

PREScriptive APPROACH

1. Actual and Allowed LPD
2. Complete Building Method
3. Area Category Method
4. Tailored Method
5. Reduced Wattage Method for Alterations

This section contains exercises for lighting power adjustments, Complete Building Method, and Area Category Method. The exercises are designed to follow the forms and Certificates of Compliance for Nonresidential indoor Lighting.

THE COMPLIANCE PROCESS

There are two major steps to Title 24 compliance:

1. Meet all **mandatory requirements** by installing required controls and devices and ensuring that they have all of the required functionality.
2. Meet all **prescriptive or performance** requirements by ensuring that the *actual* lighting power installed in a space is less than the *allowed* lighting power for that space.

ACTUAL LIGHTING POWER

The **actual indoor lighting power** of the proposed building area is the total wattage of **all planned, permanent and portable lighting systems**, adjusted by the following:

1. Reduction of wattage through controls
2. Lighting wattage exclusions



Photo Credit: Color Kinetics

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SLIDE 93

SECTION 7

PRESCRIPTIVE APPROACH

Lighting Power Adjustment Factors (PAF)

Type of Control	Type of Area	Factor
a. To qualify for any of the Power Adjustment Factors in this table, the installation will comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below c. Lighting controls that are required for compliance with the Energy Standards shall not be eligible for a PAF		
Daylight Dimming plus OFF Control	Luminaires in skylit daylight zone or primary sidelit daylight zone	0.10
Occupant Sensing Controls in Large Open Plan Offices	In open plan offices > 250ft ² : One sensor controlling an area that is:	No larger than 125ft ²
		From 126 to 250ft ²
		From 251 to 500ft ²
Institutional Tuning	Luminaires in non-daylit areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.	0.10
	Luminaires in daylight areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.	0.05
Demand Responsive Control	All building types less than 10,000 sq. ft. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF	0.05

Table 140.6-A in the Energy Standards

ACTUAL LIGHTING POWER: REDUCTION THROUGH CONTROLS

If you **exceed** the mandatory controls requirements by installing a control where it is not required, you are eligible for a **Power Adjustment Factor (PAF)**. This will result in a lower calculated lighting power use for the installed system.

**(Controlled W) X (PAF from 140.6-A) =
Lighting Power Reduction**

For example, a 2000 ft² boutique with 1000 Watts of lighting enrolls in an ADR program with their local utility. They are eligible for a PAF of 0.05:

**1000 Watts X 0.05 =
50 Watts of excluded lighting power, or
950 Watts total**



Photo Credit: Soraa

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SLIDE 95

SECTION 7

PRESCRIPTIVE APPROACH

ACTUAL LPD: LIGHTING WATTAGE EXCLUDED

Wattage of many lighting applications may be excluded, including:

- Theme parks, dance floors, theatres, religious worship, dressing rooms, temporary exhibits, surgical lighting,
- Studio lighting for film or photography and for a videoconferencing studio
- Equipment that is for sale and for demonstration
- Lighting installed by the manufacturer in vending machines, scientific and industrial equipment, refrigerated cases, walk-in freezers, and food preparation equipment
- Lighting for plant growth or maintenance



Photo Credit: Philips



Photo Credit: Philips



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SLIDE 96

SECTION 7

PRESCRIPTIVE APPROACH

ALLOWED LIGHTING POWER

The **allowed** indoor lighting power for each building or area is calculated using one of the following methods:

- Complete Building Method
- Area Category
- Tailored Method

Each of these methods involves multiplying the square footage of a space by the allowed wattage per square foot for that space.

4/11/2017

SLIDE 97

SECTION 7

PRESCRIPTIVE APPROACH

COMPLETE BUILDING METHOD

The Complete Building Method may only be used on projects involving entire buildings with one primary type of use occupancy or in mixed use buildings or tenant spaces where 90% of the spaces is of one primary use.

(TABLE 140.6-B) X (floor area of entire building) = Allowed Lighting Power

Retail and wholesale stores, hotel/motel, and high-rise residential buildings **may not use this method.** 140.6(c)1A

4/11/2017

SLIDE 98

SECTION 7

PRESCRIPTIVE APPROACH



PREScriptive APPROACH IN PRACTICE

The following exercises are designed to follow the forms and certificates of compliance for Nonresidential Indoor Lighting.

They are on the California Energy Commission's website at

energy.ca.gov/title24/2016standards/nonresidential_manual.html.

NRCC-LTI-01-E	Indoor Lighting
NRCC-LTI-02-E	Indoor Lighting Controls
NRCC-LTI-03-E	Indoor Lighting Power Allowance
NRCC-LTI-04-E	Tailored Method
NRCC-LTI-05-E	Line-Voltage Track Lighting Worksheet
NRCC-LTI-06-E	Indoor Lighting Existing Conditions

4/11/2017

SLIDE 99

SECTION 8

PRESCRIPTIVE APPROACH



JONNY'S BOUTIQUE

Jonny's Boutique is a 767-square-foot clothing and accessory retail store.

GENERAL STORE INFORMATION

- 11.5-ft ceilings
- Total of 41.5 ft of floor-to-ceiling windows

SALES AREA: 612.5 FT²

- **General illumination**
- **Track lighting** for window display area and back wall display
- **Shelf lighting** for back shelves
- **Ornamental** pendants above the center display table
- **Adjustable downlights** for floor display lighting
- **Pendants** for task lighting above register



STOCK ROOM: 144.5 FT²

- **1x4 troffers** controlled by partial-ON occupant sensing control

4/11/2017

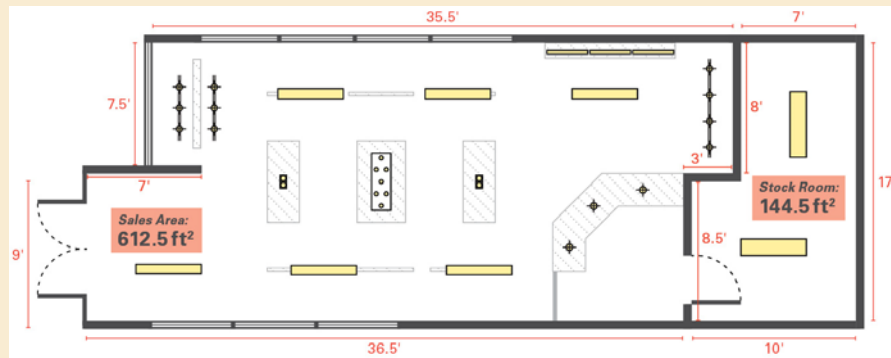
SLIDE 100

SECTION 8

PRESCRIPTIVE APPROACH



JONNY'S BOUTIQUE: 767 FT² RETAIL STORE



4/11/2017

SLIDE 101

SECTION 8

PRESCRIPTIVE APPROACH



INDOOR LIGHTING SCHEDULE

Symbol	Luminaire	Quantity	Watts	Total Watts	Efficacy (Lumens/Watt)
	4' SUSPENDED LINEAR PENDANT Lunera L7-G3	6	44	264	69
	RECTANGLE CANOPY WITH PENDANTS Tech Lighting Freejack Rectangle Canopy 7 Port Tibor Pendant	1-7 port mount 7 pendant	6	42	60
	4" ADJUSTABLE RECESSED DOWNLIGHT Juno IC LED Retrofit Eyeball Trim	4	11	44	54.5
	TRACK SYSTEM WITH LED HEADS* Tech Lighting Envision 18 W LED Head Nora Lighting Two-Circuit Track with NT-2358 / IA Current Limiter	2-4' tracks 3 heads each 1-6' track 4 heads	60 75	195	47
	UNDER-SHELF LIGHTING Tech Lighting Unilume Slimline	3	18	54	61
	PENDANT WAC Lighting Rocket	3	12	36	35
	1x4 RECESSED TROFFER Cree CR14	2	33	66	115

* Track system wattage calculated using Method 3 on "NRCC-LTI-05-E: Line-Voltage Track Lighting Worksheet"


Total Watts: 701 W

4/11/2017

SLIDE 102


SECTION 8

PRESCRIPTIVE APPROACH




EXERCISE: ACTUAL LIGHTING POWER

Required Forms:



NRCC-LTI-01-E:
Indoor Lighting




NRCC-LTI-02-E:
Indoor Lighting—Lighting Controls

4/11/2017

SLIDE 103

SECTION 8

PREScriptive APPROACH



C. SUMMARY TABLE (HOME BASE)


C. Summary of Allowed Lighting Power			
Conditioned and Unconditioned space Lighting must not be combined for compliance			
Indoor Lighting Power for Conditioned Spaces			
	Installed Lighting		Watts
01	→ NRCC-LTI-01-E, Table H, page 5	+	
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4	+	
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2	-	
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3)	=	0
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)			
05	Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1		
Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2			

4/11/2017

SLIDE 104


SECTION 7

PREScriptive APPROACH



C. INDOOR LIGHTING SCHEDULE AND FIELD INSPECTION ENERGY CHECKLIST

STATE OF CALIFORNIA
INDOOR LIGHTING
CSC NRCC-LTI-01-E (Revised 04/16)


CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-01-E
 (Page 5 of 6)

CERTIFICATE OF COMPLIANCE

Indoor Lighting

Project Name: **Jonny's Boutique** Date Prepared: **4/6/2017**

A Separate Lighting Schedule Must Be Filled Out for Conditioned and Unconditioned Spaces. Installed Lighting Power listed on this Lighting Schedule is only for:

