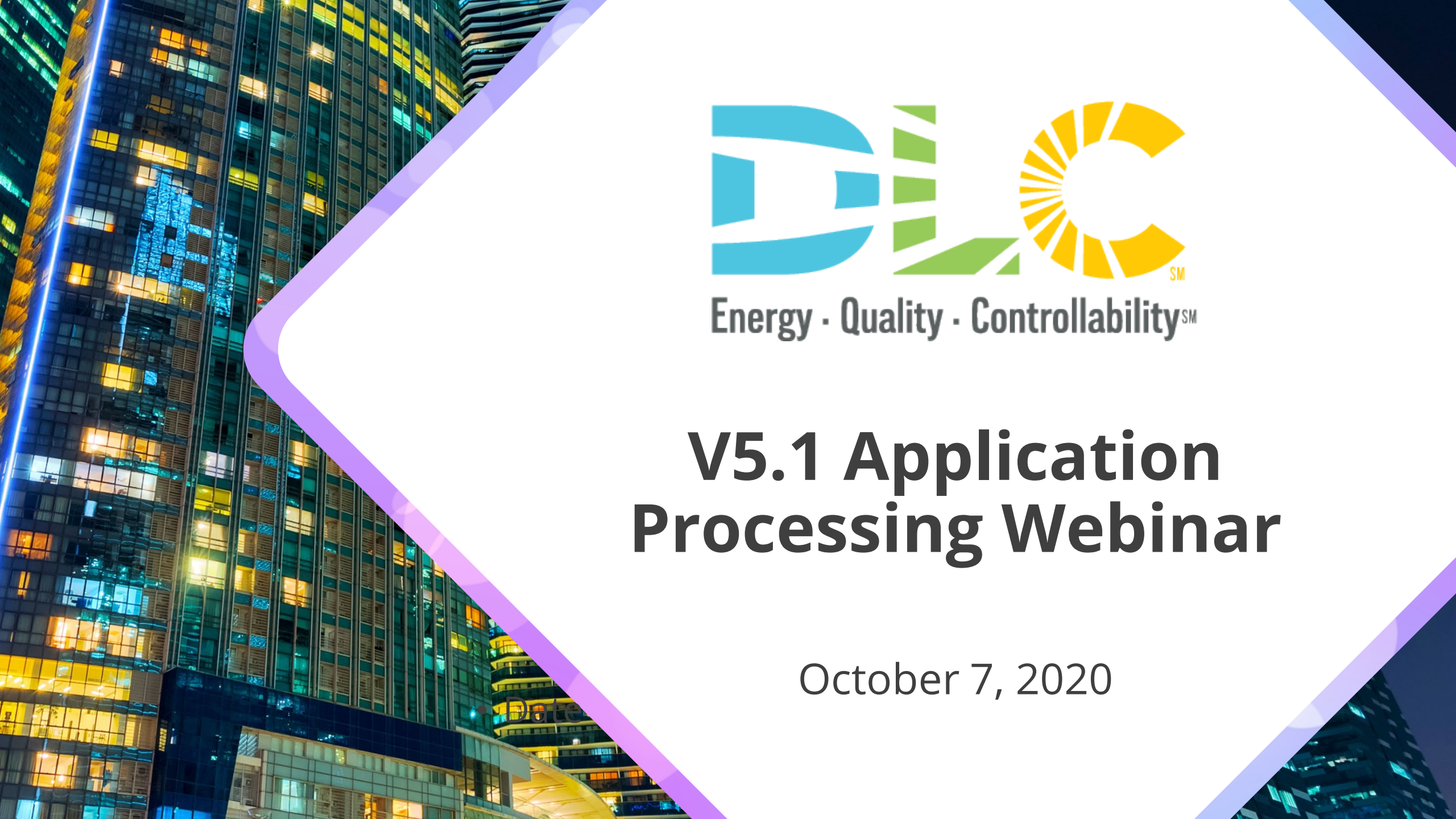


Energy · Quality · Controllability℠

V5.1 Application Processing Webinar

October 7, 2020

Date

Agenda

- Stay Up to Date
- Top Causes of Application Processing Delays
- Q&A
  - Via Chat feature
    - Specific application questions can be emailed to applications@designlights.org
    - For applications in process, please message via the Application Portal

NOTE:

This webinar is being recorded and will be posted on the DLC website following the webinar

Bernadette Boudreaux
Senior Technical Operations Manager

Aaron Feldman
Senior Technical Operations Analyst

David Ryan and Rachel Goff
D+R International

The DLC is a non-profit organization whose mission is to achieve energy optimization by enabling controllability with a focus on quality, people, and the environment.

Goals of Technical Requirements V5.1

New color quality requirements help provide good color rendering with better color consistency over time.

Lighting decision makers can use DLC Premium classification to have more confidence in the glare performance of listed products.

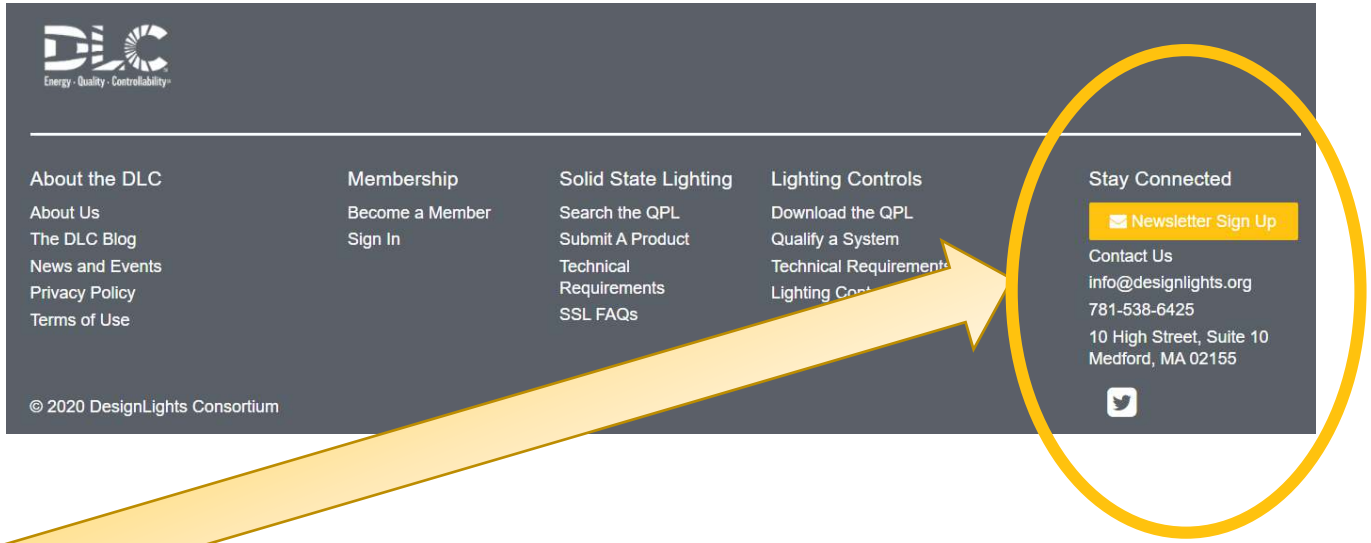
Virtually all listed products are dimmable, providing increased energy savings and improved user satisfaction.

Stay up to Date

Latest Application Files

- Download the latest applications from the DLC website
  - https://www.designlights.org/solid-state-lighting/submit-a-product/

Policy Updates



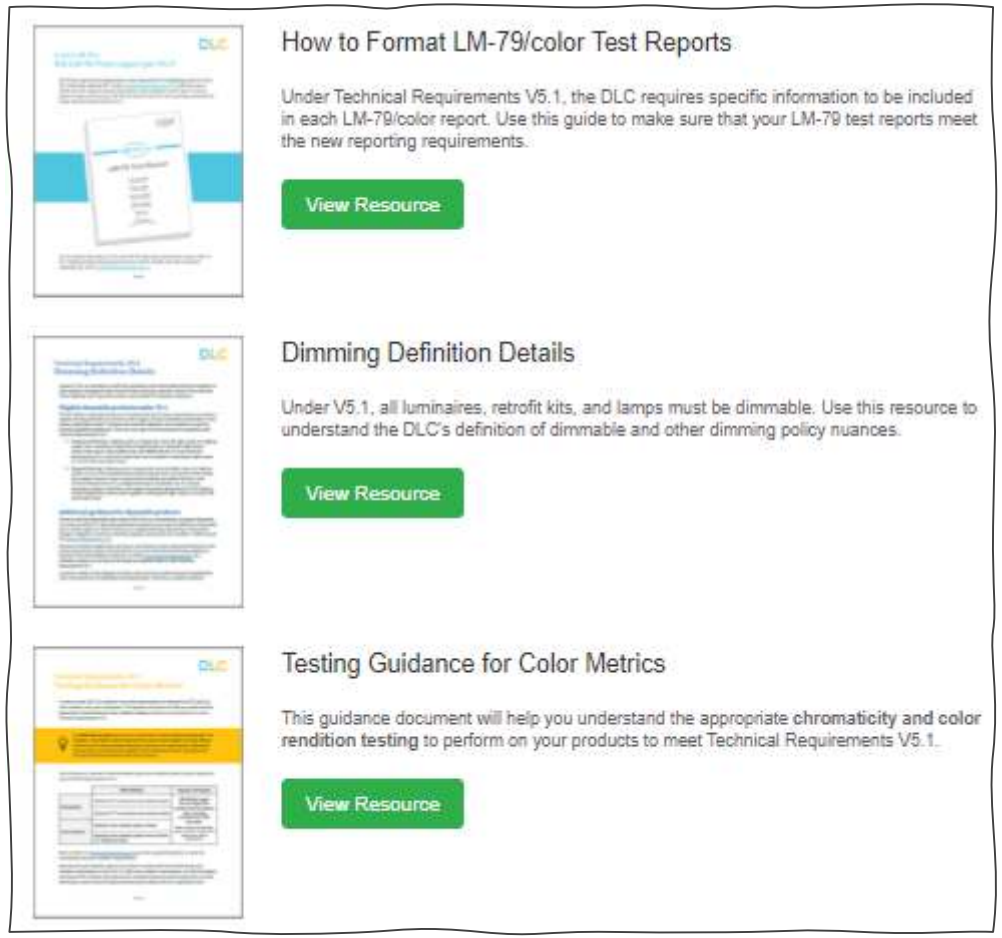
- Sign up for newsletter on DLC website
- View policy updates on web
  - Last page of Technical Requirements
  - Summary link on website

