Street Lighting – Color Temperature by Context

March 2022

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What is Correlated Color Temperature?

Correlated Color Temperature (CCT) is a way to describe the color of light produced by lamp options:

- **Lower color temperature is "warmer" or "softer", and is more amber or orange (candlelight)**
- **Higher color temperature is "cooler", and is whiter with increasing blue content**

Street Lighting – Color Temperature Requirements

"Old"
High Pressure Sodium

"New"
LED Options

Existing 2200 Kelvin HPS | 3000 Kelvin | 4000 Kelvin

Background:

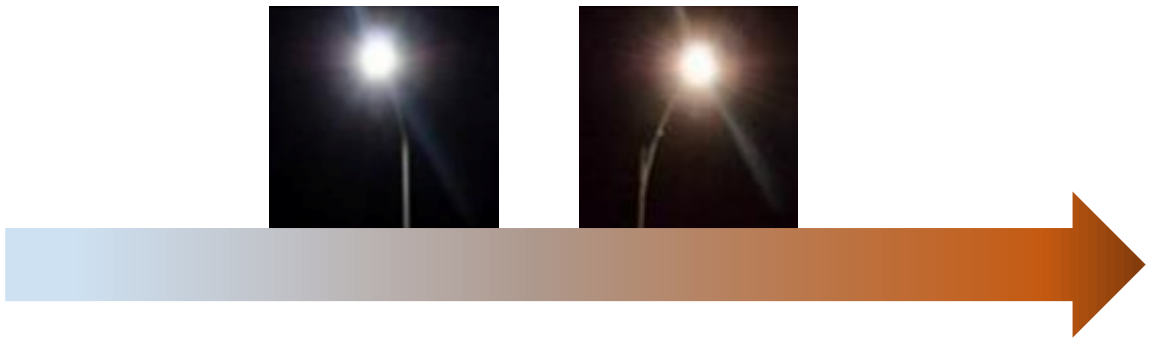
- "Old" High Pressure Sodium lights installed throughout Florida in previous decades (2200K CCT)
- "New" LED lights installed throughout Florida since 2016
- Previously:
  - FDOT Specifications require CCT ≤ 4000K
  - No further guidance given
  - Majority of installations 4000K

Street Lighting – Color Temperature Requirements

UPDATE:

Per *Roadway Design Bulletin 22-02*, new requirements are given for street light color temperature by roadway context.

***RESULT:* The majority of roadways will use warmer, 3000K light.**



Street Lighting – Color Temperature Requirements

Considerations for Choosing Color Temperature:

- **Optimum Driver Visibility – Roadway Safety**

1) ***NEW*** **National Research Study: NCHRP Solid State Lighting – Volume 2**

2) **FDOT Analysis: "detection distance" & "stopping sight distance"**

CONCLUSIONS:

- ***3000K has same driver visual performance as 4000K for most locations***
- ***4000K does benefit some limited high-speed roadway contexts***

Street Lighting – Color Temperature Requirements

Considerations for Choosing Color Temperature:

Next…

- **Environmental Needs**
- **Aesthetic Needs**
- **Health Benefits**
- **Energy Efficiency**
- **Maintenance Benefits**
- **National Trends**

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Street Lighting – Color Temperature Requirements

NEW: Color Temperature by Context

Table 231.2.3 Correlated Color Temperature (CCT)

Design Speed	Context	CCT
Arterials and Collectors		
≤ 35 mph	All	2700K[1] or 3000K
≤ 50mph	All	3000K
≥ 55mph	C1 & C2	3000K
≥ 55mph	C3[2]	4000K
Limited Access Facilities		
All	All	3000K

Notes:
1. Consider use of 2700K per ***FDM 231.2***
2. Higher number contexts may apply

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4000K is used for high-speed suburban contexts

- 4000K shows a detection distance advantage to accommodate larger stopping sight distance for ≥ 55mph

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3000K is used for all other contexts

- Implemented where same statistical visual performance as 4000K is provided
- Used for over 95% of roadway miles (Estimated)

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2700K is used for low-speed applications

- Light color is particularly insignificant at low speeds (2200K performed well)
  - **Benefits** aesthetic areas, residential areas, natural areas, historic areas, parks, campuses, or wherever locals prefer it
  - ***Example:*** *City of St. Augustine prefers warmer light*

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Supporting Policy:

Complete Lighting Replacement Projects

- New policy is not retroactive
- Leave existing luminaires in place unless an all-new lighting project is warranted *for reasons other than CCT*
- ***EXAMPLES*** - Replacement lighting system is:
  - **justified** for road widening, upgrading to LED, replacing aging system with high failure rates, meeting current illumination requirements
  - **not justified** for only changing from existing 4000K to 3000K

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Supporting Policy:

Individual Light Replacements or Additions

- Where small numbers of luminaires are added or replaced for maintenance, retrofits, or other purposes:
  - Table 231.2.3 does not apply
  - ***Instead…***
    match the CCT of the existing lighting system to maintain color consistency

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Supporting Policy:

Roadside Facilities

- Use the same CCT as the nearest roadway lighting for consistency…

- Such facilities include, but are not limited to:
  - Sidewalks
  - Shared use paths
  - Toll plazas
  - Rest areas
  - Weigh stations

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Supporting Policy:

Environmental Areas

- The CCT requirements of ***FDM 231.2.1*** supersede the requirements of ***Table 231.2.3***.

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The End