☒ **CONDITIONED SPACE** ☐ **UNCONDITIONED SPACE**

→ **H. Indoor Lighting Schedule and Field Inspection Energy Checklist**


Luminaire Schedule		Installed Watts			Location		Field Inspector		
01	02	03	04	05	06	07		08	
Name or Item Tag	Complete Luminaire Description (i.e., 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	Watts per Luminaire	How wattage was determined CFL Output Non-NAS According to §160001	Number Luminaires	Total Installed Watts in this area (NEC Table 210.18)	Primary Function area in which these luminaires are installed		Pass	Fail
	4' suspended linear pendant	44W	<input checked="" type="checkbox"/>	6	264 W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	Rectangular pendant canopy w/ 7 pendants	6W	<input checked="" type="checkbox"/>	7	42W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	4" Adjustable downlights	11W	<input checked="" type="checkbox"/>	4	44W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	4' Track with 3 LED heads	60 W	<input checked="" type="checkbox"/>	1	60W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	4' track with 3 LED heads	60 W	<input checked="" type="checkbox"/>	1	60W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	6' track with 4 LED heads	75 W	<input checked="" type="checkbox"/>	1	72W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	Pendant	12W	<input checked="" type="checkbox"/>	3	36W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	Under-shelf lighting	18W	<input checked="" type="checkbox"/>	3	54W	Retail Merchandise Sales		<input checked="" type="radio"/>	<input type="radio"/>
	1x4 Recessed Troffer	33W	<input checked="" type="checkbox"/>	2	66W	Commercial Storage (conditioned)		<input checked="" type="radio"/>	<input type="radio"/>
INSTALLED WATTS PAGE TOTAL:					701 W	Enter sum total of all pages into NRCC-LTI-01-E, Page 2			

4/11/2017

SLIDE 105

SECTION 7

PREScriptive APPROACH



C. SUMMARY TABLE (HOME BASE)

C. Summary of Allowed Lighting Power

Conditioned and Unconditioned space Lighting must not be combined for compliance

Indoor Lighting Power for Conditioned Spaces

	Installed Lighting	Watts
01	NRCC-LTI-01-E, Table H, page 5	701 W
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4	0 W
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2	-
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3)	0
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)		
05	Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1	
<p>Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2</p>		

4/11/2017

SLIDE 106

SECTION 7

PREScriptive APPROACH

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LIGHTING CONTROL CREDITS

REQUIRED FORMS:

NRCC-LTI-02-E: Indoor Lighting—Lighting Controls

None of the 2016 PAF credits apply towards this retail design.

1. Determine the PAF using **Table 140.6-A**.


The PAF is N/A.

2. Calculate the watts of controlled lighting.

None of the lighting is controlled by a PAF-eligible strategy.

3. Multiply the watts of controlled lighting by the PAF to determine the control credit.

0 W of lighting control credits



MANDATORY AND PRESCRIPTIVE INDOOR LIGHTING CONTROL SCHEDULE, PAF CALCULATION, AND FIELD INSPECTION CHECKLIST

STATE OF CALIFORNIA
INDOOR LIGHTING – LIGHTING CONTROLS
CEC/NRCC-LTI-02-E (Revised 01/16)

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-02-E
(Page 2 of 3)

CERTIFICATE OF COMPLIANCE
Indoor Lighting - Lighting Controls
Project Name: Jonny's Boutique
Date Prepared: 4/6/2017

A separate document must be filled out for Conditioned and Unconditioned Spaces. This page is used only for the following:
☐ CONDITIONED SPACES ☐ UNCONDITIONED SPACES

→

B. Mandatory and Prescriptive Indoor Lighting Control Schedule, PAF Calculation, and Field Inspection Checklist

Lighting Control Schedule			Standards Complying With ¹ (✓ all that apply, or leave empty if Exempted)								PAF Credit Calculation ²				Field Inspector Pass	Fail
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15		
Location in Building	Type/Description of Lighting Control (i.e.: occupancy sensor, automatic time switch, dimmer, automatic daylight, etc.)	# of Units	\$130.1(a)	\$130.1(b)	\$130.1(c)	\$130.1(d)	\$130.1(e)	\$130.1(f)	\$140.6(a)							
Control Credit PAGE TOTAL (Sum of Column 13):										0						
IF MULTIPLE PAGES ARE USED, ENTER SUM TOTAL OF Control Credit for all pages HERE (Sum of all Column 13):																
															Enter Control Credit total into NRCC-LTI-01-E, Page 1.	


1. \$130.1(a) = Manual area controls; \$130.1(b) = Multi Level; \$130.1(c) = Auto Shut-Off; \$130.1(d) = Mandatory Daylight; \$130.1(e) = Demand Responsive; \$140.6(a) = Additional lighting controls installed to earn a PAF; \$140.6(d) = Prescriptive Secondary Sidelight Daylight Controls.
2. Check Table 140.6-A for correct Factor. PAFs shall not be traded between conditioned and unconditioned spaces. As a condition to earn a PAF, an Installation Certificate is also required to be filled out, signed, and submitted.

4/11/2017

SLIDE 109

SECTION 7

PRESCRIPTIVE APPROACH



C. SUMMARY TABLE (HOME BASE)

C. Summary of Allowed Lighting Power

Conditioned and Unconditioned space Lighting must not be combined for compliance

Indoor Lighting Power for Conditioned Spaces

	Installed Lighting	Watts
01	NRCC-LTI-01-E, Table H, page 5	701 W
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4	0 W
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2	0 W
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3)	701 W
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)		
05	Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1 Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2	

Indoor Lighting Power for Unconditioned Spaces

4/11/2017

SLIDE 110

SECTION 7

PRESCRIPTIVE APPROACH

AREA CATEGORY METHOD

Section 140.6(c)2



AREA CATEGORY METHOD

The total allowed lighting power for the building is the sum of all allowed lighting powers for all areas in the building. An “area” is all adjacent spaces which are associated with a single function type listed in **TABLE 140.6-C**.

$(\text{TABLE 140.6-C}) \times (\text{floor area of area}) = \text{Allowed Lighting Power for that area}$



ADDITIONAL POWER ALLOTMENTS

Additional lighting power is allowed under the Area Category Method for:

- Adjustable or directional accent, display and feature lighting
- Ornamental lighting
- Decorative lighting



Photo Credit: GE Lighting



Photo Credit: Tech Lighting



Photo Credit: Tech Lighting

4/11/2017

SLIDE 113

SECTION 7

PRESCRIPTIVE APPROACH

TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT²)

PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER DENSITY (W/ft ²)	PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER DENSITY (W/ft ²)
Auditorium Area	1.40 ³	Library Area	Reading areas 1.1 ³
Auto Repair Area	0.90 ²		Stack areas 1.5 ³
Beauty Salon Area	1.7	Lobby Area	Hotel lobby 0.95 ³
Civic Meeting Place Area	1.3 ³		Main entry lobby 0.95 ³
Classroom, Lecture, Training, Vocational Areas	1.2 ⁵	Locker/Dressing Room	0.70
Commercial and Industrial Storage Areas (conditioned and unconditioned)	0.60	Lounge Area	0.90 ³
Commercial and Industrial Storage Areas (refrigerated)	0.7	Malls and Atria	0.95 ²
Convention, Conference, Multipurpose and Meeting Center Areas	1.2 ³	Medical and Clinical Care Area	1.2
Corridor, Restroom, Stair, and Support Areas	0.60	Office Area	> 250 square feet 0.75
Dining Area	1.0 ³		≤ 250 square feet 1.0
Electrical, Mechanical, Telephone Rooms	0.55 ²	Parking Area ¹⁰	0.14
Exercise Center, Gymnasium Areas	1.0	Parking Garage Area	Dedicated Ramps 0.30
Exhibit, Museum Areas	1.8		Daylight Adaptation Zones ⁹ 0.60
Financial Transaction Area	1.0 ³	Religious Worship Area	1.5 ³
General Commercial and Industrial Work Areas	Low bay 0.9 ² High bay 1.0 ² Precision 1.2 ⁴	Retail Merchandise Sales, Wholesale Showroom Areas	1.2 ^{6 and 7}
Grocery Sales Area	1.2 ^{6 and 7}	Theater Area	Motion picture 0.90 ³ Performance 1.4 ³

4/11/2017

SLIDE 114

SECTION 7

PRESCRIPTIVE APPROACH

Hotel Function Area	1.4 ³	Transportation Function Area	Concourse & Baggage Ticketing	0.50 1.0
Kitchen, Food Preparation Areas	1.2	Videoconferencing Studio		1.2 ⁸
Laboratory Area, Scientific	1.4 ¹	Waiting Area		0.80 ³
Laundry Area	0.70	All other areas		0.50

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 ² of task area unless otherwise noted)
1	Specialized task work	0.20 W/ft ²
2	Specialized task work	0.50 W/ft ³
3	Ornamental lighting as defined in Section 100.1 and in accordance with Section 140.6(c)2.	0.50 W/ft ²
4	Precision commercial and industrial work	1.0 W/ft ²
5	Per linear foot of white board or chalk board.	5.5 W per linear foot
6	Accent, display and feature lighting - luminaires shall be adjustable or directional	0.30 W/ft ²
7	Decorative lighting - primary function shall be decorative and shall be in addition to general illumination	0.20 W/ft ²
8	Additional Videoconferencing Studio lighting complying with all of the requirements in Section 140.6(c)2Gvii.	1.5 W/ft ²
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.

