



2013 Building Energy Efficiency Standards Committee Workshop

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Today's Agenda: **NONRESIDENTIAL**

<u>Time</u>	<u>Topic</u>	<u>Presenter</u>
09:00 AM	Introductions/ General Information about 2013 Title 24 Rulemaking Calendar	Martha Brook
09:15 AM	Revisions to Sections 120.0 to 120.6 – Mandatory Requirements for Space Conditioning and Covered Processes	Martha Brook
10:00 AM	Revisions to Sections 120.7 – Mandatory Insulation Requirements	Mazi Shirakh
10:15 AM	Revisions to Sections 120.8 – Building Commissioning	Martha Brook
10:30 AM	Revisions to Sections 130.0 to 130.5 – Nonresidential Mandatory Lighting Controls and Building power	Gary Flamm
11:15 AM	Revisions to Sections 140.0 and 140.1 – Nonresidential Performance and Prescriptive Approaches	Martha Brook
11:30 PM	Revisions to Section 140.3 – Prescriptive Requirements for Building Envelope	Mazi Shirakh
12:30 PM	Lunch	
1:30 PM	Revisions to Section 140.4 – Prescriptive Requirements for Space Conditioning Equipment and Covered Processes	Martha Brook
2:00 PM	Revisions to Sections 140.6 to 140.8 – Prescriptive Requirements for Indoor Lighting, Outdoor Lighting, and Sign Lighting	Gary Flamm
3:00 PM	Revisions to Sections 140.9 – Covered Processes	Martha Brook
3:20 PM	Revisions to Section 141.0 – nonresidential Additions, Alterations, and Repair	Gary Flamm
3:50 PM	Title 24, Part 11 – Nonresidential Voluntary “Reach” Standards	Martha Brook
4:30 PM	Public Comments	
5:00 PM	Adjourn	



2013 Title 24 Rulemaking Calendar

Sep 30, 2011	Draft Express Terms
Oct 20, 2011	Impact Analyses for EIR
Oct 13-14, 2011	Efficiency Committee Workshop(s)
Nov 3, 2011	Rulemaking Package: Express Terms, ISOR, NOPA, EIR, 399
Nov 3, 2011	399 filing to DoF
Dec 8, 2011	NOPA Package filing to CBSC
Dec 30, 2011	Publish Express Terms – 45 day language & EIR
Jan 9-13, 2012	Efficiency Committee Hearing(s)
Feb 27, 2012	Commissioner Briefings
Mar 7, 2012	Business Meeting – 45 day language
Mar 14, 2012	Publish Express Terms – 15 day language
Apr 4, 2012	Business Meeting – Adoption



Dates in blue indicate the calendar week targeted - the event is not scheduled for this particular date



§110.2 (112)

MANDATORY REQUIREMENTS FOR SPACE CONDITIONING EQUIPMENT

(a) Efficiency.

- Water Chilling Packages: Efficiency tables updated to match ASHRAE 90.1- Table 110.2-D
- Non-AHRI standard water-cooled/chilling equipment efficiency requirements updated to match ASHRAE 90.1
- Heat rejection equipment: Added Closed Cooling Tower efficiency requirements - Table 110.2-G

(e) Evaporative or Open Cooling Towers. **NEW**

- Installation of controls that Maximize Cycles of Concentration
- Documentation of Maximum Cycles of Concentration, using Commission-provided calculator
- Requirements for flow meters, overflow alarms, efficient drift eliminators



§120.2 (122)

REQUIRED CONTROLS FOR SPACE CONDITIONING SYSTEMS

(c) Operation and Control Requirements for Minimum Quantities of Outdoor Air

- Added occupant sensor ventilation control device as type of control suitable for demand control ventilation
- New requirements for functionality and installation of occupant sensor ventilation control devices

(e) Shut-off and Reset Controls for Space-conditioning Systems

- Added requirement to setup / setback temp setpoints by 2 deg F and reset ventilation rate to zero for unoccupied class, conference and multipurpose rooms



§120.2 (122)

REQUIRED CONTROLS FOR SPACE CONDITIONING SYSTEMS

(f) Economizer Fault Detection and Diagnostics (FDD) **NEW**

- All economizers for air-cooled, unitary DX units are required to have FDD system
- FDD system requirements specified in NA9

§120.3 (123)

REQUIREMENTS FOR PIPE INSULATION

- Updated insulation levels in Table 120.3-A to match ASHRAE 90.1



§120.5 (125)