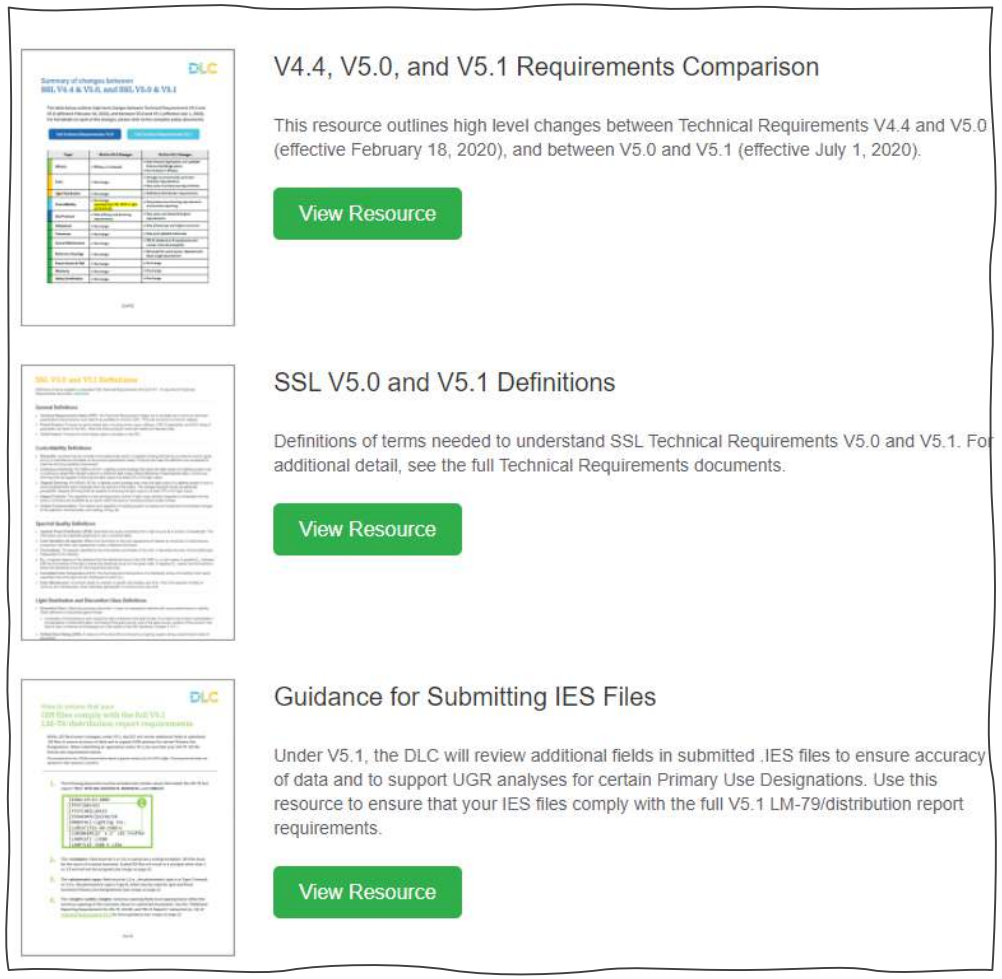
Recent Updates

Date Updated	Subject	Change Type	Description	Affected Document	Affected Page(s)
8/20/2020	Outdoor R_9 Requirement	Policy Change	The R_9 requirement for outdoor products has been changed from a required threshold to a reporting requirement only. High-bay products must still meet $R_9 \geq -40$.	V5.1 Policy and TRT	8
7/30/2020	Color Maintenance reporting requirements	Guidance added	LM-80 reports may not include absolute D_{uv} information for each reporting interval, but only the change in D_{uv} from 0 hours. Guidance has been added to the policy document and Manufacturer Guidance that describes how to report maintenance in the case that average chromaticity coordinate data at the ≈ 1000-hour and ≈ 6000-hour measurement points are not provided and only chromaticity shift (Δu'v') data is available.	V5.1 Policy and Manufacturer and Industry Guidance	10
6/17/2020	White-tunable testing requirements	Clarification	Clarified requirements around testing and reporting at various CCT settings for all white-tunable products; not just DLC Premium.	V5.1 Policy	11

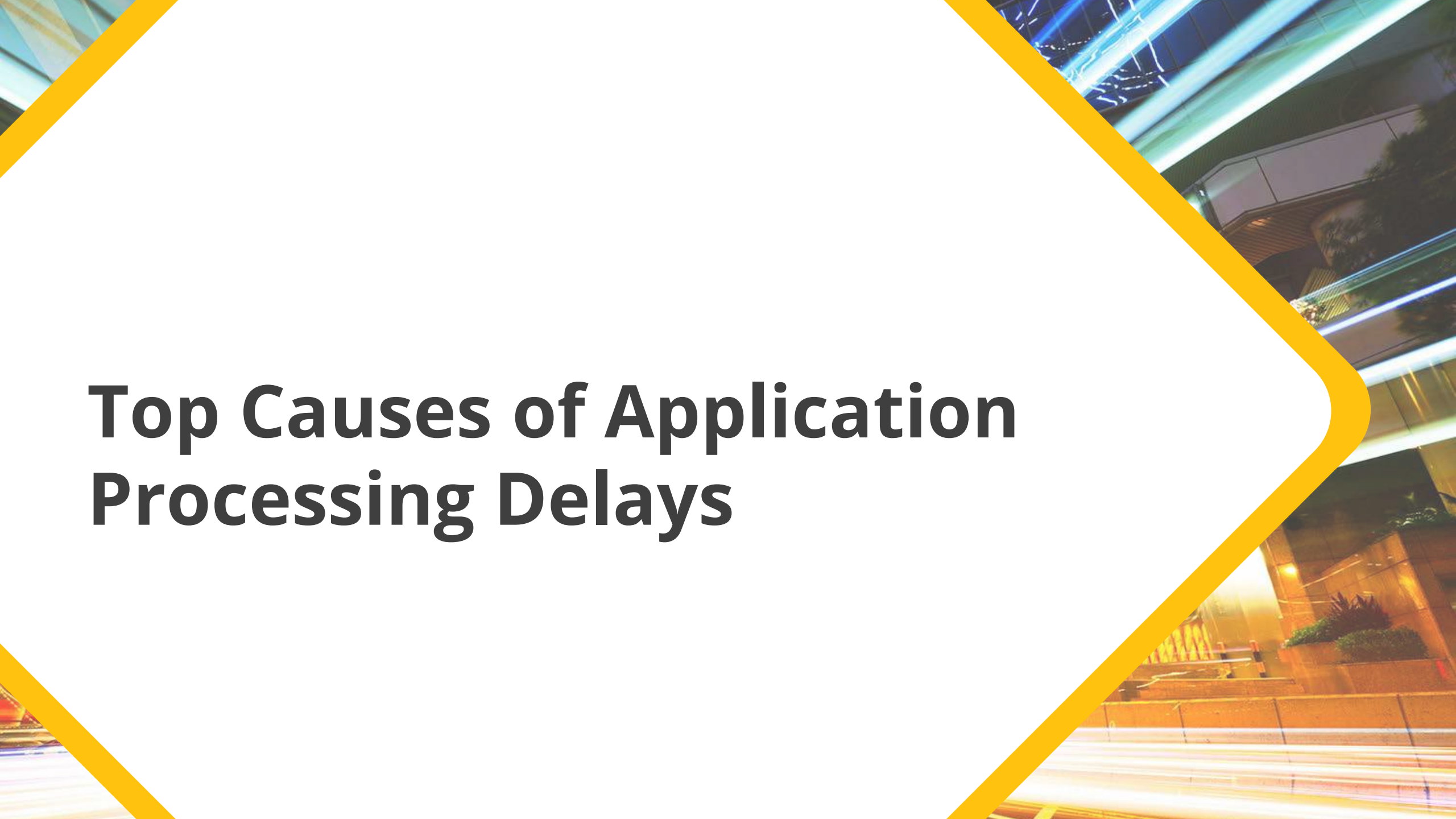
Technical Requirement Guidance Resources

- https://www.designlights.org/solid-state-lighting/qualification-requirements/ssl-v5-1-resources/





Top Causes of Application Processing Delays



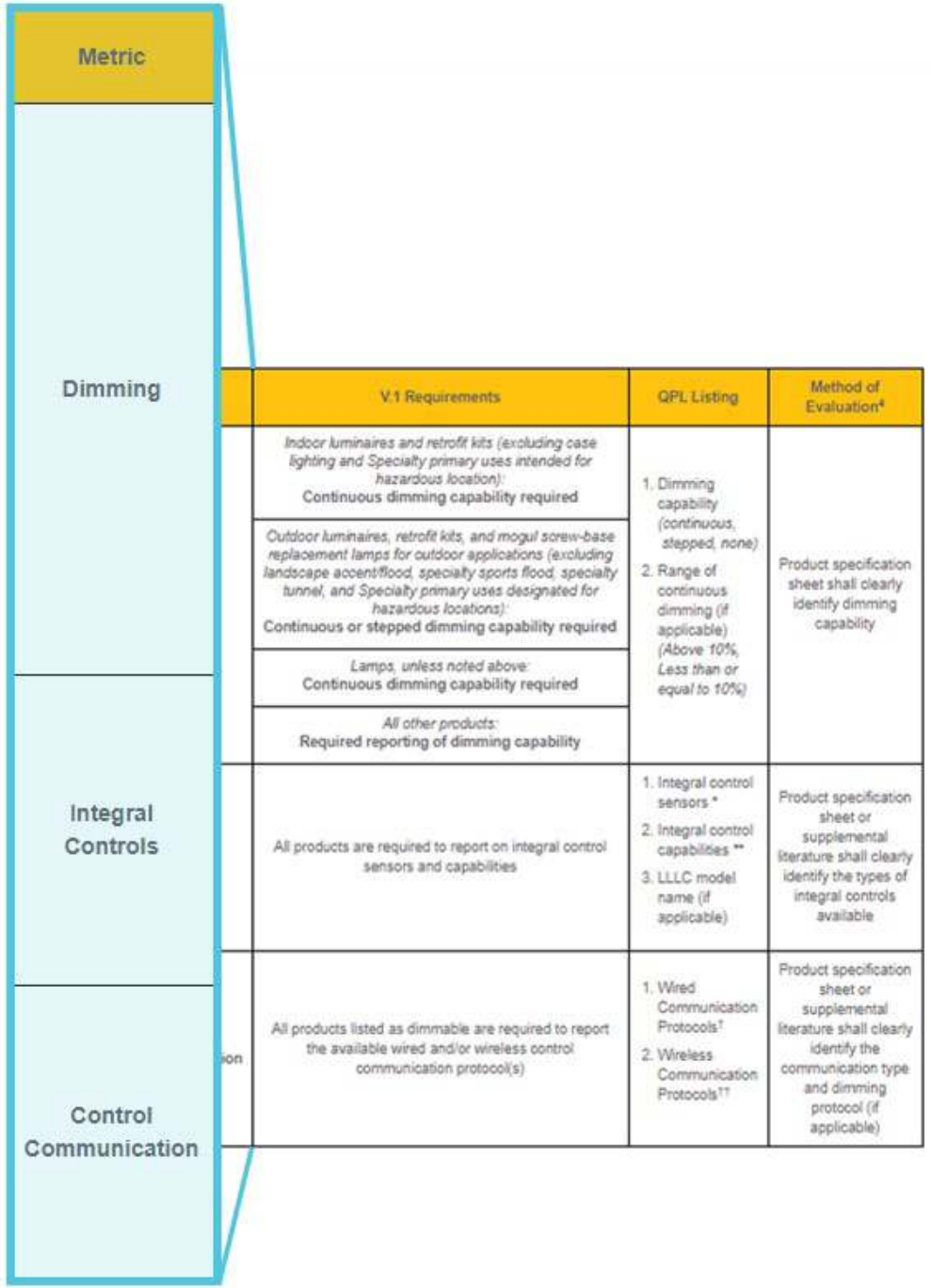
Reported Control Capabilities

- Fill out application forms completely, controls information columns on the Reported Data tab
- All columns except “LLLC Model Name” require an entry
  - “No” should be selected instead of leaving blank