4/11/2017 SLIDE 115 SECTION 7 PRESCRIPTIVE APPROACH



EXERCISE: AREA CATEGORY

Required Forms:

[illegible]

NRCC-LTI-03-E: Indoor Lighting Power Allowances

4/11/2017 SLIDE 116 SECTION 8 PRESCRIPTIVE APPROACH



LIGHTING POWER ALLOWANCE

REQUIRED FORMS:

NRCC-LTI-03-E: Indoor Lighting Power Allowance

There are two function areas in this space according to **Table 140.6-C**

- Retail Merchandise Sales, Wholesale Showroom Area
- Commercial and Industrial Storage Areas (conditioned and unconditioned)

1. Determine the watts per square foot, per function area, according to **Table 140.6-C**.

Retail Merchandise Sales, Wholesale Showroom Areas: 1.2 ft²

Commercial and Industrial Storage Areas (conditioned and unconditioned): **0.6 ft²**

2. Multiply the watts per square foot by the area of the spaces.

$$1.2 \text{ W / ft}^2 \times 612.5 \text{ ft}^2 = 735 \text{ W}$$

$$0.6 \text{ W / ft}^2 \times 144.5 \text{ ft}^2 = 86.7 \text{ W}$$

- 3. Total the allowed watts.**

$$735 \text{ W} + 86.7 \text{ W} = 821.7 \text{ W}$$

4/11/2017

SLIDE 117

SECTION 8

PRESCRIPTIVE APPROACH



C-2. AREA CATEGORY METHOD

GENERAL LIGHTING POWER ALLOWANCE

STATE OF CALIFORNIA
INDOOR LIGHTING POWER ALLOWANCE

CEC-NROC-LT103-E (Revised 04/16)

Certificate of Compliance - Indoor Lighting Power Allowance

Project Name:

Date Prepared:

CALIFORNIA ENERGY COMMISSION

NRCC-LTI-03-E

(Page 2 of 4)

A separate page must be filled out for Conditioned and Unconditioned Spaces. This page is only for:

☐ **CONDITIONED** spaces

- UNCONDITIONED spaces

C-2 AREA CATEGORY METHOD GENERAL LIGHTING POWER ALLOWANCE

- Do not include portable lighting for offices. Portable lighting for offices shall be documented only in Section G of NRCC-LTI-01-E.
- Separately list lighting for each primary function area as defined in §100.1 of the Standards.

01 AREA CATEGORY (From §140.6 Table 140.6-C)		02 WATTS PER ft²	X	03 AREA (ft²)	=	04 ALLOWED WATTS
Location in Building	Primary Function Area per Table 140.6-C					
Sales Area	Retail Merchandise Sales	1.2		612.5 ft²		735 W
Stock Room	Commercial Storage	0.6		144.5 ft²		86.7 W
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
TOTALS				0		821.7 W

Enter sum total Area Category allowed watts into section C-1 of NRCC-LI-03-E (this compliance document)

WATTS

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance

4/11/2017

SLIDE 118

SECTION 6

PRESCRIPTIVE APPROACH



ADDITIONAL LIGHTING WATTAGE ALLOWANCE

REQUIRED FORMS:

NRCC-LTI-03-E: Indoor Lighting Power Allowance

According to the footnotes in **Table 140.6-C**, there are two lighting types that qualify for additional lighting wattage allowances:

- Decorative Lighting
- Display Lighting

1. Determine the additional watts allowed according to the footnotes in **Table 140.6-C**.

Decorative Lighting: 0.2 W

Display Lighting: 0.3 W

2. Determine the square feet of the sales area.

612.5 ft²

3. Calculate the wattage allowance by multiplying the square feet of the sales area by the additional watts allowed.

Decorative Lighting: $612.5 \text{ ft}^2 \times 0.2 \text{ W} = 122.5 \text{ W}$

Display Lighting: $612.5 \text{ ft}^2 \times 0.3 \text{ W} = 183.75$

4. Choose the smaller of either the newly calculated allowed watts or the total design watts of the luminaire.

42 W for decorative lighting and 183.75 W for display lighting, totaling **225.75 W of additional allowed lighting wattage.**

4/11/2017

SLIDE 119

SECTION 8

PRESCRIPTIVE APPROACH



C-3. AREA CATEGORY METHOD

ADDITIONAL LIGHTING WATTAGE ALLOWANCE

C-3 AREA CATEGORY METHOD ADDITIONAL LIGHTING ALLOWANCE (from Table 140.6-C Footnotes)							
G1	G2	G3 ¹	G4	G5		G6	G7
Primary Function	Sq Ft or Linear Ft. ²	Additional Watts Allowed	Wattage Allowance (G2 x G3)	Description(s) and Quantity of Special Luminaire Types in each Primary Function Area		Total Design Watts ³	ALLOWED WATTS Smaller G4 or G6
Decorative	612.5 R ²	0.2	122.5W	Rectangular pendant canopy w/ 7 pendants		42 W	42 W
Display	612.5 R ²	0.3	183.75W	Track Lighting, adjustable downlights, shelf lighting		293 W	183.75 W
			0				
			0				
			0				
			0				
			0				
			0				
			0				
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			0				
			0				
			0				
			0				
			0				
			0				
TOTALS – Enter into TOTAL AREA CATEGORY METHOD ADDITIONAL ALLOWANCES – Section C-1							225.75 W

- Use linear feet only for additional allowance for white board or chalk board. All other additional Area Category allowances shall use watts per square foot.
- Additional watts are available only when allowed according to the footnotes on bottom of Table 140.6-C, which include: Specialized task work; Ornamental lighting; Precision commercial and industrial work; Per linear foot of white board or chalk board; Accent, display and feature lighting; and Videoconferencing studio lighting.
- Luminaire classification and wattage shall be determined in accordance with §130.0(c)(1) of the Standards.

4/11/2017

SLIDE 120

SECTION 8

PRESCRIPTIVE APPROACH



TOTAL LIGHTING POWER ALLOWANCE

REQUIRED FORMS:

NRCC-LTI-03-E: Indoor Lighting

Calculate the allowed installed lighting power.

$$(\text{General Lighting Power Allowance}) + (\text{Additional Lighting Wattage Allowance}) \\ = \text{Allowed Lighting Power}$$

$$821.7 \text{ W} + 225.75 \text{ W} = 1,047.45 \text{ W}$$

4/11/2017

SLIDE 121

SECTION 8

PRESCRIPTIVE APPROACH



C-1. AREA CATEGORY METHOD TOTAL LIGHTING POWER ALLOWANCES

STATE OF CALIFORNIA
INDOOR LIGHTING POWER ALLOWANCE
CERTIFICATE OF COMPLIANCE (Revised 04/16)

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-03-E
(Page 1 of 4)

Project Name: _____ Date Prepared: _____

A separate page must be filled out for Conditioned and Unconditioned Spaces. This page is only for:
☐ CONDITIONED spaces ☐ UNCONDITIONED spaces

A. SUMMARY TOTALS OF LIGHTING POWER ALLOWANCES

If using Complete Building Method for compliance, use only the total in column (a) as total allowed building watts.
 If using Area Category Method, Tailored Method, or a combination of Area Category and Tailored Method for compliance, use only the total in column (b) as the total allowed building watts.

	(a)	(b)
01 Complete Building Method Allowed Watts. Documented in section B of NRCC-LTI-03-E (below on this page)	0	
02 Area Category Method Allowed Watts. Documented in section C-1 of NRCC-LTI-03-E (below on this page)		1,047.45 W
03 Tailored Method Allowed Watts. Documented in section A of NRCC-LTI-04-E		
TOTAL ALLOWED BUILDING WATTS. Enter number into correct cell on NRCC-LTI-01, Page 2, Row 1	0	0

☐ Check here if building contains both conditioned and unconditioned areas.


B. COMPLETE BUILDING METHOD LIGHTING POWER ALLOWANCE

01	02	03	04
TYPE OF BUILDING (From §140.6 Table 140.6-B)	WATTS PER ft^2	COMPLETE BLDG. AREA	ALLOWED WATTS
	X	=	
Total Area:			0
Total Watts. Enter Total Watts into section A, row 1 (Above on this page).			0

C-1 AREA CATEGORY METHOD TOTAL LIGHTING POWER ALLOWANCES

	Watts
Total from section C-2:	821.7 W
Total from section C-3:	225.75 W
Total Watts. Enter Total Watts into section A, row 2 (Above on this page).	1,047.45 W

For Alterations Only – Reduced lighting power option (Total Allowed Watts x 0.85). Enter this value into section A, row 2 if using this option.



C. SUMMARY TABLE (HOME BASE)

C. Summary of Allowed Lighting Power			
Conditioned and Unconditioned space Lighting must not be combined for compliance			
Indoor Lighting Power for Conditioned Spaces			
		Watts	
01	Installed Lighting NRCC-LTI-01-E, Table H, page 5	+	701 W
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4	+	0 W
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2	-	0 W
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3)	=	701 W
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)			
05	Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1 Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2		1,047.45 W

Indoor Lighting Power for Unconditioned Spaces

		Watts
06	Installed Lighting NRCC-LTI-04-E, Table I, page 5	
07	Mean Lighting Control Credits NRCC-LTI-02-E, page 2	
08	Adjusted Installed Lighting Power (row 6 plus row 7)	
Complies ONLY if Installed ≤ Allowed (row 04 < row 08)		
09	Allowed Lighting Power Unconditioned NRCC-LTI-05-E, page 3	
Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires may instead use the allowed wattage from NRCC-LTI-06, page 2		


✓ Our lighting plan is compliant.