REQUIRED NONRESIDENTIAL MECHANICAL SYSTEM ACCEPTANCE

- Factory installed economizers do not need acceptance testing
- New acceptance tests for supply air temperature reset and condenser water reset controls
- EMCS installed to function as a thermostat must functionally meet thermostat requirements in Section 110.2(c)



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(a) Mandatory Requirements for Refrigerated Warehouses

- Added definitions for freezers and coolers, replaced “frozen storage” and “cold storage”
- Revised space and surface insulation requirements
- Clarified requirements for variable speed fan-powered evaporators
- Increased scope of design temperature requirements for fan-powered condensers to include water-cooled condensers
- Condensing temperature reset controls
- Efficiency requirements for fan-powered condensers
- Clarified requirements for variable speed screw compressors



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(a) Mandatory Requirements for Refrigerated Warehouses

- Screw compressors to vary compressor volume in response to pressure
- Freezer and cooler infiltration barriers
- Acceptance tests for electric resistance underslab heating systems, evaporator fan motor controls, air-cooled condensers and variable speed compressors



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(b) Mandatory Requirements for Commercial Refrigeration **NEW**

- Variable speed condenser fans
- Condensing temperature reset controls
- Minimum condensing temperature setpoint (70 deg F)
- Efficiency requirements for fan-powered condensers
- Compressor suction temperature reset controls



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(b) Mandatory Requirements for Commercial Refrigeration **NEW**

- Liquid subcooling requirements for low temp, parallel compressor systems
- Display case lighting occupancy or time switch controls
- Upright low-temp display cases must have reach-in glass doors
- HVAC systems must recover a portion of available heat from refrigeration systems without a significant increase in HFC refrigerant charge



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(c) Mandatory Requirements for Enclosed Parking Garages

NEW

- Garages with design exhaust rate $\geq 10,000$ cfm
- Automatically detect contaminant levels
- Reduce fan airflow 50% or less with maintenance of acceptable contaminant levels
- Fan motor demand $\leq 30\%$ design wattage at 50% airflow
- CO concentration kept at < 25 ppm at all times
- Ventilation rate at 0.15 cfm/sf for all scheduled occupation
- Specifications for CO sensor count, location, calibration, monitoring
- Ventilation system acceptance testing



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(d) Mandatory Requirements for Commercial and Process Boilers

NEW

- Boilers ≥ 2.5 MMBtu/hr
- Must have combustion air positive shut-off
- Combustion air fan motors ≥ 10 hp shall be variable speed or have motor demand limit controls such that motor demand $\leq 30\%$ design wattage at 50% airflow
- Boilers ≥ 5 MMBtu/hr must maintain excess $O_2 \leq 5\%$ by volume
- Process boilers ≥ 10 MMBtu/hr must maintain excess $O_2 \leq 3\%$ by volume



§120.6 (126)

MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(d) Mandatory Requirements for Compressed Air Systems **NEW**

- Compressed air systems ≥ 25 hp
- Trim compressor and primary storage required
- Compressed air system controller required
- Compressed air system acceptance testing



§120.7 (NEW)

Mandatory Insulation Requirements for Nonresidential Buildings

- Newly constructed building in a nonresidential, high-rise residential, and hotel/motel buildings shall meet the minimum requirements in this Section.
- Roof Insulation
 - Metal buildings weighted average U-factor not exceeding 0.065
 - Wood framed weighted average buildings U-factor not exceeding 0.075
- Wall Insulation
 - Metal building weighted average U-factor not exceeding 0.113
 - Metal framed weighted average U-factor not exceeding 0.098
 - Mass wall U-factor not exceeding 0.44
 - Wood framed weighted average buildings U-factor not exceeding 0.110
- Floor Insulation - assembly shall not exceed the U-factor of U-0.071



§120.8 (NEW) BUILDING COMMISSIONING

- Copied building commissioning text from 2010 California Green Building Standards (GBS)
- Removed redundant requirements
- Will add clarification note in 2013 GBS stating that all energy system commissioning requirements are now in Title 24, Part 6, Section 120.8
- Added design phase design review requirements



§120.8 (NEW) BUILDING COMMISSIONING

- Summary of commissioning requirements:
 1. Owner's or owner representative's project requirements;
 2. Basis of design;
 3. Design phase design review; **NEW**
 4. Commissioning measures shown in the construction documents;
 5. Commissioning plan;
 6. Functional performance testing;
 7. Documentation and training; and
 8. Commissioning report.