AD	AE	AF	AG	AH	AI	AJ	AK
Sensor Type	**Control Capability**	**LLLC Model Name**	**Dimming Capability and Range** ***(Continuous Below 10, Continuous Above 10, Stepped, Not Dimmable)***	**Wired Communication Protocol**	**Other Wired Protocol Name**	**Wireless Communication Protocol**	**Other Wireless Protocol Name**
Exterior Photocell	LLLC	LLLC Control	Stepped Dimmable	Phase-Cut		WiFi	
Occupancy Sensor; Daylight Sensor; Multifun	Integral Sensor Receptacle		Continuous Dimmable <10%	0-10V		Zigbee; Bluetooth	
Multifunction Sensor	Energy Monitoring; High-end Trim		Not Dimmable	No Wired Communication Protocol		No Wireless Protocol	
Traffic Sensor; Exterior Photocell	LLLC; Energy Monitoring	TestLLLC	Continuous Dimmable >10%	0-10V; Phase-cut	TestWiredProtocol	Bluetooth; WiFi	TestWirelessProtocol

Controllability Reporting

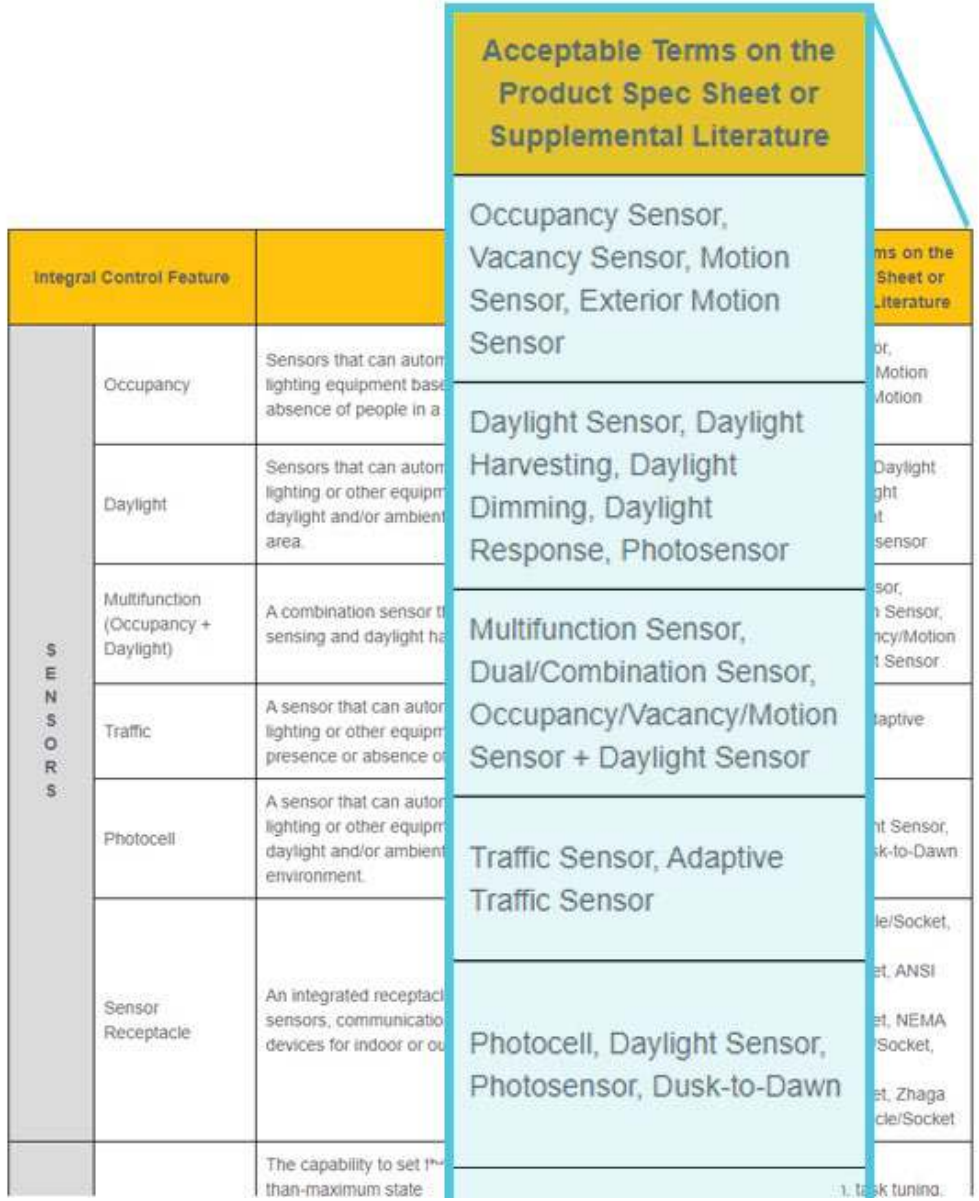
- 3 different controllability reporting requirements
  - Dimming
  - Integral Controls
  - Control Communication
- Must be in app form
- Must be reflected on spec sheets and reported data on application form



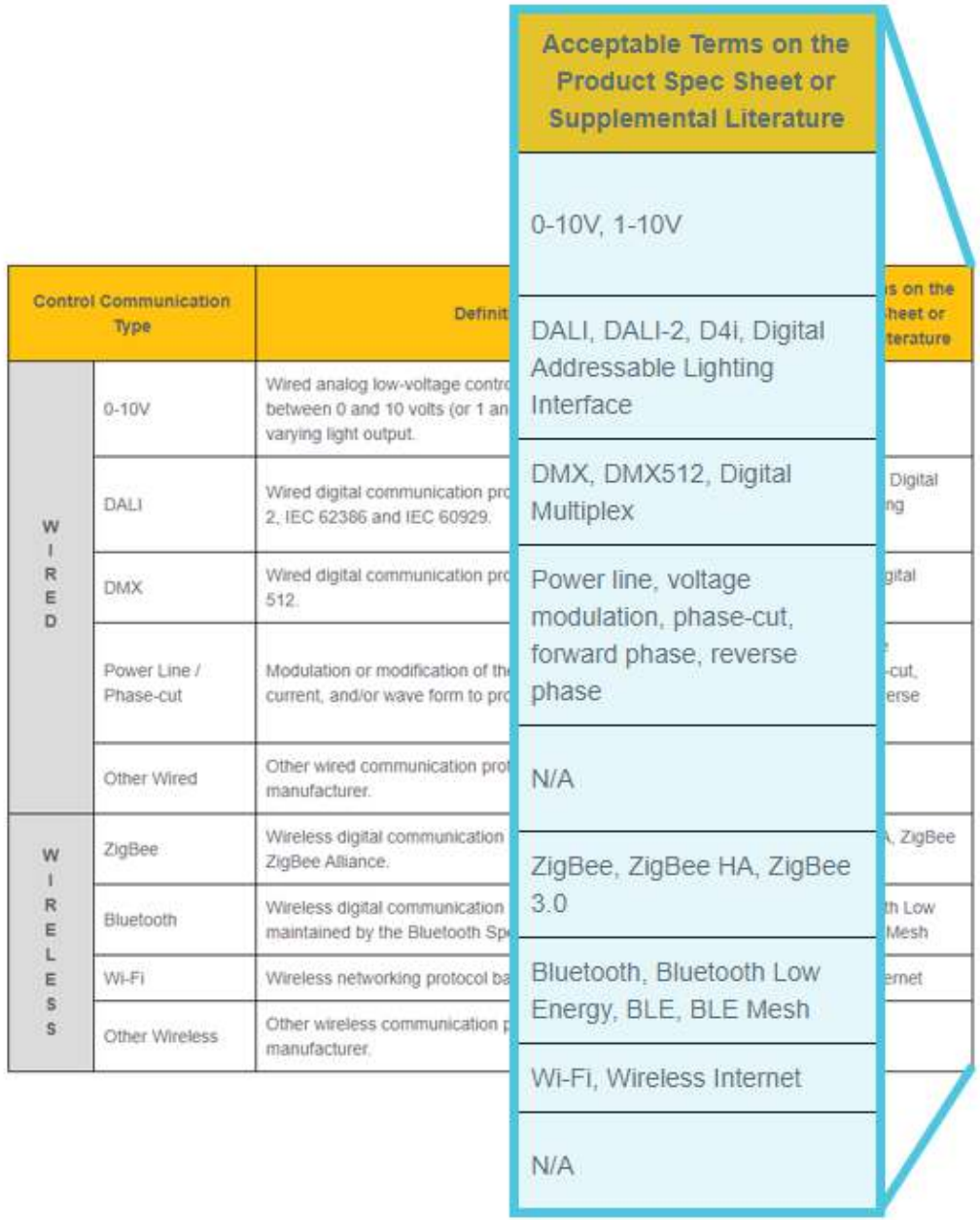
Metric	V.1 Requirements	QPL Listing	Method of Evaluation[4]
Dimming	*Indoor luminaires and retrofit kits (excluding case lighting and Specialty primary uses intended for hazardous location):* **Continuous dimming capability required**	1. Dimming capability (continuous, stepped, none) 2. Range of continuous dimming (if applicable) *(Above 10%, Less than or equal to 10%)*	Product specification sheet shall clearly identify dimming capability
	Outdoor luminaires, retrofit kits, and mogul screw-base replacement lamps for outdoor applications (excluding landscape accent/flood, specialty sports flood, specialty tunnel, and Specialty primary uses designated for hazardous locations): **Continuous or stepped dimming capability required**		
	Lamps, unless noted above: **Continuous dimming capability required**		
	All other products: **Required reporting of dimming capability**		
Integral Controls	All products are required to report on integral control sensors and capabilities	1. Integral control sensors * 2. Integral control capabilities ** 3. LLLC model name (if applicable)	Product specification sheet or supplemental literature shall clearly identify the types of integral controls available
Control Communication	All products listed as dimmable are required to report the available wired and/or wireless control communication protocol(s)	1. Wired Communication Protocols† 2. Wireless Communication Protocols††	Product specification sheet or supplemental literature shall clearly identify the communication type and dimming protocol (if applicable)

