 Category C High. Submit SPD information that documents these requirements.

j. The manufacturer shall submit a ~~five~~ten-year non-prorated full warranty on all components of the luminaire retrofit kit to the Department. The warranty shall begin on the ~~project acceptance date and include all components of the luminaire retrofit kit.~~ date the retrofit kit is shipped from the vendor.