§120.8 (NEW) BUILDING COMMISSIONING

- Design phase design review:
 - ✓ Design reviewer requirements vary by building size and system complexity
 - ✓ Schematic design phase - kick-off meeting with owner, design team and design reviewer & complete design review checklist
 - ✓ Construction document phase – complete design review compliance form that lists items to check

NOTE: Examples of Design Review Checklists (Compliance Forms) are posted on CEC 2013 Standards website



§110-120 COMMENTS





§130.0 (130)

General lighting requirements & determining lighting power

- Luminaire classification & power
 - Edited for clarity: Incandescent, Ballasts, Low-Voltage, Track Lighting, LED, & Miscellaneous
 - Incandescent recessed luminaires with medium screw base sockets ≥ 50 W per socket.
 - Clarify: No “permanent” adaptors
 - Clarify: Lamps do not change classification of luminaire type
 - Lighting controls comply with §110.9 & installed in accordance with manufacturer's instructions.



§130.0 (130)

General lighting requirements & determining lighting power

- NA-8 - Default luminaire power options
 - Voluntary alternative to §130.0 having conservative default wattage tables.
 - Content of document significantly reduced



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

- Edited and rearranged for clarity
 - (a) Area Controls
 - Manual ON/OFF controls. May be dimmer
- Separately Controlled Lighting Systems
 - General lighting separately controlled from all other lighting systems
 - Floor & wall display, window display, case display, ornamental, & special effects lighting each separately controlled.
 - Track lighting: General, display, ornamental, & special effects lighting shall each be separately controlled.



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

(c) Multi-Level Lighting Controls.

- General lighting; ≥ 100 square feet; > 0.5 W per square foot
- Meet requirements in Table 130.1-A
- And each luminaire controlled by one of following methods:
 - Manual dimming
 - Lumen maintenance
 - Tuning
 - Automatic daylighting
 - Demand responsive



§130.1 (131)

Table 130.1-A Multi-Level Lighting Controls and Uniformity Requirements

- Incandescent sockets; LED; GU-24 LED
 - Continuous dimming 10-100 percent
- GU-24 sockets CFL > 20 W; Pin-based CFL 20 W
 - Continuous dimming 20-100 percent
- GU-24 CFL \leq 20 W; Pin-based CFL \leq 20 W; Linear fluorescent and U-bent fluorescent \leq 13 W
 - Minimum one step between 30-70 percent
 - Dimming or switching alternate lamps



§130.1 (131)

Table 130.1-A Multi-Level Lighting Controls and Uniformity Requirements

- Linear fluorescent and U-bent fluorescent > 13 W
 - Minimum one step in each range: 20-40%, 50-70%, 80-85%, 100%
 - Stepped dimming, continuous dimming, or switching alternate lamps in luminaire ≥ 4 lamps
- Track Lighting
 - Minimum one step between 30–70%
 - Step dimming, continuous dimming, or separately switching circuits with a minimum of two circuits.
- HID >20 W; Induction >25 W; other light sources
 - Minimum one step between 50-70%
 - Stepped dimming, continuous dimming, or switching alternate lamps in luminaire ≥ 2 lamps



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

(c) Shut-off Controls

- Occupant sensing device, automatic time control, signal from another building system, or other device capable of automatically shutting off all of the lighting when the space is typically unoccupied
- Clarify: No countdown timer switches. **EXCEPTION** - Bathrooms & closets < 40 square feet \leq five minutes



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

(c) Shut-off Controls

- **Partial OS IN ADDITION TO shutoff:**
 - Aisle ways & open areas in warehouses
 - Library book stack aisles
 - Corridors & stairwells
- **Partial OS INSTEAD OF shutoff:**
 - Stairwells & common area corridors providing access to guestrooms & dwelling units of high-rise residential buildings & hotel/motels
 - Parking garages, parking areas & loading & unloading areas



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

(d) Automatic Daylighting Controls.

- Daylit Zones definitions: SKYLIT DAYLIT ZONE, PRIMARY SIDELIT DAYLIT ZONE, SECONDARY SIDELIT DAYLIT ZONE
- Mandatory daylight controls
- All Skylit Daylit Zones & Primary Sidelit Daylit Zones shall be shown on the plans.
- Luminaires in the Skylit Daylit Zone controlled separately from Primary Sidelit Daylit Zones
- Automatic Daylighting Control Device Installation & Operation
- Parking Garage Daylighting Requirements



§130.1 (131)

Nonresidential Indoor Lighting Control Applications

(e) Demand Responsive Controls.

