

# Indoor Light Sources

## Draft Code Language

Last Updated: March 20, 2017

## 1. INTRODUCTION

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The California Statewide Utility Codes and Standards Team actively supports the California Energy Commission in developing revisions to the 2019 California Building Energy Efficiency Standards (Title 24, Part 6). Our joint intent is to achieve significant energy savings through the development of reasonable, responsible, and cost-effective code change proposals for the 2019 Title 24 code change cycle.

The Statewide Utility Team is proposing code change for Indoor Light Sources:

- Reduced LPDs for all nonresidential indoor spaces
- Cleanup language surrounding current limiters, overcurrent protection panels, relabeling to take credit for lower wattage lamps in retrofits, and recessed luminaires with line-voltage medium screw base sockets.

This CASE Report and proposed code change builds off of the 2016 Nonresidential Lighting – Indoor LPDs CASE Report and code change. This measure intends to revise the indoor lighting allowances found in Tables 140.6-B, 140.6-C, 140.6-D, and 140.6-G. The Statewide CASE Team is proposing new indoor LPDs based on LEDs with a comparable color temperature and color rendering index to the legacy light sources they are replacing so lighting color and fidelity are maintained. The Statewide CASE Team will also ensure this proposed measure will not result in a compromise in light quality, an increase in glare, or the exclusion of color tuning systems.

Other issues the Statewide CASE Team is aware of and will be researching is the allowance of screw-in LED lamps as a high efficiency source. Retrofits will depend heavily on the allowance of screw-in LED lamps, but currently they are not allowed as a high efficacy source for calculating LPDs. Additionally, the Statewide CASE Team is aware that the current limiter allowance is potentially penalizing the usage of LEDs in track lighting and will also investigate this issue and potential solutions. The Statewide CASE Team is researching these issues and expects this measure to update Section 130.0 and 110.9. The Statewide CASE Team intends to simplify this language which is expected to result in the removal of language prohibiting the use of LED screw-in lamps and updates to current limiter requirements.

**The Statewide Utility Team is requesting feedback on the draft code language presented in this document.** Input we receive will inform the code change proposal that the Statewide Utility Team will be proposing to the California Energy Commission in April 2017.

To provide feedback, please email us at [info@title24stakeholders.com](mailto:info@title24stakeholders.com) or contact the measure lead at:

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For more information about the California Statewide Utility Codes and Standards Team's 2019 Title 24, Part 6 advocacy efforts, and the latest information on this code change proposal please visit:  
[www.title24stakeholders.com](http://www.title24stakeholders.com).

## 2. DRAFT CODE LANGUAGE

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The proposed changes to the Standards, Reference Appendices, and the ACM Reference Manuals are provided below. Changes to the 2016 documents are marked with underlining (new language) and ~~strikethroughs~~ (deletions).

### 2.1 Standards

#### 2.1.1 *SECTION 110.9 - MANDATORY REQUIREMENTS FOR LIGHTING CONTROL DEVICES AND SYSTEMS, BALLASTS, AND LUMINAIRES*

~~(c) **Track Lighting Integral Current Limiter.** An integral current limiter for line voltage track lighting shall be recognized for compliance with Part 6 only if it meets all of the following requirements:~~

- ~~1. ——— Shall be certified to the Energy Commission as meeting all of the applicable requirements in Section 110.9(c); and~~
- ~~2. ——— Shall comply with the Lighting Control Installation requirements in accordance with Section 130.4; and~~
- ~~3. ——— Shall be manufactured so that the current limiter housing is used exclusively on the same manufacturer's track for which it is designed; and~~
- ~~4. ——— Shall be designed so that the current limiter housing is permanently attached to the track so that the system will be irreparably damaged if the current limiter housing were to be removed after installation into the track. Methods of attachment may include but are not limited to one way barbs, rivets, and one way screws; and~~
- ~~5. ——— Shall employ tamper resistant fasteners for the cover to the wiring compartment; and~~
- ~~6. ——— Shall have the identical volt-ampere (VA) rating of the current limiter, as installed and rated for compliance with Part 6 clearly marked as follows; and:~~
  - ~~A. So that it is visible for the enforcement agency's field inspection without opening coverplates, fixtures, or~~

panels; and

B. Permanently marked on the circuit breaker; and

C. On a factory printed label that is permanently affixed to a non-removable base plate inside the wiring compartment.

7. ~~Shall have a conspicuous factory installed label permanently affixed to the inside of the wiring compartment warning against removing, tampering with, rewiring, or bypassing the device; and~~