Integral Controls Reporting

- The spec sheets/literature must be clear about what control options are available, and that there must be clear indications of these in the model number/ordering code
  - Needs to match reporting on app form
- **Spec sheets/literature must explicitly and exactly match the Acceptable Terms for controls, sensors, and communication protocol as described in the policy**



Integral Control Feature			Acceptable Terms on the Product Spec Sheet or Supplemental Literature
SENSORS	Occupancy	Sensors that can autom lighting equipment base absence of people in a	Occupancy Sensor, Vacancy Sensor, Motion Sensor, Exterior Motion Sensor
	Daylight	Sensors that can autom lighting or other equipm daylight and/or ambient area.	Daylight Sensor, Daylight Harvesting, Daylight Dimming, Daylight Response, Photosensor
	Multifunction (Occupancy + Daylight)	A combination sensor t sensing and daylight ha	Multifunction Sensor, Dual/Combination Sensor, Occupancy/Vacancy/Motion Sensor + Daylight Sensor
	Traffic	A sensor that can autor lighting or other equipm presence or absence of	Traffic Sensor, Adaptive Traffic Sensor
	Photocell	A sensor that can autor lighting or other equipm daylight and/or ambient environment.	Photocell, Daylight Sensor, Photosensor, Dusk-to-Dawn
	Sensor Receptacle	An integrated receptacl sensors, communicatio devices for indoor or ou	
		The capability to set t than-maximum state	



Control Communication Type		Definit	Acceptable Terms on the Product Spec Sheet or Supplemental Literature
WIRED	0-10V	Wired analog low-voltage contro between 0 and 10 volts (or 1 an varying light output.	0-10V, 1-10V
	DALI	Wired digital communication pro 2, IEC 62386 and IEC 60929.	DALI, DALI-2, D4i, Digital Addressable Lighting Interface
	DMX	Wired digital communication pro 512.	DMX, DMX512, Digital Multiplex
	Power Line / Phase-cut	Modulation or modification of the current, and/or wave form to pro	Power line, voltage modulation, phase-cut, forward phase, reverse phase
	Other Wired	Other wired communication prot manufacturer.	N/A
WIRELESS	ZigBee	Wireless digital communication ZigBee Alliance.	ZigBee, ZigBee HA, ZigBee 3.0
	Bluetooth	Wireless digital communication maintained by the Bluetooth Sp	Bluetooth, Bluetooth Low Energy, BLE, BLE Mesh
	Wi-Fi	Wireless networking protocol ba	Wi-Fi, Wireless Internet
	Other Wireless	Other wireless communication p manufacturer.	N/A

Control Communication Reporting

- The spec sheets must specifically describe control communication
- The spec sheets/literature must explicitly and exactly match the Acceptable Terms for communication protocol as described in the policy

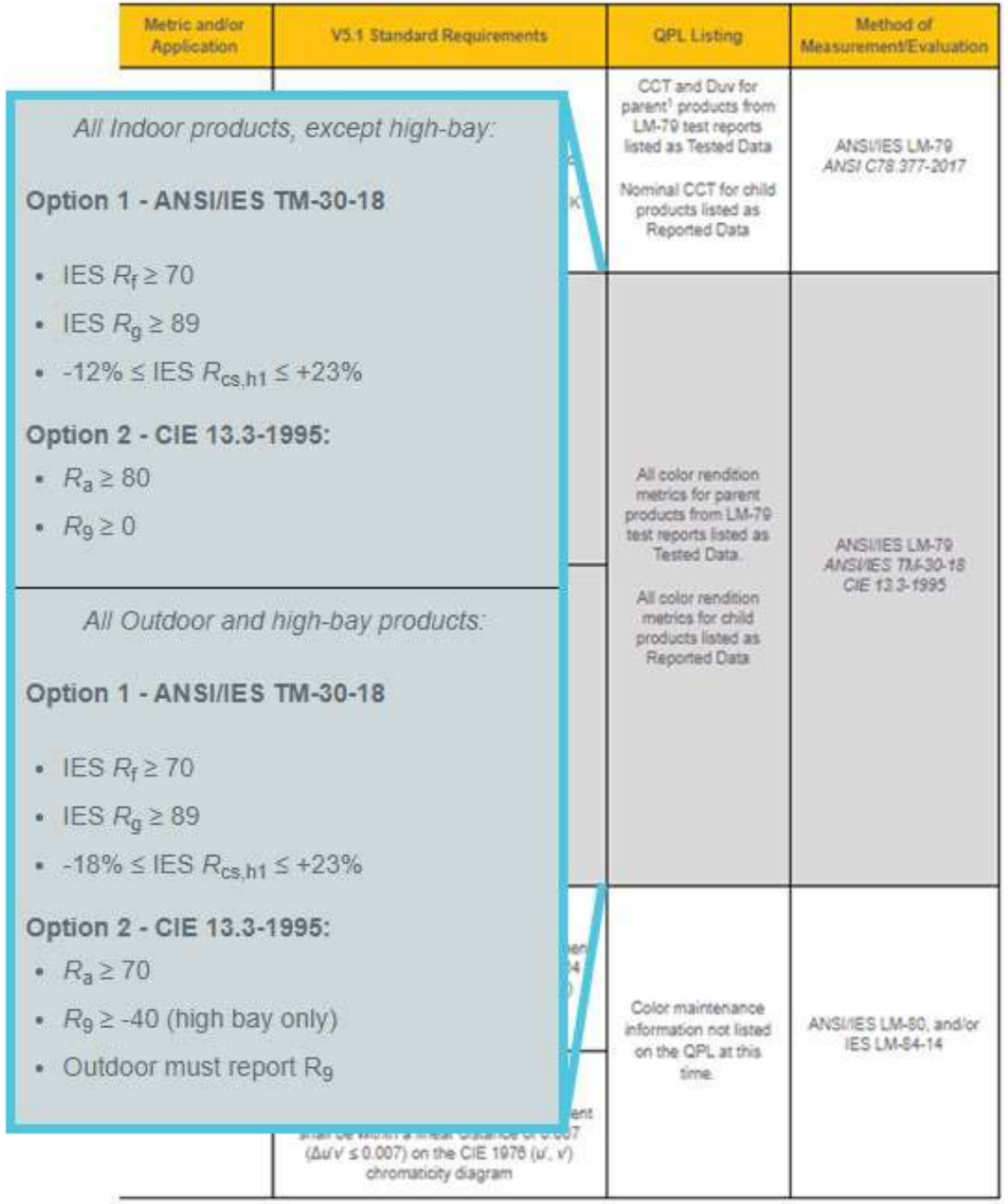
Reported Color Data

- Fill out application forms completely
  - Particularly, new color information columns on the Reported Data tab
  - All color data (column O-T) must be filled out for every app

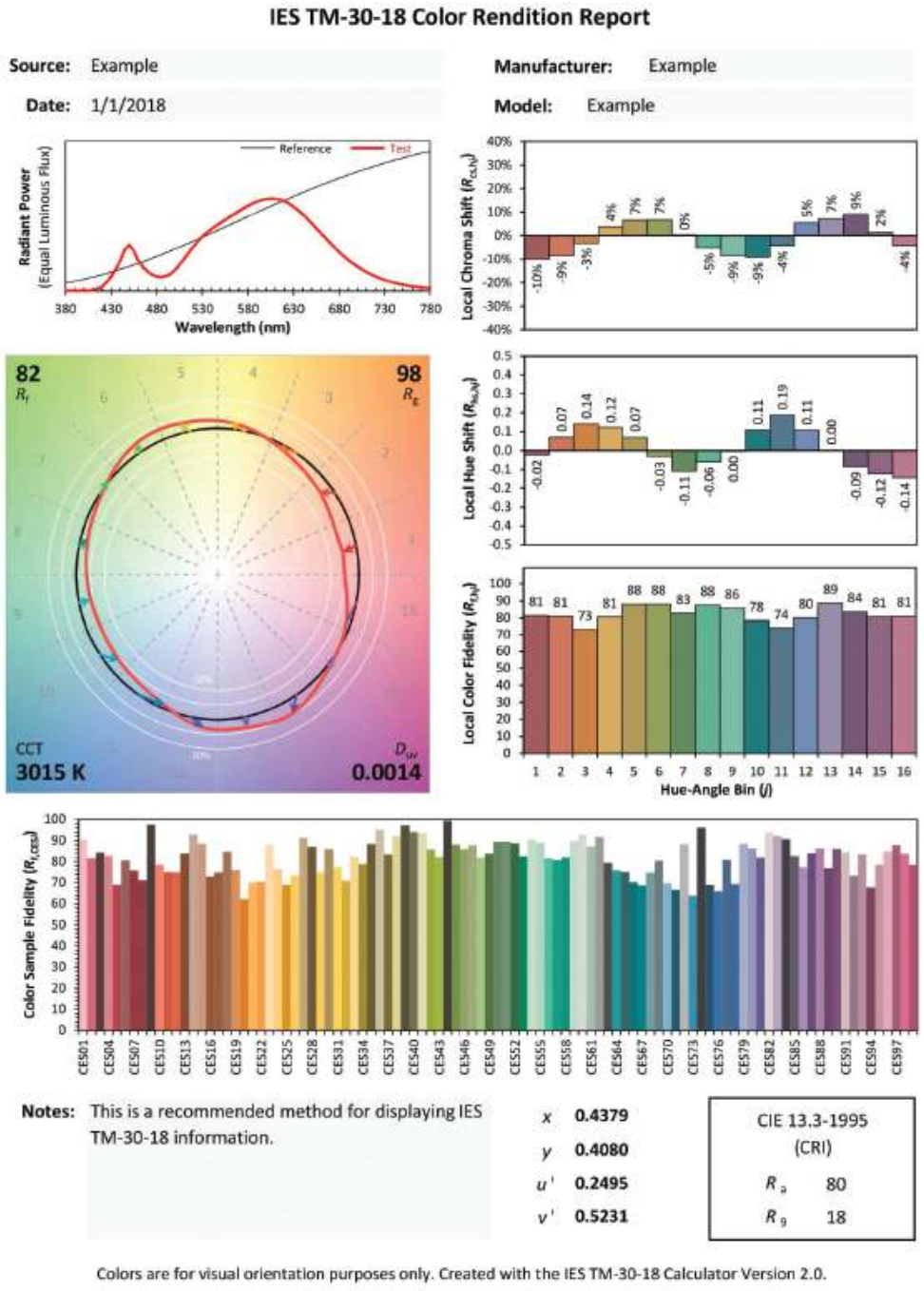
O	P	Q	R	S	T
Reported CCT (K)	Reported CRI (Ra)	Reported R9	Reported Rf	Reported Rg	Reported Rcs,h1 (%)
6500	72	0	85	92	10
3500	85	5	75	90	0.2
2700	80	23	70	89	20
2200	99	99	99	99	0