- Buildings $> 10,000 \text{ ft}^2$ (changed from $50,000 \text{ ft}^2$)
- When §130.1(b) is required
- Demand responsive lighting control:
 - $\geq 15 \%$ of full power for continuous dimming systems, or
 - One level below full ON in accordance with Table 130.1-A for stepped dimming or stepped switching.



§130.2 (132)

Nonresidential Outdoor Lighting Control Applications

- Outdoor incandescent luminaires > 100 controlled by motion sensor
- Luminaire Cutoff Requirements. > 150 W Designated Cutoff, or Backlight, Uplight, & Glare (BUG)



§130.2 (132)

Nonresidential Outdoor Lighting Control Applications

- Controls for Outdoor Lighting
 - Photocontrol or astronomical time control
 - Outdoor lighting controlled independently from other electrical loads.
 - ≤ 24 feet controlled with motion sensors
 - Outdoor Sales Frontage, Outdoor Sales Lots, & Outdoor Sales Canopies lighting, distributed part-night device or motion sensor
 - Building Facade, Ornamental Hardscape & Outdoor Dining lighting, distributed part-night device, motion sensor, or centralized time clock



§130.3 (133)

Sign Lighting Control Applications

- Edited for clarity
- No substantive changes



§130.4 (134)

Nonresidential (lighting control) Acceptance Requirements

- NA-7 lighting acceptance testing/installation requirements
- Edited for clarity
 - Lighting control systems; Energy Management Control System; Line-voltage track lighting integral current limiters; Line-voltage track lighting supplementary overcurrent protection panels; Lighting shutoff controls; Automatic daylight controls; Interlocked lighting systems; Lighting controls to earn a Power Adjustment Factor (PAF); Additional wattage for videoconference studio; Outdoor lighting controls



§130.5 (New Section)

Electrical Power Distribution Systems

- User-accessible metering of total electrical energy use per Table 130.5-A.
- Disaggregation of Electrical Circuits
- Minimum Voltage Drop
- Circuit Controls for 120-Volt Receptacles
 - Controlled & uncontrolled 120 volt receptacles in each private office, open office area, reception lobby, conference room, kitchen, & copy room.
- Demand Response Signals (specifications)
- Energy Management Control System (EMCS) provides all applicable functionality



§130 COMMENTS





§140.1 (141)

PERFORMANCE APPROACH: ENERGY BUDGETS

- Clarified the basis of the performance compliance approach
- Clarified that the methods, assumptions and required inputs for Compliance Software is approved by the Commission and documented in the Nonresidential ACM Reference Manual
- **NOTE:** Schedule for Nonresidential ACM Reference Manual and Compliance Software is now posted



§140.3 (143)

Nonresidential Prescriptive Envelope Requirements

- Section 140.3(a)1 - Roofs
- Nonresidential Steep-sloped roofs in climate zones 2 through 16 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75 0.85, or a minimum SRI of 16.
- High-rise Residential
 - Low-sloped roofs in climate zones ~~10-14~~ 2 through 15 shall have a minimum aged solar reflectance of ~~0.55~~ 0.67 and a minimum thermal emittance of 0.75 0.85, or a minimum SRI of 80.
 - Steep-sloped roofs climate zones 2 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.85, or a minimum SRI of 16.



§140.3 (143)

Nonresidential Prescriptive Envelope Requirements

Section 140.3(a)5 – Side Fenestration

- For Nonresidential Buildings, Area-Weighted Performance Rating a U-factor (for fixed windows) no greater than 0.36 (partial listing, see Section 143(a) for other windows types and high-rise residential occupancy)
- For Nonresidential Buildings, Area-Weighted Performance Rating relative solar heat gain coefficient (for fixed windows) no greater than 0.25 (partial listing, see Section 143(a) for other windows types and high-rise residential occupancy)
- For Nonresidential Buildings, Area-Weighted Performance Visual Transmittance (VT) (for fixed windows) no greater than 0.42 (partial listing, see Section 143(a) for other windows types and high-rise residential occupancy)



§140.3 (143)