4/11/2017

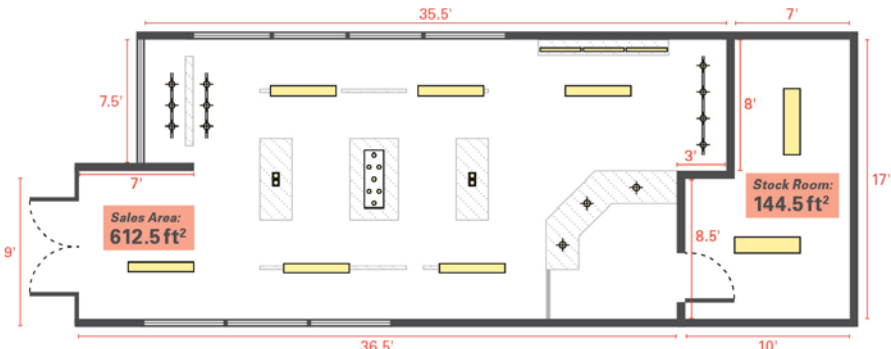
SLIDE 123

SECTION 8

PRESCRIPTIVE APPROACH



REDUCED WATTAGE COMPLIANCE PATHWAY



The diagram shows a floor plan with a Sales Area of 612.5ft² and a Stock Room of 144.5ft². Dimensions include 35.5', 7', 17', 10', 8.5', 3', 7.5', 9', and 7'. The Sales Area is a large rectangle with a semi-circular extension on the left. The Stock Room is a smaller rectangle on the right. Lighting fixtures are indicated by yellow rectangles and black dots.

SECTION 8

TITLE 24 TRIGGERS – INTERIOR ALTERATIONS

2016 Indoor Luminaire Component Modification: ≥ 70 per floor/tenant per year changed fixtures: 3 or more fixtures per room				
Entire Luminaire Alterations: $\geq 10\%$ moved, changed, replaced fixtures: 3 or more fixtures per room				
Mandatory Control	Table 141.0-E		Reduced installed wattage from existing method* §141.0(b)2Jii	Adding to connected load or remodeling
	Reduced LPD (§140.6) $\leq 85\%$ of allowable	Reduced LPD (§140.6) $> 85-100\%$ of allowable		
Area device (on/off): §130.1(a)1,2,3	Yes <i>Excluding 130.1(a)4: separately controlled lighting systems.</i>	Yes <i>Excluding 130.1(a)4: separately controlled lighting systems.</i>	Yes <i>Excluding 130.1(a)4: separately controlled lighting systems.</i>	Yes
Multi-level control: §130.1(b)	Yes <i>2 level or 130.1(b) Only for modified luminaires</i>	Yes <i>Only for modified luminaires</i>	No	Yes
Auto shut-off control: §130.1(c)	Yes	Yes	Yes: auto shut-off all building types. Partial-OFF required for warehouse and parking garages Partial-OFF excluded at: 130.1(c)6B: libraries / 130.1(c)6C: 7A stairs/corridors 130.1(c)8: Hotel/Motel guest rm 30 min. controls N/A	Yes
Daylighting control: §130.1(d)	No	Yes <i>Only for modified luminaires</i>	No	Yes
Demand response: §130.1(e)	No	Yes	No	Yes

*50% Office, retail and hotel occupancies / *35% All other occupancies

Acceptance test technician required when any number of controls for ≥ 20 fixtures being added for project

125

50/35 REDUCED WATTAGE METHOD

New compliance pathway for 2016 standards:


- A retrofit project may bypass additional multilevel and some occupancy control requirements by installing new products that achieve a minimum of 35% power reduction at full output as compared to the luminaires they replaced.
- For **hotel, office and retail** occupancies, the reduction must be **at least 50%**.
- New form introduced for this compliance pathway

2016-NRCC-LTI-06-E

126

2016-NRCC-LTI-06-E

STATE OF CALIFORNIA
INDOOR LIGHTING EXISTING CONDITIONS
CEC-NRCC-LTI-06-E (Revised 04/16)


 CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE

NRCC-LTI-06-E

Indoor Lighting Existing Conditions

Page 1 of 2

Project Name:

Date Prepared:

A. General Information

Project Address:

B. Existing Luminaire Schedule

Alterations in which replacement luminaires have at least 50/35 percent lower power consumption compared to the original luminaires. (Exceptions to 141.0(b)(2)(ii) or 141.0(b)(2)(iii))

Fill out LTI-06, LTI-01, LTI-02, and LTI-05. Use LTI-06 Table B, to record the information of the original, existing luminaires. Use LTI-01 Table H, to record information of the replacement luminaires, and luminaires with component modifications.

Name of the space with the alteration:

01	02	03	04		05	06
Name or Item Tag	Luminaire Description	Wattage per Luminaire	How Wattage was Determined		Quantity of Luminaires	Total Wattage (Quantity x Wattage per Luminaire) (03 x 05)
			CEC default from NAB	According to §130.0 (c)		
4-lamp T8, 32 W, 2x4, Rapid Start Ballast, Normal Output		114 W	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13	1482 0
Total Installed Watts:						0

Add Row
Delete Row

141.0(b)(2)(ii) or 141.0(b)(2)(iii):

For alterations using the 50/35 percent power reduction compliance option in Section 141.0(b)(2)(ii) or 141.0(b)(2)(iii), multiply the **Total Installed Wattage** by a multiplier of 0.50 or 0.65 and enter the adjusted value in the box to the right.

Use 0.50 for office, retail, and hotel occupancies. Use 0.65 for all other occupancies.

Enter this value in Form NRCC-LTI-01-E, Table C, Cell 05 (Allowed Indoor Lighting Power).

127

741

Watts

C. SUMMARY TABLE (HOME BASE)

C. Summary of Allowed Lighting Power

Conditioned and Unconditioned space Lighting must not be combined for compliance

Indoor Lighting Power for Conditioned Spaces		
		Watts
01	Installed Lighting NRCC-LTI-01-E, Table H, page 5	701 W
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4	0 W
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2	0 W
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3)	701 W
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)		
05	Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1	741 W

✓ Our lighting plan is compliant.

4/11/2017

SLIDE 128

SECTION 8

PREScriptive APPROACH

TAILORED METHOD

4/11/2017

SLIDE 129

SECTION 7

PRESCRIPTIVE APPROACH

TAILORED METHOD

This is the most granular of the three methods.

- Allowances for each area (just like area category)
- Allowances for display and task lighting within an area

Allowed lighting power is determined by the occupancy type and the physical characteristics (e.g. ceiling height) of a space.

See **Table 140.6-D** for details.

4/11/2017

SLIDE 130

SECTION 7

PRESCRIPTIVE APPROACH

TAILORED METHOD

This is the most granular of the three methods.

- Allowances for each area (just like area category)
- Allowances for display and task lighting within an area

Allowed lighting power is determined by the occupancy type and the physical characteristics (e.g. ceiling height) of a space.

See **Table 140.6-D** for details.

4/11/2017

SLIDE 131

SECTION 8

PRESCRIPTIVE APPROACH

TAILORED METHOD

Areas with high ceilings have high room cavity ratios (RCR), making them more difficult to light. The Tailored Method allows greater LPD allowances for areas with an RCR greater than 2.0

The Tailored Method may only be used for space types listed in **Table 140.6-D** of the standards. Within the retail sector, these space types include:

- Merchandise sales areas
- Showroom areas
- Malls and atria

Retail space types, or “primary function areas,” not listed in Table 140.6-D, such as dressing rooms, stock rooms and restrooms, must follow the Area Category Method of compliance.

4/11/2017

SLIDE 132

SECTION 8

PRESCRIPTIVE APPROACH

GENERAL LIGHTING POWER ALLOTMENTS

Under the Tailored Method, general lighting power allotments are tailored to each space, or area, based on the dimensions of the space, including ceiling height, and IES-recommended illumination levels.

General Lighting Trade-Offs

Trade-offs must be documented using compliance forms and must be kept within conditioned areas or within unconditioned areas. Trade-offs are allowed:

- From one conditioned area using the Tailored Method to another conditioned area using either the Tailored or Area Category Method
- From one unconditioned area using the Tailored Method to another unconditioned area using either the Tailored or Area Category Method

4/11/2017

SLIDE 133

SECTION 8

PRESCRIPTIVE APPROACH

ADDITIONAL LIGHTING POWER ALLOTMENTS

The Tailored Method adds additional lighting power allowances for:

- Wall display lighting
- Floor display and task lighting (combined)
- Ornamental/special effects lighting
- Very valuable display case lighting

These lighting power allowances cannot be used in any space other than the display or task area (use it or lose it!). Any wattage not covered by these allowances must be deducted from the general lighting allowance for that area.

4/11/2017

SLIDE 134

SECTION 8

PRESCRIPTIVE APPROACH

LIGHTING POWER ALLOWANCES

Primary Function Area	General Illumination Level	ALLOWED POWER			
		Wall Display	Floor Displays, Internal Display Case and Task	Ornamental and Special Effects	Very Valuable Display Case*
Retail Merchandise Sales Areas and Wholesale Showroom Areas	400lx	14 W/ft ²	1 W/ft ²	0.5 W/ft ²	THE LEAST OF: • Primary Function area x 0.8 W/ft ² • Display case area x 12 W/ft ² OR Total lighting power for the case
Malls and Atria	300lx	3.5 W/ft ²	0.5 W/ft ²	0.5 W/ft ²	
Waiting Area	300lx	3.15 W/ft ²	0.2 W/ft ²	0.5 W/ft ²	

Based on Table 140.6-D in the standards

* The maximum lighting power allotment for very valuable display case lighting is the lowest product of the three calculations listed in the table above. Note that cases qualifying as very valuable display cases are different from display cases grouped with floor displays (see **Sections 140.6(c)3Liii** and **140.6(c)3Liv**). Additional lighting power allotments for valuable display case lighting must be documented on compliance forms.