Color Rendition Requirements

- Provide full color data (including TM-30)
  - Particularly on the “high CCT” product
- Both TM-30 and CIE color rendering metrics must be provided, even if only one set must pass

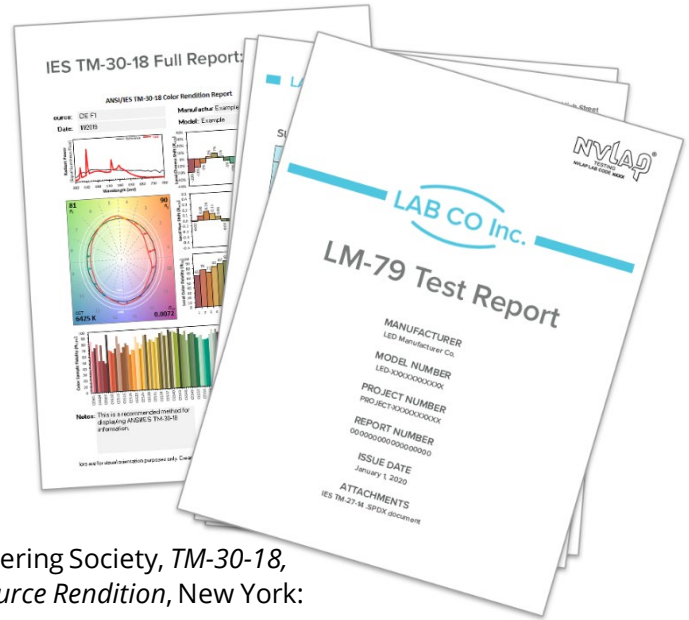


Metric and/or Application	V5.1 Standard Requirements	QPL Listing	Method of Measurement/Evaluation
		CCT and Duv for parent[1] products from LM-79 test reports listed as Tested Data Nominal CCT for child products listed as Reported Data	ANSI/IES LM-79 *ANSI C78.377-2017*
	All Indoor products, except high-bay: **Option 1 - ANSI/IES TM-30-18** • IES $R_f \geq 70$ • IES $R_g \geq 89$ • $-12\% \leq$ IES $R_{cs,h1} \leq +23\%$ **Option 2 - CIE 13.3-1995:** • $R_a \geq 80$ • $R_9 \geq 0$	All color rendition metrics for parent products from LM-79 test reports listed as Tested Data. All color rendition metrics for child products listed as Reported Data	ANSI/IES LM-79 *ANSI/IES TM-30-18 CIE 13.3-1995*
	All Outdoor and high-bay products: **Option 1 - ANSI/IES TM-30-18** • IES $R_f \geq 70$ • IES $R_g \geq 89$ • $-18\% \leq$ IES $R_{cs,h1} \leq +23\%$ **Option 2 - CIE 13.3-1995:** • $R_a \geq 70$ • $R_9 \geq -40$ (high bay only) • Outdoor must report R_9		
	($\Delta u'v' \leq 0.007$) on the CIE 1976 (u', v') chromaticity diagram	Color maintenance information not listed on the QPL at this time.	ANSI/IES LM-80, and/or IES LM-84-14



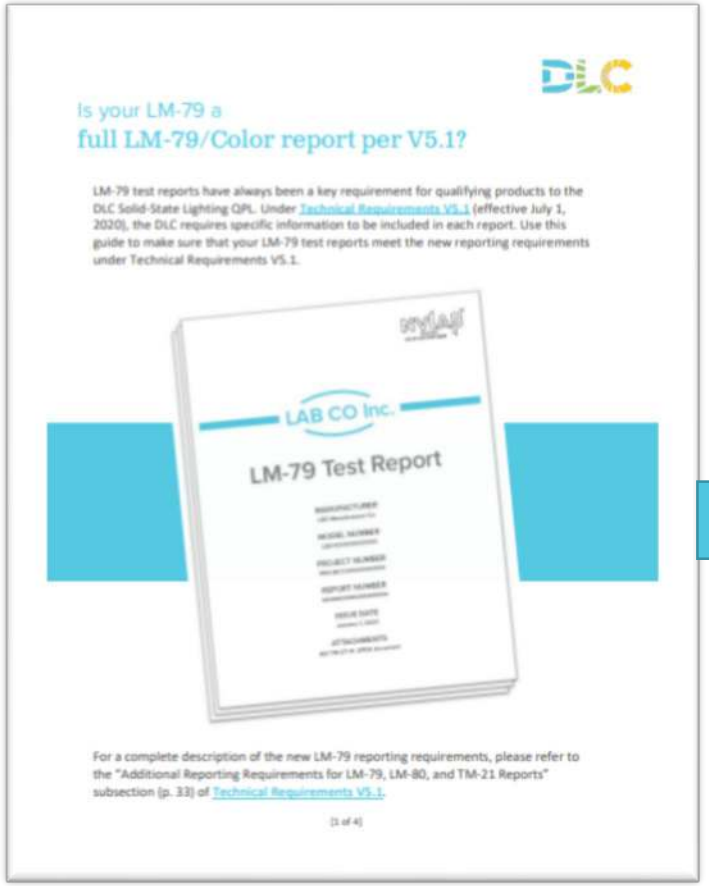
TM-30 Report Requirements

- All Full LM-79/color reports must contain the **ANSI/IES TM-30-18** Full Report (per Annex D, Figure D-3)
  - Template is free on IES website
  - Must be included within report



TM-30-18 image © Illuminating Engineering Society, *TM-30-18, IES Method for Evaluating Light Color Source Rendition*, New York: Illuminating Engineering Society, 2018. https://www.ies.org/product/ies-method-for-evaluating-light-source-color-rendition/

Data Required in LM-79 Color Report



Is your LM-79 a
full LM-79/Color report per V5.1?

LM-79 test reports have always been a key requirement for qualifying products to the DLC Solid-State Lighting QPL. Under Technical Requirements V5.1 (effective July 1, 2020), the DLC requires specific information to be included in each report. Use this guide to make sure that your LM-79 test reports meet the new reporting requirements under Technical Requirements V5.1.

LAB CO Inc.

LM-79 Test Report

For a complete description of the new LM-79 reporting requirements, please refer to the "Additional Reporting Requirements for LM-79, LM-80, and TM-21 Reports" subsection (p. 33) of Technical Requirements V5.1.

An ideal electrical results summary table will include:

- **Input Voltage**
- **Current**
- **Wattage**
- **Power Factor**
- **Current THD**

LAB CO Inc.

10 High Street
Medford, MA 02155
(000) 000-0000
www.designlights.org

SUMMARY

MODEL NUMBER	LED-XXXXXXXXXXX
DESCRIPTION	Description of product
LED MODEL NUMBER(S)	LED-XXX; LED-YYY
DRIVER MODEL NUMBER(S)	DRIVER-XXX

ELECTRICAL CRITERIA	RESULTS
Input Power (W) @ 120 (VAC)	xxx
Input Power Factor @ 120 (VAC)	xxx
Input Current ATHD (%) @ 120 (VAC)	xxx
Input Power (W) @ 277 (VAC)	xxx
Input Power Factor @ 277 (VAC)	xxx
Input Current ATHD (%) @ 277 (VAC)	xxx

PHOTOMETRIC CRITERIA	RESULTS
Lumen Output (lm)	xxx
Lumen Efficacy (lm/W) @ 120 (VAC)	xxx
Correlated Color Temperature (K)	xxx
Color Rendering Index - Ra	xxx
Color Rendering – R9	xxx
D_{uv}	xxx
Chromaticity Coordinate (x)	xxx
Chromaticity Coordinate (y)	xxx
Chromaticity Coordinate (u')	xxx
Chromaticity Coordinate (v')	xxx

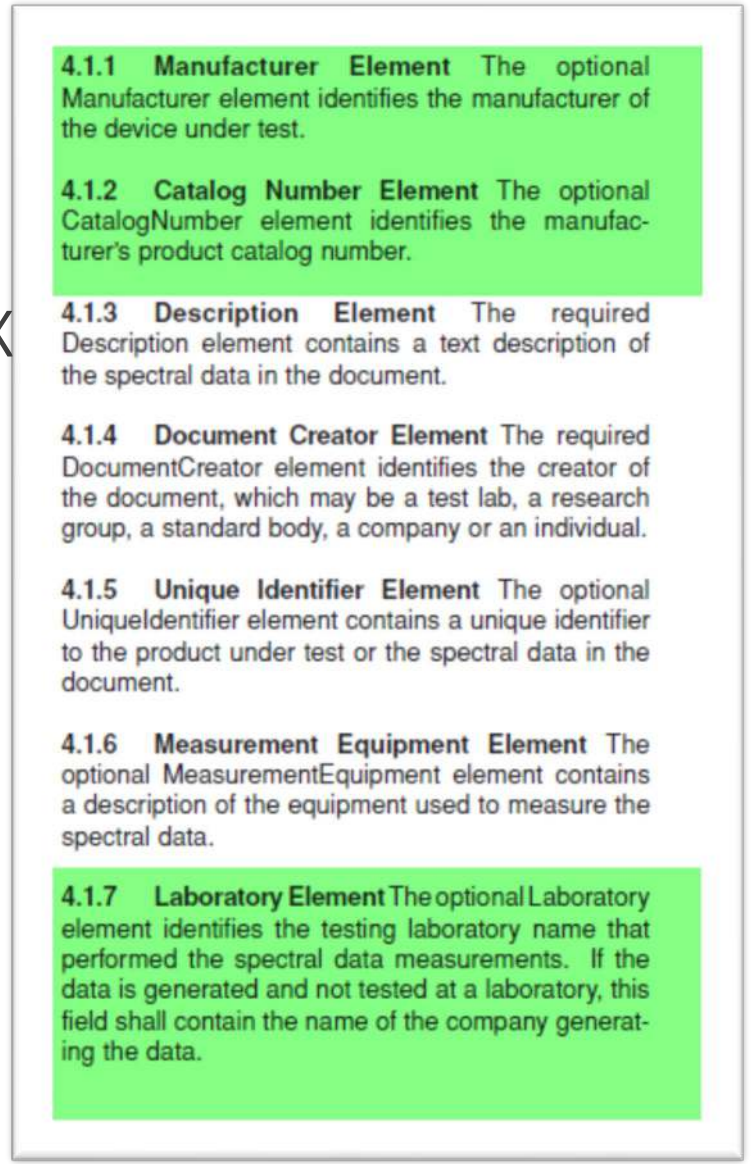
THERMAL CRITERIA	RESULTS
Max. Measured Source Temperature (°C)	xxx
Max. Measured Driver Temperature (°C)	xxx

An ideal photometric results summary table will include:

- **Total Luminous Flux**
- **Luminous Efficacy**
- **Chromaticity Coordinates**
- **CCT & Duv**
- **IES Rf, Rg, and Rcs,h1**
- **CRI (Ra) and R9**