Nonresidential Prescriptive Envelope Requirements

Section 140.3(a)6 – Skylights

- For Nonresidential Buildings, Area-Weighted Performance Rating a U-factor (for glass curb mounted skylights) no greater than 0.58 (partial listing, see Section 143(a) for other skylights types and high-rise residential occupancy)
- For Nonresidential Buildings, Area-Weighted Performance Rating relative solar heat gain coefficient (for glass curb mounted skylights) no greater than 0.25 (partial listing, see Section 143(a) for other skylights types and high-rise residential occupancy)
- For Nonresidential Buildings, Area-Weighted Performance Visual Transmittance (VT) (for glass curb mounted skylights) no greater than 0.49 (partial listing, see Section 143(a) for other skylights types and high-rise residential occupancy)



§140.3 (143)

Nonresidential Prescriptive Envelope Requirements

Section 140.3(a)6 – Air Barrier

- A continuous air barrier shall be installed to the building envelope in Climate Zones 10-16, except in reloadable classrooms

Section 140.3(b) – Other Envelope TDV Energy Tradeoff Approaches

- The Overall TDV Energy Approach will be replaced by a simplified performance approach interface.



§140.3(c) (143(c))

Mandatory daylighting (building envelope)

- 8,000 ft² threshold changed to > 5,000 ft²
- $\geq 50\%$ floor area in the skylit daylight area changed to:
- $\geq 75\%$ floor area within one head height from windows or within 0.7 times average ceiling height from the edge of rough opening of skylights
- Minimum Skylight Area or Effective Aperture no longer needed



§140.1-140.3 COMMENTS





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§140.4 (144)

PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(c) Power Consumption of Fans

- Removed requirement for VAV fans > 10 hp to be variable speed – *replaced with 140.4 (m)*
- Efficiency requirements for HVAC pump and fan motors 1/12 hp to 1 hp

(d) Space-conditioning Zone Controls

- Reduce the degree to which primary air is reheated



§140.4 (144)

PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(e) Economizers

- DX systems with economizers must cycle compressors off when economizers provide partial cooling
- Effective January 2015, DX systems must be able to stage or modulate capacity
- Economizers and return air dampers on individual cooling fan systems have requirements for warranty, drive mechanism, reliability, leakage, adjustable setpoint, damper control sensor location specifications, sensor accuracy, sensor calibration data, prevention of sensor false readings, relief air system
- **NOTE:** Table 140.4(e)-A,B ECONOMIZER TRADE-OFF TABLES - efficiency requirements will be updated
- Updated TABLE 140.4(e)-C AIR ECONOMIZER HIGH LIMIT SHUT OFF CONTROL REQUIREMENTS



§140.4 (144)

PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(i) Minimum Chiller Efficiency

- Chillers must meet or exceed the Path B efficiencies listed in TABLE 110.2-D

(j) Limitation of Air-Cooled Chillers

- Chilled water plants can provide up to 300 tons with air-cooled chillers



§140.4 (144)

PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(m) Fan Control **NEW**

- Multiple and single zone systems must vary the airflow rate as a function of actual load – either two speed or variable speed, with fan motor demand limitations:
Single zone $\leq 50\%$ design wattage at 66% design fan speed, Multi-zone $\leq 30\%$ design wattage at 50% design air volume
- This replaces existing *Variable air volume control for single zone system* and *Power Consumption of Fans: VAV fans > 10 hp == variable speed* code requirements



§140.4 COMMENTS





§140.6 (146)

Prescriptive Nonresidential Indoor lighting power

- Edited for clarity
- Office default portable lighting exclusion changed from 0.2 W/sf to 0.3 W/sf
- Two interlocked lighting systems edited for clarity, and require Acceptance testing if invoked
- Reduction of wattage through controls (PAF) edited for clarity and consistency with changes to Table 140.6-A
- Because daylighting controls now required, there are no more daylighting PAFs
- New PAF for OS in open offices



§140.6 (146)

Prescriptive Nonresidential Indoor lighting power

- Lighting wattage excluded.
 - Removed lighting for videoconferencing studio, moved to Area Category Table
 - Added lighting in elevators meeting the requirements of ASHRAE/IESNA Standard 90.1, 2010
- Tailored Method narrative expanded for clarity
- IES Illuminance categories (A through G) changed to illuminance values (Lux)



§140.6 (146)