4/11/2017

SLIDE 135

SECTION 8

PRESCRIPTIVE APPROACH

ROOM CAVITY RATIO

The RCR must be calculated for any function area using the Tailored Method. **Section 140.6-F** of the standards provides the equations for the calculations.

The RCR is based on the entire space bounded by floor-to-ceiling partitions. If a task area with a larger space is not bounded by floor-to-ceiling partitions, the RCR of the entire space must be used for the task area.

Room Cavity Ratio (RCR) Equations

Determine the Room Cavity Ratio using one of the following equations

Room cavity ratio for rectangular rooms

$$RCR = \frac{5 \times H \times (L + W)}{L \times W}$$

Room cavity ratio for irregularly shaped rooms

$$RCR = \frac{2.5 \times H \times P}{A}$$

H = Vertical distance from the work plane to the center line of the lighting fixture
 L = Length W = Width P = Perimeter A = Area of the room

Table 140.6-F in the standards

4/11/2017

SLIDE 136

SECTION 8

PRESCRIPTIVE APPROACH



EXERCISE: TAILORED METHOD

Required Forms:

The form is titled 'NRCC-LTI-04-E: Tailored Method' and includes sections for room data entry and calculations. It contains tables for room data and a summary table at the bottom.

NRCC-LTI-04-E: Tailored Method

4/11/2017

SLIDE 137

SECTION 8

PRESCRIPTIVE APPROACH



ROOM CAVITY RATIO

REQUIRED FORMS:

NRCC-LTI-04-E: Tailored Method

Use the calculation for irregular-shaped rooms in **Table 140.6-E**

$$\text{RCR} = \frac{2.5 \times H \times P}{A}$$

Room cavity ratio for irregularly shaped rooms

1. Determine the room area (A) of the sales area.

612.5 ft²

2. Determine the room perimeter (P).

108.5 ft

3. Determine the room cavity height (H).

11.5 ft

4. Calculate the RCR by using the room cavity ratio equation for irregular shaped rooms.

$$(2.5 \times 11.5 \text{ ft} \times 108.5 \text{ ft}) / 612.5 \text{ ft}^2 = 5.1$$

4/11/2017

SLIDE 138

SECTION 8

PRESCRIPTIVE APPROACH



ROOM CAVITY RATIO (RCR) WORKSHEET

ROOM CAVITY RATIO (RCR) WORKSHEET					
RECTANGULAR SPACES					
01	02	03	04	05	06
Room Number	Task/Activity Description	Room Length (L) (ft)	Room Width (W) (ft)	Room Cavity Height (H) (ft)	RCR $5 \times H \times (L+W) / (L \times W)$
NON-RECTANGULAR SPACES					
01	02	03	04	05	06
Room Number	Task/Activity Description	Room Area (A) (ft ²)	Room Perimeter (P) (ft)	Room Cavity Height (H) (ft)	RCR $2.5 \times H \times P / A$
	Retail Merchandise Sales	612.5 ft ²	108.5 ft	11.5 ft	5.1

4/11/2017

SLIDE 139

SECTION 8

PRESCRIPTIVE APPROACH



ALLOWED GENERAL LIGHTING POWER

REQUIRED FORMS:

NRCC-LTI-04-E: Tailored Method

According to **Table 140.6-E**, this retail store can be classified as "Retail Merchandise Sales, and Showroom Areas."

- The stock room is not listed as a primary function area so this must be calculated using the Area Category Method

1. Determine the illuminance value using **Table 140.6-D**.

400 lx

2. Use the RCR to determine the allowed LPD using **Table 140.6-G**.

The RCR is 5.1. The RCR is > 3.5 and ≤ 7.0 and the illuminance level is 400 so the allowed LPD is 1.34.

3. Multiply the allowed LPD by the floor area.

$1.34 \times 612.5 \text{ ft}^2 = 820.75 \text{ W allowed LPD}$

4/11/2017

SLIDE 140

SECTION 8

PRESCRIPTIVE APPROACH



B. TAILORED METHOD ALLOWED GENERAL LIGHTING POWER

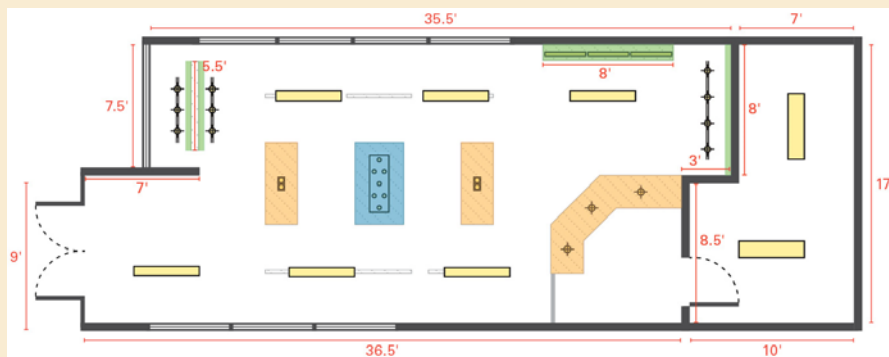
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4/11/2017 SLIDE 141

PRESCRIPTIVE APPROACH



ADDITIONAL LIGHTING POWER ALLOWANCES




4/11/2017

SLIDE 142

SECTION 8

PRESCRIPTIVE APPROACH



WALL DISPLAY LIGHTING


REQUIRED FORMS:
NRCC-LTI-04-E: Tailored Method

Wall Display Lighting in this retail space include:

- Track Lighting
- Shelf Lighting

Refer to “D-1. Additional Allowed Lighting Power for Wall Display Lighting”

4/11/2017SLIDE 143SECTION 8PRESCRIPTIVE APPROACH



D-1. ADDITIONAL ALLOWED LIGHTING POWER FOR WALL DISPLAY LIGHTING

STATE OF CALIFORNIA
CERTIFICATE OF COMPLIANCE
CSC NRCC-LTI-04-E (Revised 01/16)

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-04-E
(Page 2 of 7)

Project Name: _____ Date Required: _____

Complete separate documents for Conditioned and Unconditioned Spaces.
This page is used to document: ☐ CONDITIONED SPACES ☐ UNCONDITIONED SPACES

D. TAILORED METHOD ADDITIONAL “USE IT OR LOSE IT” LIGHTING POWER ALLOWANCES

☐ Use this section to document and calculate additional lighting power for wall display, floor display, task, ornamental, special effects, or very valuable display case lighting.

☐ The additional lighting power allowance shall be the smaller of the allowed lighting power or the actual lighting power used.

☐ These additional lighting power allowances shall not be available when using §140.6(c)(3)H to determine the general lighting power allowance, when using the Complete Building Method, or for any areas using the Area Category Method.

D-1. ADDITIONAL ALLOWED LIGHTING POWER FOR WALL DISPLAY LIGHTING

☐ Floor displays shall not qualify for the wall display lighting power allowance.

☐ Qualifying wall lighting complies with the applicable requirements in §140.6(c)(3)I.

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
Primary Function Area	Wall Display Length in (Linear Feet)	Wall Display Power (W/lin foot)	Allotted Watts (10 x D3)	DESIGN WATTS						
				Luminaire Code	Mounting Height	Mounting Height Factor	Watts per Luminaire	# Luminaires	Design Watts (D7 x D8 x D9)	Allowed Watts (smaller of D4 or D10)
Retail Merchandise Sales	5.5ft	14w/ft ²	77		< 12 feet	1.00	18	3	54	54W
					12 feet to 2 1/2 feet	0.87				
					2 1/2 feet to 2 1/2 feet	0.77				
				Total for this Primary Function Area:			0			
Retail Merchandise Sales	5.5ft	14w/ft ²	77		< 12 feet	1.00	18	3	54	54W
					12 feet to 2 1/2 feet	0.87				
					2 1/2 feet to 2 1/2 feet	0.77				
				Total for this Primary Function Area:			0			
Retail Merchandise Sales	8ft	14w/ft ²	112		< 12 feet	1.00	18	4	72	72W
					12 feet to 2 1/2 feet	0.87				
					2 1/2 feet to 2 1/2 feet	0.77				
				Total for this Primary Function Area:			0			
Retail Merchandise Sales	8ft	14w/ft ²	112		< 12 feet	1.00	18	3	54	54W
					12 feet to 2 1/2 feet	0.87				
					2 1/2 feet to 2 1/2 feet	0.77				
				Total for this Primary Function Area:			0			
Sum total power for wall display lighting for all function areas:										

GA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

Sum total for wall display lighting 234 W

4/11/2017SLIDE 144SECTION 8PRESCRIPTIVE APPROACH



FLOOR DISPLAY AND TASK LIGHTING

REQUIRED FORMS:

NRCC-LTI-04-E: Tailored Method

Floor Display and Task Lighting in this retail space include:

- Adjustable recessed downlights
- Pendants

Refer to “D-2. Additional allowed lighting power for combined floor display and task lighting”

4/11/2017

SLIDE 145

SECTION 8

PRESCRIPTIVE APPROACH



D-2. ADDITIONAL ALLOWED LIGHTING POWER FOR COMBINED FLOOR DISPLAY AND TASK LIGHTING

STATE OF CALIFORNIA
TAILORED METHOD
DEC-IRC-04-04-E (Revised 01/16)

CERTIFICATE OF COMPLIANCE
Indoor Lighting – Tailored Method

Page Name: _____ Date Prepared: _____

Complete separate documents for Conditioned and Unconditioned Spaces.
This page is used to document: ☐ CONDITIONED SPACES ☐ UNCONDITIONED SPACES

D-2. ADDITIONAL ALLOWED LIGHTING POWER FOR COMBINED FLOOR DISPLAY AND TASK LIGHTING

☐ Displays that are installed against a wall shall not qualify for the floor display lighting power allowances.