8. ~~Each electrical panel from which track lighting integral current limiters are energized shall have a factory printed label permanently affixed and prominently located, stating the following: "NOTICE: Current limiting devices installed in track lighting integral current limiters connected to this panel shall only be replaced with the same or lower amperage. Adding track or replacement of existing current limiters with higher continuous ampere rating will void the track lighting integral current limiter certification, and will require re-submittal of compliance documentation to the enforcement agency responsible for compliance with the California Title 24, Part 6 Building Energy Efficiency Standards."~~

~~(d) **Track Lighting Supplementary Overcurrent Protection Panel.** A Track Lighting Supplementary Overcurrent Protection Panel shall be used only for line voltage track lighting and shall be recognized for compliance with Part 6 only if it meets all of the following requirements:~~

1. ~~Shall comply with the Lighting Control Installation requirements in accordance with Section 130.4; and~~

2. ~~Shall be listed as defined in Section 100.1; and~~

3. ~~Shall be used only for line voltage track lighting. No other lighting or building power shall be used in a Supplementary Overcurrent Protection Panel used to determine input wattage for track lighting; and~~

4. ~~Be permanently installed in an electrical equipment room, or permanently installed adjacent to the lighting panel board providing supplementary overcurrent protection for the track lighting circuits served by the supplementary over current protection pane; and~~

5. ~~Shall have a permanently installed label that is prominently located stating the following: "NOTICE: This Panel for Track Lighting Energy Code Compliance Only. The overcurrent protection devices in this panel shall only be replaced with the same or lower amperage. No other overcurrent protective device shall be added to this panel. Adding to, or replacement of existing overcurrent protective device(s) with higher continuous ampere rating, will void the panel listing and require re-submittal of compliance documentation to the enforcement agency responsible for compliance with the California Title 24, Part 6 Building Energy Efficiency Standards."~~

## 2.1.2 SECTION 130.0 – LIGHTING SYSTEMS AND EQUIPMENT, AND ELECTRICAL POWER DISTRIBUTION SYSTEMS —GENERAL

(c) **Luminaire classification and power.** Luminaires ~~shall be classified~~ and wattage shall be determined as follows:

1. The wattage of line-voltage luminaires not containing permanently installed ballasts, transformers, or similar devices shall be greater of the installed wattage of the light source in the luminaire and the maximum rated wattage of the luminaire as determined under UL 1574, 1598, 2108, or 8750, as applicable. The luminaire rated wattage shall be listed on a permanent, preprinted, factory-installed label, as specified by the applicable UL standard.

Exception to Section 130.0(c)1: Luminaires containing light sources with a rated lifespan in excess of 25,000 hours shall be the input wattage of the installed light source and control equipment.

~~1. Luminaire labeling. Luminaire wattage shall be labeled as follows:~~

~~A. The maximum relamping rated wattage of a luminaire shall be listed on a permanent, preprinted, factory installed label, as specified by UL 1574, 1598, 2108, or 8750, as applicable; and~~

~~B. The factory installed maximum relamping rated wattage label shall not consist of peel-off or peel-down layers or other methods that allow the rated wattage to be changed after the luminaire has been shipped from the manufacturer.~~