Prescriptive Nonresidential Indoor lighting power

- TABLE 140.6-A – Lighting Power Adjustment Factors (PAF)
- TABLE 140.6-B – Complete Building Method LPD Values W/ft^2
- TABLE 140.6-C – Area Category Method LPD Values W/ft^2
- TABLE 140.6-D – Tailored Method Lighting Power Allowances
- TABLE 140.6-E – Mounting Height Adjustments
- TABLE 140.6-F – Room Cavity Ratio (RCR) Equations
- TABLE 140.6-G – Illuminance Levels (LUX) LPD



§140.7 (147)

Nonresidential outdoor lighting power

- Edited for clarity
- Some LPDs reduced
- Additional Lighting Power Allowance for local ordinance removed



§140.8 (148)

Sign lighting power

- Edited for clarity
- No substantive changes



§140.6-140.8 COMMENTS





§140.9 (NEW)

PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

(a) Prescriptive Requirements for Computer Rooms **NEW**

- Integrated economizers required for each cooling fan system, to meet 100% of expected load – calculation method for expected system load approved by Commission
- Controls that prevent reheating, recooling or simultaneous heating and cooling
- Non-adiabatic humidification is prohibited
- Limitation on fan power
- Two-speed or variable speed control on fans with motor demand limitations
- Air barriers for containment – to prevent discharge air from recirculating



§140.9 (NEW)

PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

(c) Prescriptive Requirements for Laboratory Exhaust Systems

NEW

- Zone exhaust and makeup airflow rates shall be capable of reducing to regulated minimum circulation rates or rate necessary to maintain pressurization, whichever is larger



§140.9 COMMENTS





§141.0 (149)

Additions, Alterations, and Repairs

- Edited for clarity
- Added exceptions to solar ready requirements for additions and alterations not having a solar zone.
- Added when a space conditioning system is altered, unitary systems with an economizer shall have control systems that cycle compressors off when economizers can provide partial cooling



§141.0 (149)

Additions, Alterations, and Repairs

Section 141.0(b)1B – Cool Roof Requirements

- Specifies that the reflectance requirement for low-slope roof in alteration is 0.63 in CZ 1-16 and emittance of 0.85, or SRI of 75
- Provides continuous insulation as a prescriptive alternative to low-slope cool roof requirements for the reflectance range of 0.45 to 0.62
- Steep-sloped roofs in climate zones 1 through 16 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.85, or a minimum SRI of 16.



§141.0 (149)

Additions, Alterations, and Repairs

Section 141.0(b)2 – Performance Approach for Nonresidential buildings

- For all altered components provide partial credits for altered components that exceed mandatory requirements. Provides full credit if the altered components meet the 2013 prescriptive requirements.



§141.0 (149)

Additions, Alterations, and Repairs

- Defined
 - Luminaire Alterations
 - Luminaire Modifications-in-Place
 - Lighting Wiring Alterations
- Used lighting alteration table format for clarity



§141.0 (149)

Additions, Alterations, and Repairs

- **Luminaire Alterations - Each room with > 10%**
 - < 40 Building with Luminaire Alterations for General Lighting 85% VS 100% of applicable general lighting = multi level controls Table 130.1-A VS two-level lighting control
 - Task, display, special effects lighting alterations
- **Luminaire Modifications-in-Place - Each room with > 10%**
 - < 40 Building with Luminaire Alterations for General Lighting 85% VS 100% of applicable general lighting = multi level controls Table 130.1-A VS two-level lighting control



§141 COMMENTS





Title 24, Part 11

Nonresidential Voluntary “Reach” Standards

- Tier 1: Energy Budget \leq 90% of Part 6 Energy Budget
- Tier 2: Energy Budget \leq 80% of Part 6 Energy Budget
- Energy Budget calculated by Energy Commission certified Compliance Software
- Prerequisites – Required measures if applicable to building project



Title 24, Part 11

Nonresidential Voluntary “Reach” Standards

Prerequisites

- Installed outdoor lighting power $\leq 90\%$ of Part 6 allowance
- Retail food stores ≥ 8000 SF use CO₂ indirect or cascade cooling for refrigerated display cases and walk-ins
 - Exceptions for medium temperature indirect glycol with additional efficiency measures (e.g. variable speed pumps and controls)



Title 24, Part 11

Nonresidential Voluntary “Reach” Standards

Prerequisites

- Restaurant water heating for buildings $\geq 12,600$ SF (still under development)
 - Solar water-heating system providing minimum of 25 percent of annual water heating energy
- or
- Options under development (e.g. condensing boiler/water heater)



Green Building Standards – Energy Efficiency COMMENTS





GENERAL COMMENTS