☐ Additional allowed power for floor display lighting, and additional allowed power for task lighting, may be used by qualifying floor display lighting systems, qualifying task lighting systems, or a combination of both. For floor areas qualifying for both floor display and task lighting power allowances, the additional allowed power shall be used only once for the same floor area, so that the allowance shall not be additive.

☐ Qualifying floor display lighting complies with the applicable provision in §140.6(c)(3)(iv) and (v).

☐ Additional allowed power for a combination of floor display lighting and task lighting shall be available only for (i) floors having floor displays; or (ii) floors not having floor displays but having tasks having illuminance recommendations that appear in the Tenth Edition of the IES Lighting Handbook and that are higher than the general lighting level in column 2 of TABLE 140.6-D. The square footage of floor display or the square footage of task areas shall be determined in accordance with §140.6(c)(3)(c) and (d), except that any floor area designed to not have floor displays or tasks, such as floor areas designated as a path of egress, shall not be included for the floor display allowance.

01	02	03	04	05	06	07	08	09	10	11
Primary Function Area	ALLOTTED WATTS			DESIGN WATTS						
	Square Feet of Area	Lighting Power (W/ft²)	Alotted Watts (02 x 03)	Luminaire Code	Mounting Height	Mounting Height Factor	Watts per Luminaire	# Luminaires	Design Watts (07 x 08 x 09)	Allowed Watts (smaller of 04 or 10)
Retail Merchandise Sales	612.5 ft²	1.0 W/ft²	612.5 W	4"	< 12 feet	1.00	11 / 12	4 / 3	44 / 36	
				Downlight/Pendant	12 feet to	0.87				0
					≥ 16 feet	0.77				0
					Total for this Primary Function Area					80 W
			0		< 12 feet	1.00				0
					12 feet to	0.87				0
					≥ 16 feet	0.77				0
					Total for this Primary Function Area					0
			0		< 12 feet	1.00				0
					12 feet to	0.87				0
					≥ 16 feet	0.77				0
					Total for this Primary Function Area					0
Sum total power for combined floor display and task lighting										80 W



ORNAMENTAL AND SPECIAL EFFECTS LIGHTING

REQUIRED FORMS:

NRCC-LTI-04-E: Tailored Method

Ornamental and Special Effects Lighting in this retail space include:

- Pendant canopy

Refer to “D-3. Additional allowed lighting power for combined ornamental and special effects”

4/11/2017

SLIDE 147

SECTION 8

PRESCRIPTIVE APPROACH



D-3. ADDITIONAL ALLOWED LIGHTING POWER FOR COMBINED ORNAMENTAL AND SPECIAL EFFECTS

STATE OF CALIFORNIA TAILORED METHOD CERTIFICATE OF COMPLIANCE Indoor Lighting – Tailored Method		CALIFORNIA ENERGY COMMISSION NRCC-LTI-04-E (Page 4 of 7)	
Project Name:		Site Address:	

Complete separate documents for Conditioned and Unconditioned Spaces.
This page is used to document: ☐ CONDITIONED SPACES ☐ UNCONDITIONED SPACES

→ D-3. ADDITIONAL ALLOWED LIGHTING POWER FOR COMBINED ORNAMENTAL AND SPECIAL EFFECTS

☐ Qualifying ornamental lighting includes luminaires such as chandeliers, sconces, lanterns, neon and cold cathode, light emitting diodes, theatrical projectors, moving lights, and light color panels when any of these lights are used in a decorative manner that does not serve as display lighting or general lighting.

☐ Special effects lighting is defined as lighting installed to give off luminance instead of providing illuminance.

☐ There is no mounting height multiplier for ornamental or special effects lighting.

☐ Additional allowed power for ornamental and special effects lighting may be used only for qualifying lighting systems. For floor areas qualifying for both ornamental and special effects lighting power allowances, the additional allowed power shall be used only once for the same floor area, so that the allowance shall not be additive.

01	02	03	04	DESIGN WATTS				09
Primary Function Area	Square Feet of Area	Lighting Power (W/ft²)	Allocated Watts (02 x 03)	Luminaire Code or Description (rows below accommodate 3 layers per function area)	Watts per Luminaire	# Luminaires	Design Watts (06 x 07)	Allowed Watts (smaller of 04 or Total for 08)
Retail Merchandise Sales	612.5 ft²	0.5 W/ft²	306.25 W	1. Rectangular pendant canopy w/ 7 pendants	42	1	42	42 W
				2.			0	
				3.			0	
			0	Total ornamental/special effects lighting for this primary function area.			0	
			0	Total ornamental/special effects lighting for this primary function area.			0	
			0	1.			0	
			0	2.			0	
			0	3.			0	
			0	Total ornamental/special effects lighting for this primary function area.			0	
			0	1.			0	
			0	2.			0	
			0	3.			0	
			0	Total ornamental/special effects lighting for this primary function area.			0	
			0	Total ornamental/special effects lighting for this primary function area.			0	
			0	Sum total allowed watts for ornamental and special effects lighting.			42 W	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance


January 2016

4/11/2017

SLIDE 148

SECTION 8

PRESCRIPTIVE APPROACH



LIGHTING POWER ALLOWANCE SUMMARY

REQUIRED FORMS:
NRCC-LTI-04-E: Tailored Method

Calculate the total allowed watts using the Tailored Method.


(General Lighting Power)	820.75 W
+ (Wall Display Lighting)	234 W
+ (Floor Display and Task Lighting)	80 W
+ (Ornamental and Special Effects Lighting)	42 W
+ (Very Valuable Merchandise Lighting)	—
= Allowed Lighting Power	TOTAL: 1,176.75 W

4/11/2017

SLIDE 149

SECTION 8

PRESCRIPTIVE APPROACH



A. TAILORED METHOD LIGHTING POWER ALLOWANCE SUMMARY

STATE OF CALIFORNIA
TAILORED METHOD
CERTIFICATE OF COMPLIANCE
Tailored Lighting - Tailored Method

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-04-E
(Page 1 of 1)

Complete separate documents for Conditioned and Unconditioned Spaces.
This page is used to document: ☐ CONDITIONED SPACES ☐ UNCONDITIONED SPACES

A. TAILORED METHOD LIGHTING POWER ALLOWANCE SUMMARY

01 General lighting power (Building Total from Section 8 of NRCC-LTI-04-E)

81 820.75 W

02 General lighting power (Section 8) (Building Total from Section 8 of NRCC-LTI-04-E)

82

03 Additional "use or type of" lighting power (watts listed in each of these cells shall be identical to total allowed watts determined in Section 8 of NRCC-LTI-04-E. These are auto filled depending on values in Section 8).

Wall Display Lighting from Section 8-1	Combined Floor Display and Task Lighting from Section 8-2	Combined Ornamental and Special Effects Lighting from Section 8-3	Very Valuable Merchandise from Section 8-4	
234W	80W	42W		

04 Total Allowed watts using Tailored Method (add lines 1, 2 and 3)

83 1,176.75 W

4/11/2017

SLIDE 150

SECTION 8

PRESCRIPTIVE APPROACH

LINE-VOLTAGE TRACK LIGHTING



Photo: GE Lighting

4/11/2017

SLIDE 151

SECTION 8

PRESCRIPTIVE APPROACH

METHODS FOR DETERMINING WATTAGE

There are four different methods for determining how many watts of line-voltage track or line-voltage busway has been installed. One or more methods may be used to determine how many watts of line-voltage track or line-voltage busway has been installed.

- **Method 1:** Volt-ampere (VA) rating of the branch circuit(s)
- **Method 2:** Use the higher of 45 watts per linear foot of track or total rated wattage of all luminaires
- **Method 3:** Use the higher of: 12.5 watts / linear ft of track—or VA rating of integral current limiter
- **Method 4:** Dedicated track lighting supplementary overcurrent protection panel

4/11/2017

SLIDE 152

SECTION 8

PRESCRIPTIVE APPROACH



EXERCISE: LINE-VOLTAGE TRACK LIGHTING

Required Forms:

[illegible]

NRCC-LTI-05-E: Line-Voltage Track Lighting

4/11/2017

SLIDE 153

SECTION 8

PRESCRIPTIVE APPROACH



LINE-VOLTAGE TRACK LIGHTING WATTAGE

REQUIRED FORMS:

NRCC-LTI-05-E: Line-Voltage Track Lighting Worksheet

Method 3 will be used to calculate line-voltage track lighting wattage.

- An integral current limiter that is certified to the Energy Commission is used
- The VA rating of the integral current limiter is 60W.
- Note: This method will not be recognized if **Installation Certificate NRCI-LTI-03-E** is not submitted.