~~**EXCEPTION** to Section 130.0(c)1B: Peel down labels may be used only for the following luminaires when they can accommodate a range of lamp wattages without changing the luminaire housing, ballast, transformer or wiring. Qualifying luminaires shall have a single lamp, and shall have integrated ballasts or transformers. Peel down labels must be layered such that the rated wattage reduces as successive layers are removed.~~

~~i. High intensity discharge luminaires, having an integral electronic ballast, with a maximum relamping rated wattage of 150 watts.~~

~~ii. Low voltage luminaires (except low voltage track systems), ≤ 24 volts, with a maximum relamping rated wattage of 50 watts.~~

~~iii. Compact fluorescent luminaires, having an integral electronic ballast, with a maximum relamping rated wattage of 42 watts.~~

~~2. For luminaires with line voltage lamp holders not containing permanently installed ballasts or transformers;~~

~~the wattage of such luminaires shall be determined as follows:~~

~~A. The maximum relamping rated wattage of the luminaire; and~~

~~B. For recessed luminaires with line voltage medium screw base sockets, wattage shall not be less than 50 watts per socket.~~

~~3. Luminaires and luminaire housings designed to accommodate a variety of trims or modular components that allow the conversion between incandescent and any other lighting technology without changing the luminaire housing or wiring shall be classified as incandescent.~~

~~4. Screwbased adaptors shall not be used to convert an incandescent luminaire to any type of nonincandescent technology. Screw based adaptors, including screw base adaptors classified as permanent by the manufacturer, shall not be recognized for compliance with Part 6.~~

~~5. Luminaires and luminaire housings with incandescent screw base sockets shall be classified only as incandescent. Field modifications, including but not limited to hard wiring of an LED module, shall not~~

be recognized as converting an incandescent luminaire or luminaire housing to a nonincandescent technology for compliance with Part 6 unless such sockets are removed.

~~62. The wattage of luminaires with permanently installed or remotely installed ballasts or drivers. The wattage of such luminaires shall be determined as follows:~~

~~A. The shall be the operating input wattage of the rated lamp/ballast combination published in ballast manufacturer's catalogs based on independent testing lab reports as specified by UL 1598.~~

~~B. 3. The wattage of luminaires with permanently installed or remotely installed drivers shall be the maximum input wattage of the rated driver published in driver's manufacturer catalogs based on independent testing lab reports as specified by UL 8750 or LM-79. <Placeholder for calculating wattage of LED strips hardwired versus plug-in>~~

~~7-4. The wattage of Line-voltage lighting track and plug-in busway or other lighting systems that allows the addition or relocation of luminaires without altering the wiring of the system. The wattage of such luminaires shall be determined by one of the following methods:~~

~~A. The wattage of line voltage busway and track rated for more than 20 amperes shall be the total volt-ampere rating of the branch circuit feeding the busway and track.~~

~~B. The wattage of line voltage busway and track rated for 20 amperes or less shall be determined by one of the following methods:~~

~~i. The volt-ampere rating of the branch circuit feeding the track or busway; or~~

~~ii-A. The wattage is the higher of the rated wattage of all of the luminaires included in the system, where luminaire classification and wattage is determined according to the applicable provisions in Section 130.0(c), or 45 30 watts per linear foot of track or plug-in busway; or~~

~~B. The wattage is deemed to be equal to the volt-ampere rating of current limiting as specified by UL 1077, or the volt-ampere rating of over-current protection devices as specified by UL 489, or the maximum rated input wattage of the transformer as specified by UL 2108, serving the lighting system.~~

~~iii When using a line-voltage track lighting integral current limiter, the higher of the volt-ampere rating of an integral current limiter controlling the track or busway, or 12.5 xx watts per linear foot of track or busway. An Integral current limiter shall be certified to the Energy Commission in accordance with Section 110.9, and shall comply with the Lighting Control Installation Requirements in accordance with Section 130.4, to qualify to use Subsection Biii to determine luminaire power; or~~