TM-27/.SPDX files

- Minimum Information needed in the TM-27/SPDX files:
  - Manufacturer
  - Catalog/Model Number
  - Laboratory
  - Report Number
  - Report Date
  - Spectral Power Distribution Data from 380-780 nm in ≤5nm increments



4.1.1 Manufacturer Element The optional Manufacturer element identifies the manufacturer of the device under test.

4.1.2 Catalog Number Element The optional CatalogNumber element identifies the manufacturer's product catalog number.

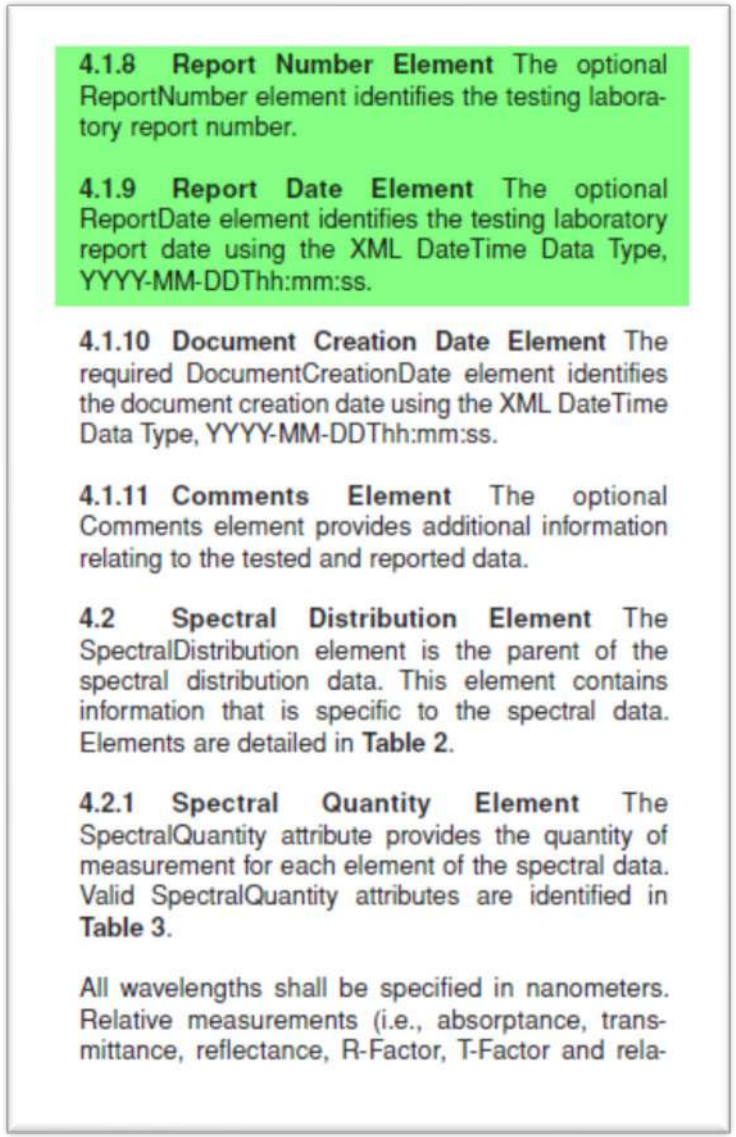
4.1.3 Description Element The required Description element contains a text description of the spectral data in the document.

4.1.4 Document Creator Element The required DocumentCreator element identifies the creator of the document, which may be a test lab, a research group, a standard body, a company or an individual.

4.1.5 Unique Identifier Element The optional UniqueIdentifier element contains a unique identifier to the product under test or the spectral data in the document.

4.1.6 Measurement Equipment Element The optional MeasurementEquipment element contains a description of the equipment used to measure the spectral data.

4.1.7 Laboratory Element The optional Laboratory element identifies the testing laboratory name that performed the spectral data measurements. If the data is generated and not tested at a laboratory, this field shall contain the name of the company generating the data.



4.1.8 Report Number Element The optional ReportNumber element identifies the testing laboratory report number.

4.1.9 Report Date Element The optional ReportDate element identifies the testing laboratory report date using the XML DateTime Data Type, YYYY-MM-DDThh:mm:ss.

4.1.10 Document Creation Date Element The required DocumentCreationDate element identifies the document creation date using the XML DateTime Data Type, YYYY-MM-DDThh:mm:ss.

4.1.11 Comments Element The optional Comments element provides additional information relating to the tested and reported data.

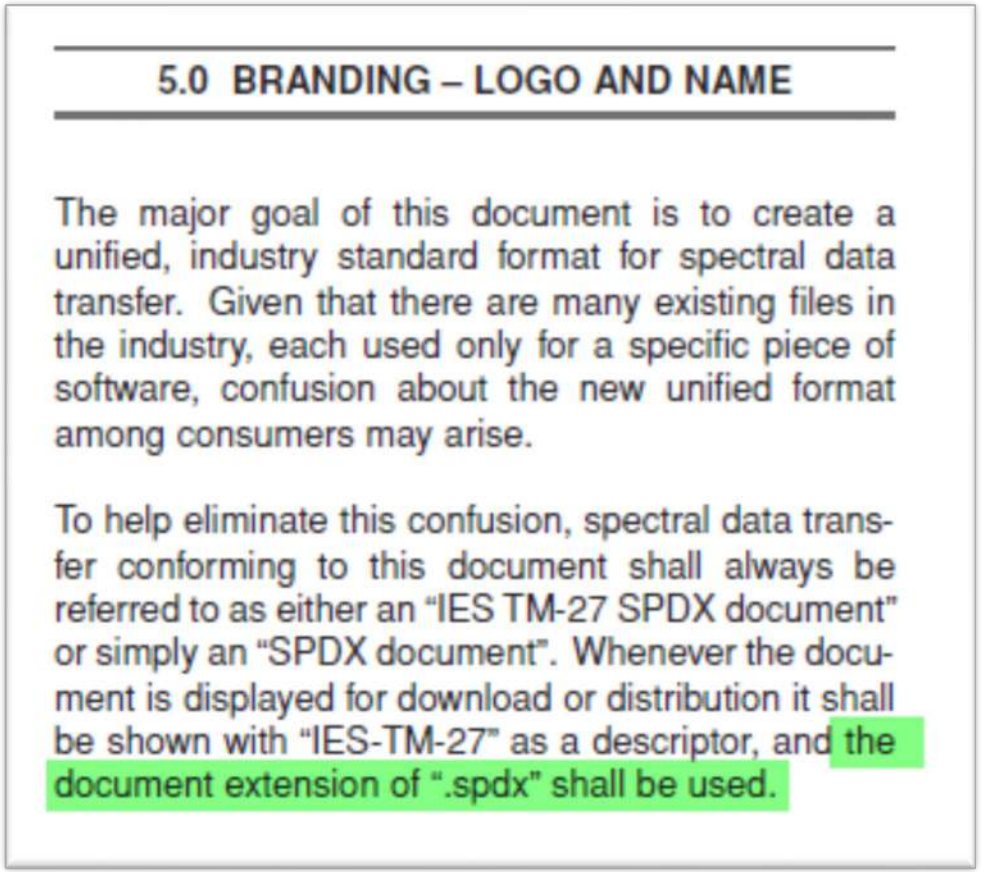
4.2 Spectral Distribution Element The SpectralDistribution element is the parent of the spectral distribution data. This element contains information that is specific to the spectral data. Elements are detailed in **Table 2**.

4.2.1 Spectral Quantity Element The SpectralQuantity attribute provides the quantity of measurement for each element of the spectral data. Valid SpectralQuantity attributes are identified in **Table 3**.

All wavelengths shall be specified in nanometers. Relative measurements (i.e., absorptance, transmittance, reflectance, R-Factor, T-Factor and rela-

TM-27/.SPDX files

- Must be provided with every LM-79/color test
- IES calculator (Excel) is not an acceptable substitute
- These must be .spdx files and not simply .xml files.



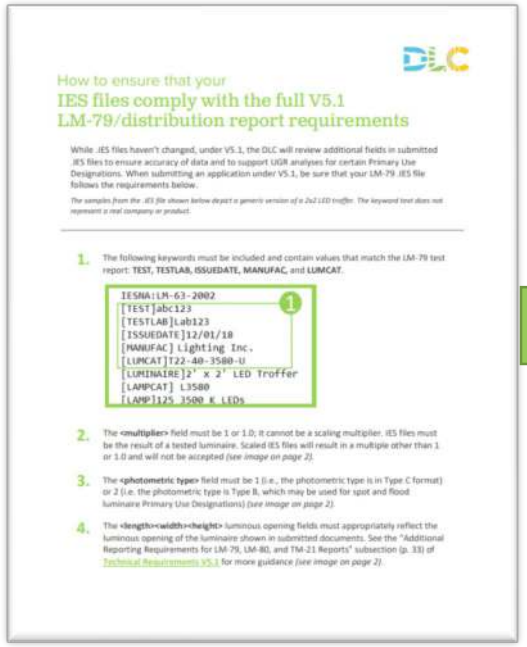
5.0 BRANDING – LOGO AND NAME

The major goal of this document is to create a unified, industry standard format for spectral data transfer. Given that there are many existing files in the industry, each used only for a specific piece of software, confusion about the new unified format among consumers may arise.

To help eliminate this confusion, spectral data transfer conforming to this document shall always be referred to as either an "IES TM-27 SPDX document" or simply an "SPDX document". Whenever the document is displayed for download or distribution it shall be shown with "IES-TM-27" as a descriptor, and the document extension of ".spdx" shall be used.

Image © Illuminating Engineering Society. ANSI/IES TM-27-20,Technical Memorandum: IES Standard Format for the Electronic Transfer of Spectral Data. New York: IES, 2020 https://www.ies.org/product/ies-standard-format-for-the-electronic-transfer-of-spectral-data/

Data Required in LM-79/Distribution Reports



How to ensure that your
IES files comply with the full V5.1
LM-79/distribution report requirements

While .IES files haven't changed, under V5.1, the DLC will review additional fields in submitted .IES files to ensure accuracy of data and to support UGR analyses for certain Primary Use Designations. When submitting an application under V5.1, be sure that your LM-79 .IES file follows the requirements below.

The samples from the .IES file shown below depict a generic version of a 2x2 LED troffer. The keyword text does not represent a real company or product.

1. The following keywords must be included and contain values that match the LM-79 test report: **TEST, TESTLAB, ISSUEDATE, MANUFAC,** and **LUMCAT**.

```
IESNA:LM-63-2002
[TEST]abc123
[TESTLAB]Lab123
[ISSUEDATE]12/01/18
[MANUFAC] Lighting Inc.
[LUMCAT]T22-40-3580-U
[LUMINAIRE]2' x 2' LED Troffer
[LAMPCAT] L3580
[LAMP]125 3500 K LEDs
```

2. The **<multiplier>** field must be 1 or 1.0; it cannot be a scaling multiplier. IES files must be the result of a tested luminaire. Scaled IES files will result in a multiple other than 1 or 1.0 and will not be accepted *(see image on page 2)*.