1. Determine the amount of linear feet of track in the lighting plan.

Track 1: 4 ft

Track 2: 4 ft

Track 3: 6 ft

2. Multiply the linear feet of track by 12.5 W / LF.

Track 1: 4 ft x 12.5 W / LF = 50 W

Track 2: 4 ft x 12.5 W / LF = 50 W

Track 3: 6 ft x 12.5 W / LF = 75 W

3. Choose the larger of either the linear feet of track multiplied by 12.5 W or the VA rating of the integral current limiter.


There are 60 W each for the 4 ft tracks and 75 W for the 6 ft track, totaling 195 W of installed watts from track lighting.

4/11/2017

SLIDE 154

SECTION 8

PRESCRIPTIVE APPROACH



METHOD 3—USE THE HIGHER OF: 12.5 WATTS/LINEAR FOOT OF TRACK— OR VA RATING OF INTEGRAL LIMITER

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE
Indoor Lighting – Low Voltage Track Lighting Worksheet
Title: _____ Date: _____
Page 1 of 2

There are four different methods available for determining how many watts of the voltage track, or the voltage fixture, has been installed. One or more methods may be used to determine how many watts of low-voltage track, or low-voltage fixture, has been installed. Use this worksheet to separately calculate the input wattage for each system.

Separately enter each row of this worksheet into the Luminaire Schedule in Section 8 of the NRC-4 table.

Method 1 is the only option available for determining wattage for track or fixture rated for more than 20 amperes.

A. METHOD 1 – VOLT-AMPERE (VA) RATING OF THE BRANCH CIRCUIT(S)

BRANCH CIRCUIT NAME OR ID	VOLT-AMPERE (VA) RATING OF THE BRANCH CIRCUIT

B. METHOD 2 – USE THE HIGHER OF 45 WATTS PER LINEAR FOOT OF TRACK OR TOTAL RATED WATTAGE OF ALL LUMINAIRES

Track or Name #	Linear Foot of Track (W/LF)	45	800 x 800 (W)	Total Rated Wattage of all luminaires	Larger of (45 or 800)
		45	0	0	
		45	0	0	
		45	0	0	

C. METHOD 3 – USE THE HIGHER OF: 12.5 WATTS / LINEAR FOOT OF TRACK – OR VA RATING OF INTEGRAL CURRENT LIMITER

Only integral current limiter which is certified to the Energy Commission shall be recognized by the standards.

This method shall not be recognized if an installation certificate is not submitted.

Track or Name #	Linear Foot of Track (W/LF)	12.5	800 x 800 (W)	VA Rating of integral current limiter	Larger of (12.5 or 800)
Window Display (front)	4	50	50	60	60
Window Display (back)	4	50	50	60	60
Wall Display	6	75	75	60	75

D. METHOD 4 – DEDICATED TRACK LIGHTING SUPPLEMENTARY OVERCURRENT PROTECTION PANEL

This method shall not be recognized if an installation certificate is not submitted.

This method shall be used only for low-voltage track lighting, and shall not be recognized for any other lighting systems or devices are installed, the supplementary overcurrent protection panel shall not be recognized for compliance with the standards.

Name or ID	Voltage of the Branch Circuit	Sum of the ampere rating of all devices installed in the Panel	Wattage = Sum of the ampere rating of all of the devices Times the Branch Circuit Voltage (200 x 000)
			0
			0
			0

CA Building Energy Efficiency Standards – 2016 Nonresidential Compliance


January 2016

4/11/2017



SLIDE 155

SECTION 8

PRESCRIPTIVE APPROACH



OUTDOOR



4/11/2017

SLIDE 156

SECTION 8

PRESCRIPTIVE APPROACH

LIGHTING ZONES

Lighting Zone 0: Underdeveloped areas in parks and preserves

Ambient Illumination: Dark Sky

Where no continuous lighting is intended. Sites may utilize a single luminaire of 15 Watts or less at entrances to parking lots, trail heads, or other areas in order to safely illuminate site facilities.

Lighting Zone 1: Government parks, recreation areas, and wildlife preserves

Ambient Illumination: Dark

The local entity with authority over the property will know if the property is a government designated park, recreation area, or wildlife preserve. If the park is within a rural or urban area, it can be considered a part of lighting zone two or three.

Lighting Zone 2: Rural Areas

Ambient Illumination: Low

Rural areas include any population, housing, and territory that contain less than 2,500 people.

LIGHTING ZONES

Lighting Zone 3: Urban Areas

Ambient Illumination: Medium

An urban area is a densely settled core of census tracts that contain at least 2,500 people.

Lighting Zone 4: Special Use District

Ambient Illumination: High

This zone may be created by a local government through application to the California Energy Commission and is used for special area types that require a particularly high amount of light.

LIGHTING POWER ALLOWANCES

The allowed lighting power for a space is determined by measuring the area of the installation and multiplying by the lighting power allowance for that space.

The actual lighting power is the total watts of all non-exempt lighting systems (including ballast, driver, or transformer losses).

159

LIGHTING POWER ALLOWANCES

When determining allowed lighting power, the number of luminaires, their mounting heights, and their layout affect the size of the illuminated area and thus the allowed lighting power for a space.

The illuminated area is any hardscape area within a square around each luminaire or pole, less any obstructions. The size of this square is 10 times the luminaire mounting height, with the luminaire in the middle of the square.



160

LIGHTING POWER ALLOWANCES

There are three major areas that are considered when determining the allowed lighting power for a space:

Area Wattage Allowances (AWA)

The Area Wattage Allowance is determined for the total illuminated hardscape area.

Linear Wattage Allowances (LWA)

The Linear Wattage Allowance is determined for the total perimeter length of the hardscape. The total hardscape perimeter does not include areas that are not illuminated.

Initial Wattage Allowances (IWA)

The Initial Wattage Allowance may be used once per project site.
The IWA provides additional wattage for small sites or for unusual hardscape geometries.

LIGHTING POWER ALLOWANCES

	LZ0	LZ1	LZ2	LZ3	LZ4
Area Wattage Allowance (AWA) The total illuminated hardscape area included in the project multiplied by the AWA for the lighting zone.	Not Applicable	0.020 W/ square feet	0.030 W/ square feet	0.040 W/ square feet	0.050 W/ square feet
Linear Wattage Allowance (LWA) The total perimeter length of the hardscape included in the project multiplied by the LWA for the lighting zone appropriate to the project. The total hardscape perimeter does not include areas that are not illuminated.	Not Applicable	0.15 W/lf	0.25 W/lf	0.35 W/lf	0.45 W/lf
Initial Wattage Allowance (IWA) An additional power allowance for small sites or unusual hardscape geometries. The IWA value for the project's lighting zone is added—only once—to the total lighting power allowance for a site.	Not Applicable	340 W	450 W	520 W	640 W

Adapted from Table 140.7-A in the Energy Standards

PLANTERS AND LANDSCAPE AREAS

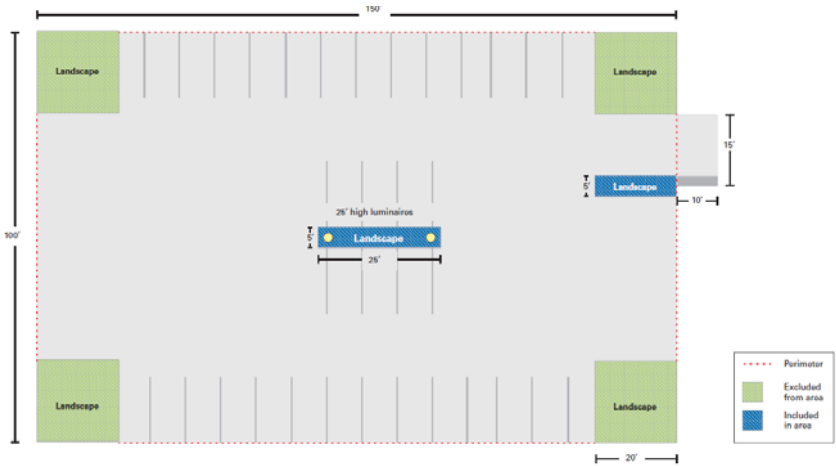
Planters and small landscape areas are included within the general hardscape area as long as the width or length of the inclusion is less than 10 ft., and the inclusion is bordered on at least three sides.

Landscape areas that are greater than 10 ft. in both width and length are excluded from the general hardscape area calculation, but the perimeter of these exclusions may be included in the linear wattage allowance (LWA) calculation



CALCULATE THE TOTAL POWER ALLOWANCE FOR AREA!

An outdoor parking lot 15,000 square feet in size is located in a commercial area categorized as Lighting Zone 3. Two 300W luminaires are mounted at a height of 25' in a 5'x25' island in the middle of the lot. The parking lot has 20' x 20' landscaped areas in each corner.



CALCULATE THE TOTAL POWER ALLOWANCE FOR AREA!