~~iv—When using a dedicated track lighting supplementary overcurrent protection panel, the sum of the ampere (A) rating of all of the overcurrent protection devices times the branch circuit voltages. Track lighting supplementary overcurrent protection panels shall comply with the applicable requirements in Section 110.9, and shall comply with the Lighting Control Installation Requirements in accordance with Section 130.4, to qualify to use Subsection Biv to determine luminaire power.~~

~~8—Luminaires and lighting systems with permanently installed or remotely installed transformers. The wattage of such luminaires shall be determined as follows:~~

~~A-5. The wattage of For low-voltage luminaires that do not allow the addition of lamps, lamp holders, or luminaires without rewiring, the wattage shall be the rated wattage of the lamp/transformer combination.~~

~~B. For low-voltage lighting systems, including low-voltage tracks and other low-voltage lighting systems that allow the addition of lamps, lamp holders, or luminaires without rewiring, the wattage shall~~

be the maximum rated input wattage of the transformer, labeled in accordance with Item 1, or the maximum rated wattage published in transformer manufacturer's catalogs, as specified by UL 2108.

~~9. Light emitting diode (LED) Luminaires, and LED Light Engine.~~

~~A. The wattage of such luminaires shall be the maximum rated input wattage of the system when tested in accordance with IES LM-79-08.~~

~~B. The maximum rated input wattage shall be labeled in accordance with Section 130.0(c)1.~~

~~C. An LED lamp, integrated or nonintegrated type in accordance with the definition in ANSI/IES RP-16-~~

~~2010, shall not be classified as a LED lighting system for compliance with Part 6. LED modules having screw bases, including but not limited to screw based pig tails, screw based sockets, or screw based adaptors, shall not be recognized as a LED lighting system for compliance with Part 6.~~

~~D. Luminaires manufactured or rated for use with low voltage incandescent lamps, into which have been installed LED modules or LED lamps, shall not be recognized as a LED lighting system for compliance with Part 6.~~

~~E. For LED lighting systems that allow the addition of luminaires or light engines without rewiring, the wattage of such luminaires shall be the maximum rated input wattage of the power supply, labeled in accordance with Section 130.0(c)1 or published in the power supply manufacturer's catalog.~~

~~EXCEPTION to Section 130.0(c)9: Luminaires in areas that must comply with Section 150.0(k), as specified by Section 130.0(b).~~

~~10-6. The wattage of all other miscellaneous lighting equipment shall be the maximum rated wattage of the lighting equipment, or operating input wattage of the system, labeled in accordance with Section 130.0(c)1, or published in manufacturer's catalogs, based on independent testing lab reports as specified by UL 1574 or UL 1598. Lighting technologies listed in Subsections 2 through 9 shall be determined in accordance with the applicable requirements in Subsections 1 through 9.~~

TABLE 140.6-B COMPLETE BUILDING METHOD LIGHTING POWER DENSITY VALUES

TYPE OF BUILDING	ALLOWED LIGHTING POWER DENSITY (WATTS PER SQUARE FOOT)
Auditorium Building	
Classroom Building	
Commercial and Industrial Storage Building	
Convention Center Building	
Financial Institution Building	
General Commercial Building/Industrial Work Building	
Grocery Store Building	
Library Building	
Medical Building/Clinic Building	
Office Building	
Parking Garage Building	
Religious Facility Building	
Restaurant Building	
School Building	
Theater Building	
All others buildings	

TYPE OF BUILDING	ALLOWED LIGHTING POWER DENSITY (WATTS PER SQUARE FOOT)
<u>Auditorium</u>	
<u>Civic Center</u>	
<u>Convention center</u>	
<u>Courthouse</u>	
<u>Financial Institution</u>	
<u>Grocery Store</u>	
<u>Hospital</u>	
<u>Industrial/ Manufacturing facility</u>	
<u>Library</u>	
<u>Medical/Healthcare Clinic</u>	
<u>Motion picture theater</u>	
<u>Office</u>	
<u>Parking Garage</u>	
<u>Performing arts theater</u>	
<u>Religious Facility</u>	
<u>Restaurant</u>	
<u>Retail Store</u>	
<u>School and/or university</u>	
<u>Service facility</u>	
<u>Sports arena</u>	
<u>Warehouse</u>	
<u>All other buildings</u>	

**TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

PRIMARY FUNCTION AREA		ALLOWED LIGHTING POWER DENSITY (W/ft <sup>2</sup> )	PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER DENSITY (W/ft <sup>2</sup> )
Auditorium Area			Library Area	Reading areas
Auto-Repair Area				Stack areas
Beauty Salon Area			Lobby Area	Hotel lobby
Civic Meeting Place Area				Main entry lobby
Classroom, Lecture, Training, Vocational Areas			Locker/Dressing Room	
Commercial and Industrial Storage Areas (conditioned and unconditioned)			Lounge Area	
Commercial and Industrial Storage Areas (refrigerated)			Malls and Atria	
Convention, Conference, Multipurpose and Meeting Center Areas			Medical and Clinical Care Area	
Corridor, Restroom, Stair, and Support Areas			Office Area	> 250-square feet
Dining Area				≤ 250-square feet
Electrical, Mechanical, Telephone Rooms			Parking Garage Area	Parking Area <sup>40</sup>
Exercise Center, Gymnasium Areas				Dedicated Ramps
Exhibit, Museum Areas				Daylight Adaptation Zones <sup>9</sup>
Financial Transaction Area			Religious Worship Area	
General Commercial and Industrial Work Areas	Low-bay		Retail Merchandise Sales, Wholesale	
	High-bay		Showroom Areas	
	Precision		Theater Area	Motion picture
Grocery Sales Area				Performance

**CONTINUED: TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

Hotel-Function-Area		Transportation Function-Area	Concourse-& Baggage Ticketing	
Kitchen, Food Preparation Areas		Videoconferencing Studio		
Laboratory Area, Scientific		Waiting Area		
Laundry-Area		All-other-areas		
Footnotes for this table are listed below.				
FOOTNOTES FOR TABLE 140.6-C: See Section 140.6(c)2 for an explanation of additional lighting power available for specialized task work, ornamental, precision, accent, display, decorative, and white boards and chalk boards, in accordance with the footnotes in this table. The smallest of the added lighting power listed in each footnote below, or the actual design wattage, may be added to the allowed lighting power only when using the Area Category Method of compliance.				
Footnote number	Type of lighting system allowed		Allowed lighting power density. (W/ft <sup>2</sup> of task area unless otherwise noted)	
1	Specialized task work			
2	Specialized task work			
3	Ornamental lighting as defined in Section 100.1 and in accordance with Section 140.6.(c)2.			
4	Precision commercial and industrial work			
5	Per linear foot of white board or chalk board.			

6	Accent, display and feature lighting – luminaires shall be adjustable or directional	
7	Decorative lighting – primary function shall be decorative and shall be in addition to general illumination.	
8	Additional Videoconferencing Studio lighting complying with all of the requirements in Section 140.6(c)2Gvii.	
9	Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage	
10	Additional allowance for ATM locations in Parking Garages. Allowance per ATM:	200 watts for first ATM location. 50 watt for each additional ATM location in a group.

**TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

PRIMARY FUNCTION AREA	BASE ALLOWANCE LPD (W/ft <sup>2</sup> )	ADDITIONAL LIGHTING POWER FUNCTIONS LPD per square foot for Specialized task, Precision work, Ornamental lighting and/or Lineal feet of white board or chalk board	
		Type of Additional Allowance	Allowed LPD
<u>Auditorium</u>			
<u>Audience Seating</u>			
<u>Beauty Salon</u>			
<u>Civic Meeting Place</u>			
<u>Classroom, Lecture, Training</u>			
<u>Commercial/Industrial Storage (Warehouse)</u>	<u>Low Bay</u>		
	<u>High Bay</u>		
	<u>Precision?</u>		
<u>Convention, Conference, Multipurpose and Meeting Center</u>			
<u>Copy/Print Room</u>			
<u>Dining</u>	<u>Bar/lounge or leisure</u>		
	<u>Cafeteria/fast food</u>		
	<u>Family</u>		
<u>Electrical, Mechanical, Telephone Rooms</u>			
<u>Exercise /Fitness Center &amp; Gymnasium</u>			
<u>Electrical, Mechanical, Telephone Rooms</u>			
<u>Museum</u>	<u>Exhibition/Display</u>		
	<u>Restoration room</u>		
<u>Financial Transaction</u>			
<u>General/Commercial &amp; Industrial Work</u>	<u>Low Bay</u>		
	<u>High Bay</u>		
	<u>Precision?</u>		
<u>Library</u>	<u>Reading</u>		
	<u>Stacks</u>		
<u>Main Entry Lobby</u>			
<u>Locker-room</u>			
<u>Lounge, Breakroom, or Waiting</u>			
<u>Concourse and Atria</u>			
<u>Medical and Clinical Care</u>	<u>Exam/treatment room</u>		
	<u>Pharmacy</u>		

TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)

PRIMARY FUNCTION AREA		BASE ALLOWANCE LPD (W/ft <sup>2</sup> )	ADDITIONAL LIGHTING POWER FUNCTIONS LPD per square foot for Specialized task, Precision work, Ornamental lighting and/or Lineal feet of white board or chalk board	
			Type of Additional Allowance	Allowed LPD
<u>Office</u>	> 250 square feet			
	≤ 250 square feet			
	<u>Open plan</u>			
<u>Parking Structure</u>	<u>Parking Zone</u>			
	<u>Dedicated Ramps</u>			
	<u>Daylight Adaptation Zones</u> <sup>9</sup>			
<u>Pharmacy</u>				
<u>Merchandize Sales</u>	<u>Grocery Sales</u>			
	<u>Retail Merchandise</u>			
	<u>Fitting Room</u>			
<u>Theater</u>	<u>Motion picture</u>			
	<u>Performance</u>			
<u>Kitchen and/or Food Preparation</u>				
<u>Laboratory</u>				
<u>Healthcare Facility (Hospital)</u>	<u>Exam/treatment room</u>			
	<u>Imaging room</u>			
	<u>Medical supply room</u>			
	<u>Nursery</u>			
	<u>Nurse's station</u>			
	<u>Operating room</u>			
	<u>Patient room</u>			
	<u>Physical therapy room</u>			
	<u>Recovery room</u>			
<u>Laundry</u>				
<u>Transportation Functions</u>	<u>Transportation</u>			
	<u>Baggage</u>			
	<u>Transportation Ticketing</u>			
<u>Sports Arena—Playing Area</u>	<u>Class I facility</u>			
	<u>Class II facility</u>			
	<u>Class III facility</u>			
	<u>Class IV facility</u>			
<u>Videoconferencing Studio</u>				
<u>Waiting Area</u>				
<u>All other</u>				

**TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES**

1	2	3	4	5
Primary Function Area	General Illumination Level (Lux)	Wall Display Lighting Power Density (W/ft)	Allowed Combined Floor Display Power and Task Lighting Power Density (W/ft <sup>2</sup> )	Allowed Ornamental/ Special Effect Lighting Power Density (W/ft <sup>2</sup> )
Auditorium Area	300			
Civic Meeting Place	300			
Convention, Conference, Multipurpose, and Meeting Center Areas	300			
Dining Areas	200			
Exhibit, Museum Areas	150			
Financial Transaction Area	300			
Grocery Store Area	500			
Hotel Function Area	400			
Lobby Area:				
Hotel lobby	200			
Main entry lobby	200			
Lounge Area	200			
Malls and Atria	300			
Religious Worship Area	300			
Retail Merchandise Sales, and Showroom Areas	400			
Theater Area:				
Motion picture	200			
Performance	200			
Transportation Function Area	300			
Waiting Area	300			