3. The **<photometric type>** field must be 1 (i.e., the photometric type is in Type C format) or 2 (i.e. the photometric type is Type B, which may be used for spot and flood luminaire Primary Use Designations) *(see image on page 2)*.

4. The **<length><width><height>** luminous opening fields must appropriately reflect the luminous opening of the luminaire shown in submitted documents. See the "Additional Reporting Requirements for LM-79, LM-80, and TM-21 Reports" subsection (p. 33) of Technical Requirements V5.1 for more guidance *(see image on page 2)*.

1. The following keywords must be included and contain values that match the LM-79 test report: **TEST, TESTLAB, ISSUEDATE, MANUFAC,** and **LUMCAT**.

```
IESNA:LM-63-2002
[TEST]abc123
[TESTLAB]Lab123
[ISSUEDATE]12/01/18
[MANUFAC] Lighting Inc.
[LUMCAT]T22-40-3580-U
[LUMINAIRE]2' x 2' LED Troffer
[LAMPCAT] L3580
[LAMP]125 3500 K LEDs
```

2. The **<multiplier>** field must be 1 or 1.0; it cannot be a s
be the result of a tested luminaire. Scaled IES files will
or 1.0 and will not be accepted *(see image on page 2)*.

3. The **<photometric type>** field must be 1 (i.e., the photo
or 2 (i.e. the photometric type is Type B, which may be
luminaire Primary Use Designations) *(see image on pag*

4. The **<length><width><height>** luminous opening fields
luminous opening of the luminaire shown in submitted
Reporting Requirements for LM-79, LM-80, and TM-21
Technical Requirements V5.1 for more guidance *(see i*

5. The **<input watts>** field must match the total input power specified in the LM-79 report *(see image below)*.

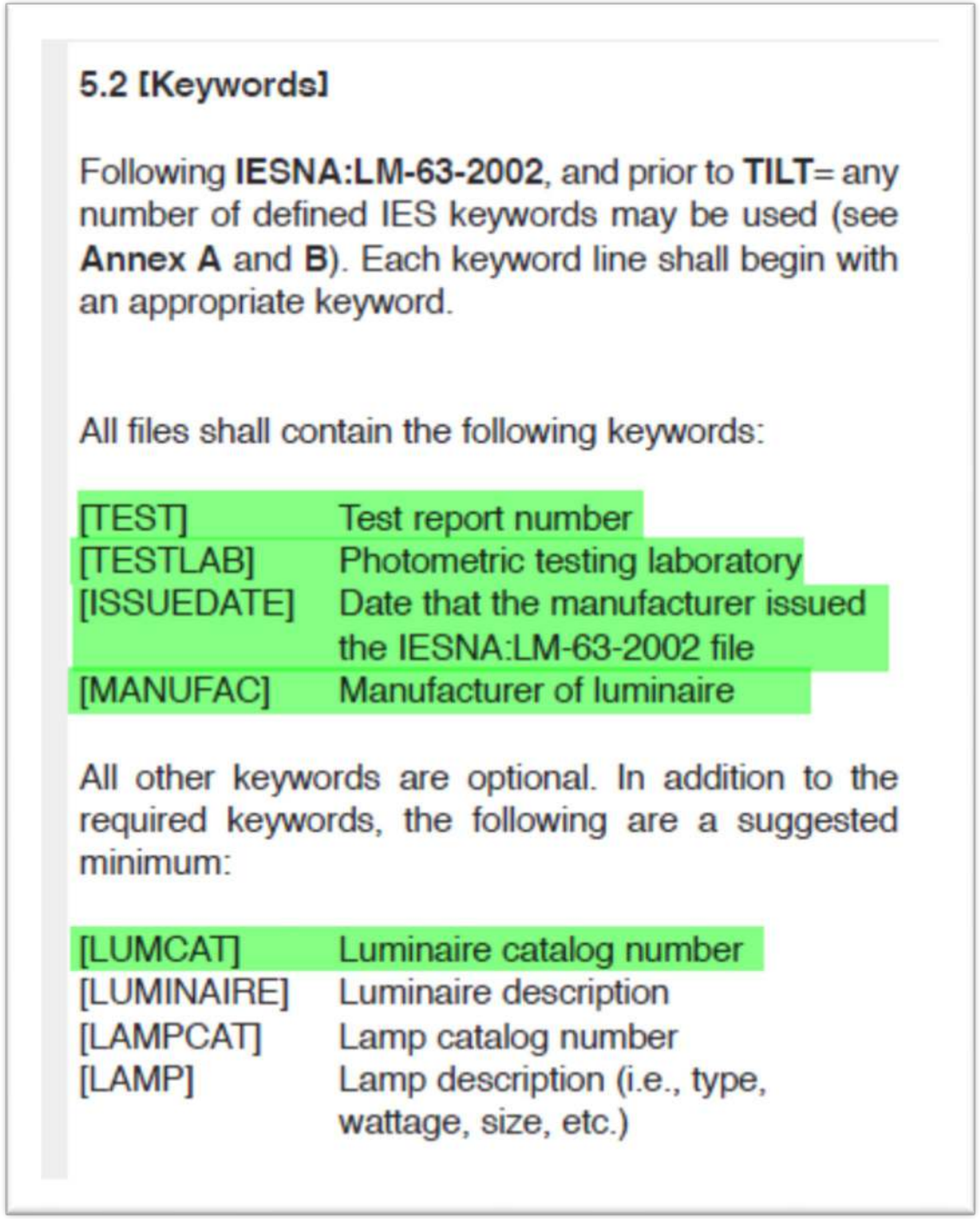
6. The angular resolution for the **<vertical angles>** field must be at most 5 degrees. In this example it is 2.5 degrees *(see image below)*.

7. The angular resolution for the **<horizontal angles>** field must be at most 22.5 degrees *(see image below)*.

```
[LAMPCAT] L3580
[LAMP]125 3   K
[BALLASTCAT]  23
[BALLAST]
TILT=NONE
1 -1 1 37 5 1 1 2 2 0
1 1 32
0 2.5 5 7.5 10 12.5 15 17.5 20 22.5 25 27.5 30 32.5 35
47.5 50 52.5 55 57.5 60 62.5 65 67.5 70 72.5 75 77.5 80
0 22.5 45 67.5 90
```

LM-63/.IES files

- Minimum Information needed in the LM-63/.IES files
  - Manufacturer
  - Catalog/Model Number
  - Laboratory
  - Report Number
  - Report Date
  - Wattage and Input Voltage
  - Multiplier may only be 1.0
  - Luminous Dimensions
  - Candela Array



5.2 [Keywords]

Following **IESNA:LM-63-2002**, and prior to **TILT**= any number of defined IES keywords may be used (see **Annex A** and **B**). Each keyword line shall begin with an appropriate keyword.

All files shall contain the following keywords:

[TEST]	Test report number
[TESTLAB]	Photometric testing laboratory
[ISSUEDATE]	Date that the manufacturer issued the IESNA:LM-63-2002 file
[MANUFAC]	Manufacturer of luminaire

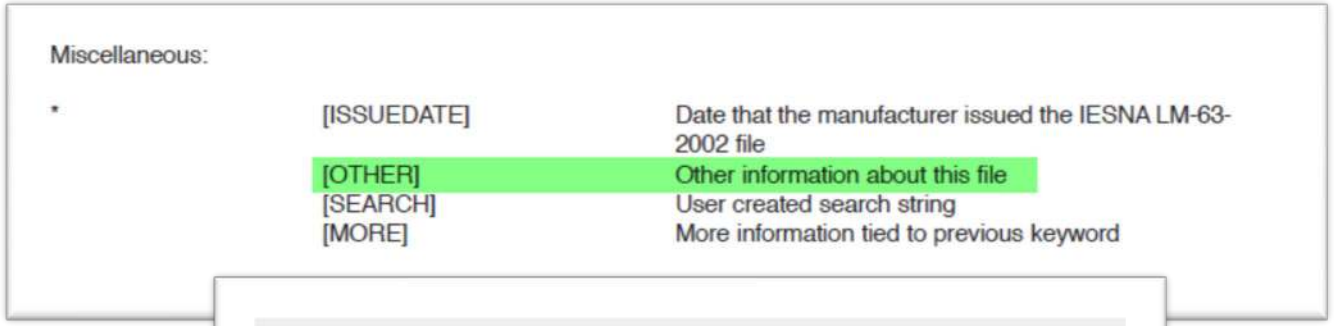
All other keywords are optional. In addition to the required keywords, the following are a suggested minimum:

[LUMCAT]	Luminaire catalog number
[LUMINAIRE]	Luminaire description
[LAMPCAT]	Lamp catalog number
[LAMP]	Lamp description (i.e., type, wattage, size, etc.)

Image © Illuminating Engineering Society. ANSI/IES LM-63-19, IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information. New York: IES, 2020 https://www.ies.org/product/approved-method-ies-standard-file-format-for-the-electronic-transfer-of-photometric-data-and-related-information/