Steps

1. Calculate the illuminated hardscape area, remembering to subtract any landscape areas over 10' x 10': The illuminated area for each 25' pole is 250'x250', so it extends beyond the actual hardscape of the parking lot and encompasses the 150 square feet entrance. Because the lot is not adjacent to other hardscape on the site, use the 15,000 square feet area of the lot itself, adding the 15'x10' entrance and subtracting the four 400 square feet landscaped corners of the lot:
 $15,000 \text{ ft}^2 + 150 \text{ ft}^2 - 1,600 \text{ ft}^2 = 13,550 \text{ ft}^2$
2. Determine the general hardscape lighting allowance. Multiply the illuminated hardscape area (Step 1) by the AWA for LZ3 (found in [Table 140.7-A](#)):
 $13,550 \text{ ft}^2 \times 0.04 \text{ W/ft}^2 = 542 \text{ W}$
3. Calculate perimeter length and linear wattage allowance. Multiply the hardscape perimeter by the LWA (listed by lighting zone in [Table 140.7-A](#)):
 $520 \text{ ft} \times 0.34 \text{ W/lf} = 176.8 \text{ W}$
4. Add the power allowances determined in steps 2 and 3:
 $542 \text{ W} + 176.8 \text{ W} = 718.8 \text{ W}$
5. Add any additional lighting power allowances for specific applications:
None are listed in Table 140.7-B for this example.
6. Add the IWA—only once for the entire site. The IWA for a site in LZ3 is listed in [Table 140.7-A](#) as 520 W:
 $718.8 \text{ W} + 520 \text{ W} = 1,238.8 \text{ W}$

Answer

Total power allowance for this hardscape area: **1,238 W**.

165

NRCC-LTO-01-E: OVERVIEW OF COMPLIANCE

STATE OF CALIFORNIA OUTDOOR LIGHTING CERTIFICATE OF COMPLIANCE (Page 1 of 4)																																																															
<div style="display: flex; justify-content: space-between;"> <div> <p>Project Address: 1234 Main St.</p> <p>Phase of Construction: <input type="checkbox"/> New Construction <input checked="" type="checkbox"/> Existing</p> <p>Outdoor Lighting Zone (LZ): <input type="checkbox"/> LZ-1 <input checked="" type="checkbox"/> LZ-2 <input type="checkbox"/> LZ-3</p> <p><small>I have confirmed with the AHJ which LZ applies to this site. See</small></p> </div> <div> <p>Project Name: Sample Building</p> <p>See Form: 10/1/16</p> </div> </div>																																																															
<div style="display: flex; justify-content: space-between;"> <div> <p>STATE OF CALIFORNIA OUTDOOR LIGHTING CERTIFICATE OF COMPLIANCE (Page 3 of 4)</p> </div> <div> <p>CAUTION: ENERGY COMMISSION</p> </div> </div>																																																															
<p>I. Outdoor Lighting Schedule and Field Inspection Energy Checklist</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Luminaire Schedule</th> <th colspan="4">Installed Watts</th> <th>Location</th> <th>Cutoff</th> <th>Field Inspector</th> </tr> <tr> <th>01</th> <th>02</th> <th>03</th> <th>04</th> <th>05</th> <th>06</th> <th>07</th> <th>08</th> <th>09</th> </tr> </thead> <tbody> <tr> <td>Name or Item Tag</td> <td>Complete Luminaire Description</td> <td>Watts per Luminaire</td> <td>How wattage was determined</td> <td>Number of Luminaires</td> <td>Total Installed Watts in this area (03 x 05)</td> <td>Primary Function area in which these luminaires are installed (Outdoor Lighting Zone)</td> <td>BUG Rating</td> <td>Pass/Fail</td> </tr> <tr> <td>01</td> <td>02</td> <td>03</td> <td>04</td> <td>05</td> <td>06</td> <td>07</td> <td>08</td> <td>09</td> </tr> <tr> <td>DL1</td> <td>90 W LED Pole Light</td> <td>90</td> <td> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">CEC Decl. from M&E</div> <input type="checkbox"/> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">According to §15A.0(c)</div> <input checked="" type="checkbox"/> </div> </td> <td>5</td> <td>450</td> <td>Hardscape</td> <td> UH: <input type="checkbox"/> UL: <input type="checkbox"/> FVH: <input type="checkbox"/> BVH: <input type="checkbox"/> FH: <input type="checkbox"/> BH: <input type="checkbox"/> </td> <td> <div style="display: flex; justify-content: space-around;"> Pass Fail </div> </td> </tr> <tr> <td colspan="2"> <p><small>Name or Symbol</small></p> <p><small>Description of site</small></p> </td> <td colspan="4"> <p>INSTALLED WATTS PAGE TOTAL: 450</p> </td> <td colspan="3"> <p><small>Enter sum total of all pages (Sum Total INSTALLED Outdoor Lighting wattage) into NRCC-LTO-01-E, Page 1</small></p> <p>450</p> </td> </tr> </tbody> </table>										Luminaire Schedule		Installed Watts				Location	Cutoff	Field Inspector	01	02	03	04	05	06	07	08	09	Name or Item Tag	Complete Luminaire Description	Watts per Luminaire	How wattage was determined	Number of Luminaires	Total Installed Watts in this area (03 x 05)	Primary Function area in which these luminaires are installed (Outdoor Lighting Zone)	BUG Rating	Pass/Fail	01	02	03	04	05	06	07	08	09	DL1	90 W LED Pole Light	90	<div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">CEC Decl. from M&E</div> <input type="checkbox"/> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">According to §15A.0(c)</div> <input checked="" type="checkbox"/> </div>	5	450	Hardscape	UH: <input type="checkbox"/> UL: <input type="checkbox"/> FVH: <input type="checkbox"/> BVH: <input type="checkbox"/> FH: <input type="checkbox"/> BH: <input type="checkbox"/>	<div style="display: flex; justify-content: space-around;"> Pass Fail </div>	<p><small>Name or Symbol</small></p> <p><small>Description of site</small></p>		<p>INSTALLED WATTS PAGE TOTAL: 450</p>				<p><small>Enter sum total of all pages (Sum Total INSTALLED Outdoor Lighting wattage) into NRCC-LTO-01-E, Page 1</small></p> <p>450</p>		
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<p><small>CA Building Energy Efficiency Standards - 2008 Nonresidential Compliance</small></p> <p style="text-align: right;"><small>CA Building Energy Efficiency Standards - 2008 Nonresidential Compliance</small></p> <p style="text-align: right;"><small>April 2006</small></p>																																																															

166

NRCC-LTO-03-E: WATTAGE ALLOWANCES

STATE OF CALIFORNIA OUTDOOR LIGHTING POWER ALLOWANCES <small>(DEC-NRCC-LTO-03-E) (Revised 03/18)</small>	 CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE Outdoor Lighting Power Allowances <small>Project Name: _____ Sample Building: _____</small>	NRCC-LTO-03-E (Page 1 of 2) Date Printed: 03/15/18

A. OUTDOOR LIGHTING POWER ALLOWANCE SUMMARY

1. General Hardscape Lighting Power Allowance (Site Total from Section B of NRCC-LTO-03-E)					1.	644
2. Additional Specific "use it or lose it" Lighting Power Allowances listed in each of these cells shall be identical to total allowed watts determined in Section C-1 to C-4 of NRCC-LTO-03-E.						
PER APPLICATION from Section C-1		PER UNIT LENGTH (SALES FRONTAGE) from Section C-2		PER HARDSCAPE AREA (ORNAMENTAL LIGHTING) from Section C-3		PER SPECIFIC AREA from Section C-4
0	+	0	+	0	+	=
					2.	0
3. Sum Total ALLOWED Outdoor Lighting Wattage (add rows 1 and 2)					3.	644

B. GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE FROM TABLE 140.7-A

Area Wattage Allowance (AWA)				Linear Wattage Allowance (LWA)				Initial Wattage Allowance (IWA)	Total General Hardscape Lighting Allowance
O1	O2	O3	O4	O5	O6	O7	O8	O9	
Name of Area	Illuminated Hardscape Area	AWA Per Square Foot	AWA (Box x Box)	Perimeter Length of General Hardscape	LPA per Linear Foot	LWA (Box x Box)	IWA (Watts)	804 + 807 + 808	
Parking Lot	1000	0.04	40	240	.35	84	520	644	
							TOTAL:	644	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2018

NRCC-LTO-04-E: EXISTING WATTAGES

STATE OF CALIFORNIA OUTDOOR LIGHTING EXISTING CONDITIONS		CALIFORNIA ENERGY COMMISSION	
PERMITS/TITLE & PLANS (P&T)		NRCC-LTO-04-E	
CERTIFICATE OF COMPLIANCE		Page 1 of 3	
STATE OF CALIFORNIA OUTDOOR LIGHTING EXISTING CONDITIONS		CALIFORNIA ENERGY COMMISSION	
2020 NRCC-LTO-04-E (Revised 04-15)			
B. Existing Luminaire Schedule			
Name of the space with the alteration:			
O1	O2	O3	O4
Name or Item Tag	Luminaire Description	Wattage per Luminaire	How Wattage was Determined
OL1	250 w HID	260	CEC default from NAB According to §190.0(c)
			Quantity of Luminaires
			Total Wattage (Quantity x Wattage per Luminaire) (Cell O3 x Cell O5)
			6 1,560.00
Total Installed Watts:			1560
Allowed Lighting Power			
If the percentage of existing luminaires being altered (from Box 3, page 1) is less than 50%, then enter the Total installed Watts in the box to the right.			
If the percentage of existing luminaires being altered is 50% or more, multiply the Total installed Watts by a multiplier of 0.60 and enter the adjusted value in the box to the right.			936 Watts
Enter this value in compliance document NRCC-LTO-03-E, Table C, cell O3 (Allowed Outdoor Lighting Wattage). Alternatively, NRCC-LTO-03-E can be used to determine the Allowed Outdoor Lighting Wattage based on the square footage of each landscape area and the specific application of the lighting.			
CA Building Energy Efficiency Standards - 2018 Nonresidential Compliance			April 2018