Table 140.6 D TAILORED LIGHTING POWER ALLOWANCES

1		2	3	4	5
Primary Function Area		General Illumination Level (Lux)	Wall Display Lighting Power Density (W/ft²)	Allowed Combined Floor Display Power and Task Lighting Power Density (W/ft²)	Allowed Ornamental/Special Effect Lighting Power Density (W/ft²)
<u>Convention, Conference, Multipurpose, and Meeting Center</u>		<u>300</u>			
<u>Dining Room/Foodservice</u>		<u>200</u>			
<u>Museum and Exhibit Presentation,</u>		<u>150</u>			
<u>Hotel</u>	<u>Lobby</u>	<u>200</u>			
	<u>Ballroom/Events</u>	<u>400</u>			
<u>Main entry lobby</u>		<u>200</u>			
<u>Religious Worship</u>		<u>300</u>			
<u>Retail Sales</u>	<u>Grocery &amp; Food Market</u>	<u>500</u>			
	<u>Merchandise &amp; Showrooms</u>	<u>400</u>			
<u>Theater</u>	<u>Motion picture</u>	<u>200</u>			
	<u>Performance</u>	<u>200</u>			

TABLE 140.6-E ADJUSTMENTS FOR MOUNTING HEIGHT ABOVE FLOOR

Height in feet above finished floor and bottom of luminaire(s)	Floor Display or Wall Display – Multiply by
<12'	1.00
TBD	TBD
12' to 16'	0.87
TBD	TBD
>16'	0.77
TBD	TBD

TABLE 140.6-G ILLUMINANCE LEVEL (LUX) POWER DENSITY VALUES (WATTS/FT²)

Illuminance Level (Lux)	RCR ≤ 2.0	RCR > 2.0 and ≤ 3.5	RCR > 3.5 and ≤ 7.0	RCR > 7.0
50	0.18	0.22	0.32	0.46
100	0.30	0.38	0.56	0.84
200	0.48	0.64	0.88	1.34
300	0.64	0.82	1.12	1.76
400	0.78	0.98	1.34	2.08
500	0.90	1.10	1.52	2.32
600	1.06	1.26	1.74	2.60
700	1.24	1.46	1.82	2.96
800	1.44	1.70	2.28	3.30
900	1.66	2.00	2.64	3.74
1000	1.84	2.20	2.90	4.06

## **APPENDIX 1-A**

### **STANDARDS AND DOCUMENTS REFERENCED IN THE ENERGY EFFICIENCY REGULATIONS**

#### **UNDERWRITERS LABORATORIES**

UL 181 Standard for Safety for Factory-made Air Ducts and Connectors (1996)  
UL 181A Standard for Safety for Closure Systems for Use with Rigid Air Ducts and Air Connectors (1994)  
UL 181B Standard for Safety for Closure Systems for Use with Flexible Air Ducts and Air Connectors (1995)  
UL 489 Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures (2016)  
UL 723 Standard for Test for Surface Burning Characteristics of Building Materials (1996)  
UL 727 Standard for Oil-Fired Central Furnaces (1994)  
UL 731 Standard for Oil-Fired Unit Heaters (1995)  
UL 1077 Standard for Supplementary Protectors for Use in Electrical Equipment (2015)  
UL 1574 Track Lighting Systems (2000)  
UL 1598 Standard for Luminaires (2000)  
UL 2108 Low Voltage Lighting Systems (2008)  
UL 8750 Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products (2016)

Available from: Underwriters Laboratories  
333 Pfingsten Road  
Northbrook, Illinois 60062-2096  
(847) 272-8800

## **2.2 Reference Appendices**

Modify or eliminate NA7.7.3 Track Lighting Integral Current Limiter." The primary data to be collected is whether claimed wattages listed in NRCC-LTI-01 are installed.

Consider whether to modify Nonresidential Appendix NA8 "Luminaire Power" to account for default LED luminaire wattages. This may be too varied to develop default values.