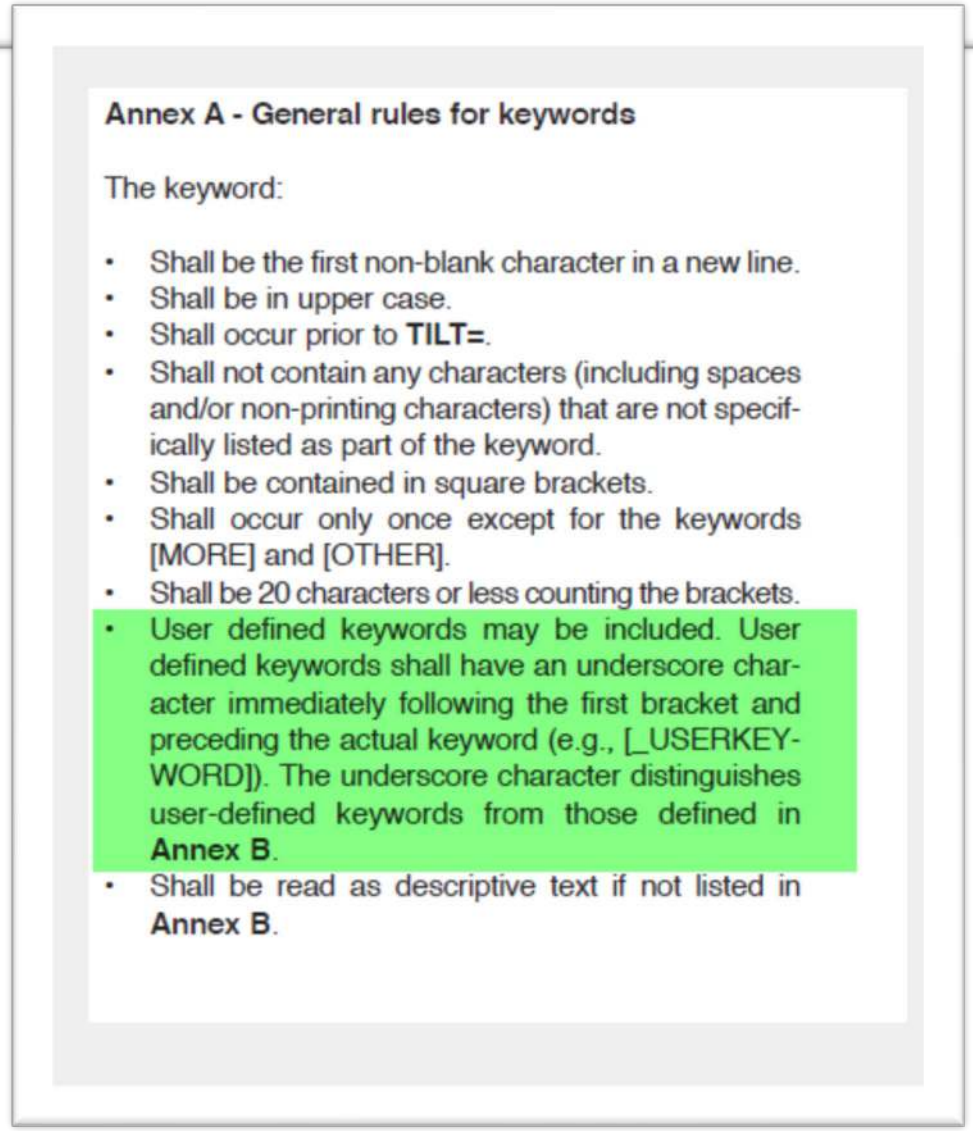
LM-63/.IES files

- Input voltage may be represented:
  - In the IES file using the [OTHER] tag
  - In the IES file using a User-Defined Keyword. For example [_VOLTAGE]
  - In an accompanying PDF report of the goniophotometer test



Miscellaneous:

•	[ISSUEDATE]	Date that the manufacturer issued the IESNA LM-63-2002 file
	[OTHER]	Other information about this file
	[SEARCH]	User created search string
	[MORE]	More information tied to previous keyword



Annex A - General rules for keywords

The keyword:

- Shall be the first non-blank character in a new line.
- Shall be in upper case.
- Shall occur prior to **TILT=**.
- Shall not contain any characters (including spaces and/or non-printing characters) that are not specifically listed as part of the keyword.
- Shall be contained in square brackets.
- Shall occur only once except for the keywords [MORE] and [OTHER].
- Shall be 20 characters or less counting the brackets.
- User defined keywords may be included. User defined keywords shall have an underscore character immediately following the first bracket and preceding the actual keyword (e.g., [_USERKEYWORD]). The underscore character distinguishes user-defined keywords from those defined in **Annex B**.
- Shall be read as descriptive text if not listed in **Annex B**.

https://www.ies.org/product/approved-method-ies-standard-file-format-for-the-electronic-transfer-of-photometric-data-and-related-information/

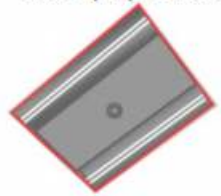
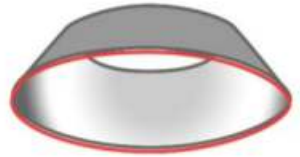
UGR Glare Guidance

- Luminous area noted in .IES must represent the light emitting opening of the luminaire.
- Represented as the smallest geometry that completely encompasses of the light emitting surfaces of the product
- Guidance for luminous area descriptions in LM-63 files for UGR calculations available on DLC website

Guidance for Modeling Luminous Area

The following examples are given as guidance for modeling common types of luminaires, with luminous areas per IES LM-63. The red boundary line indicates the boundary of suggested luminous opening. Each .ies file can only have one luminous area, so the following conventions are recommended.[1]

High Bay/Low Bay Luminaires

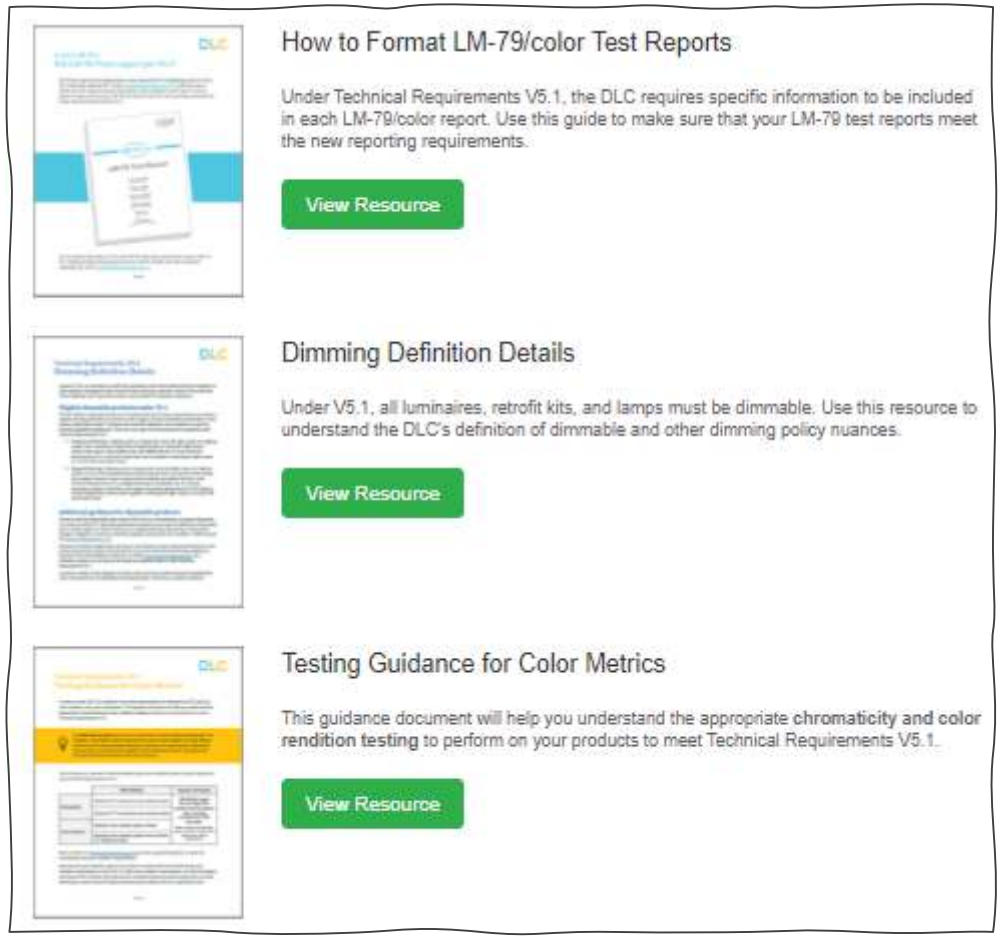
Multiple LED configurations below heat sink	Luminous channels on edges with opaque center	Luminous disk in center with reflector/refractor
		
Model as a circular opening encompassing all LED configurations	Model as rectangle (enclosing opaque area in the center) encompassing both luminous channels	Model as circular opening or vertical cylinder with sides encompassing all luminous components

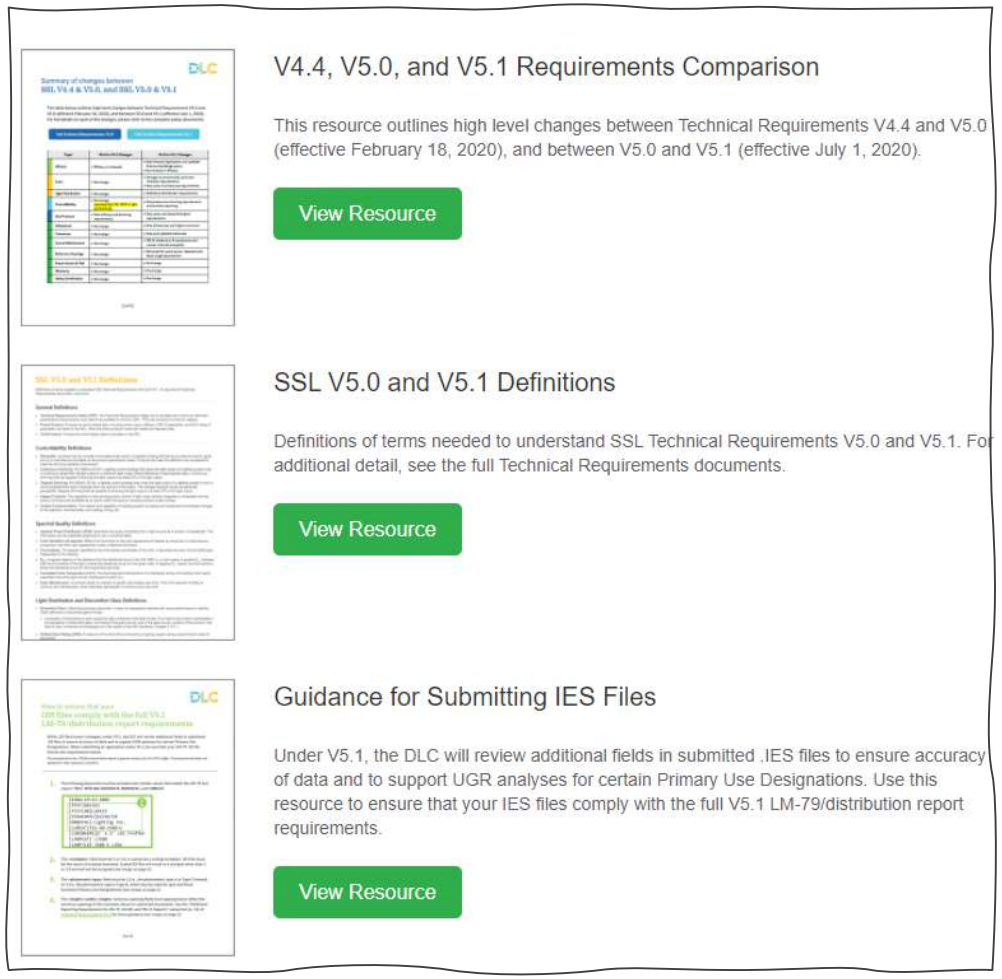
Linear Ambient Luminaires

Internal channel with luminous sides and horizontal plane	Cylinder with open top (uplight) and luminous panels on curved portion (downlight)	Cylinder with wraparound luminous panel
		

Technical Requirement Guidance Resources

- https://www.designlights.org/solid-state-lighting/qualification-requirements/ssl-v5-1-resources/





Q&A SESSION

Please use chat feature
Questions and answers will be read aloud