



# 2013 Building Energy Efficiency Standards 45-Day Language Hearing

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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
09:45 AM	Revisions to Sections 120.7 – Mandatory Insulation Requirements	Mazi Shirakh
10:00 AM	Revisions to Sections 120.8 – Building Commissioning	Martha Brook
10:15 AM	Revisions to Sections 110.9 and 130.0 to 130.5 – Nonresidential Mandatory Lighting Controls and Building power	Gary Flamm
10:35 AM	Revisions to Sections 140.0 and 140.1 – Nonresidential Performance and Prescriptive Approaches	Martha Brook
10:45 AM	Revisions to Section 140.3 – Prescriptive Requirements for Building Envelope	Mazi Shirakh
11:30 AM	Revisions to Section 140.4 – Prescriptive Requirements for Space Conditioning Equipment and Covered Processes	Martha Brook
12:00 PM	Revisions to Sections 140.6 to 140.8 – Prescriptive Requirements for Indoor Lighting, Outdoor Lighting, and Sign Lighting	
12:30 PM	Lunch	
1:30 PM	Revisions to Sections 140.9 – Covered Process	Martha Brook
1:50 PM	Revisions to Section 141.0 – Nonresidential Additions, Alterations, and Repair	Gary Flamm / Mazi Shirakh
2:10 PM	Title 24, Part 11 – Nonresidential Voluntary “Reach” Standards	Martha Brook
2:40 PM	Revisions to Nonresidential Appendices	Mazi Shirakh
3:10 PM	Revisions to Nonresidential ACM Approval Manual	Martha Brook
4:00 PM	Public Comments	
5:00 PM	Adjourn	



## 2013 Title 24 Rulemaking Calendar

45 Day Language Hearings March 12-13, 2012

Release 15 Day Language April 11, 2012

ACM Workshop May 3, 2012

2013 Standards

Adoption Hearing May 9, 2012



## §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.

- 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



## §120.1 (121)

### REQUIREMENTS FOR VENTILATION

#### (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
  - ✓ Specified for spaces where occupancy sensors already required for lighting control
  - ✓ Only occupancy-based ventilation control requirement for HVAC systems without economizers
  - ✓ Requires daily pre-occupancy purge
  - ✓ **NEW for 15-Day Language: Requires fan cycle control sequence to maintain the average outdoor air rate over a 2 hr. period**

#### (e) Design and Control Requirements for Quantities of Outdoor Air

- VAV systems need dynamic controls that maintain OA rates within 10% of requirements
- Measured OA rates for CAV systems must be within 10% of requirements



## §120.2 (122)

### REQUIRED CONTROLS FOR SPACE CONDITIONING SYSTEMS

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

- Added requirement to setup / setback temp setpoints by 2 deg F and use occupancy sensors to control ventilation rate for unoccupied class, conference and multipurpose rooms

#### (f) Economizer Fault Detection and Diagnostics (FDD)

- All economizers for air-cooled, unitary DX units  $\geq 4.5$  tons 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”
- Clarified which sections apply, based on size and type of refrigeration system configurations, and new vs. altered
- 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
- Added condensing temperature reset controls



## §120.6 (126)

### MANDATORY REQUIREMENTS FOR COVERED PROCESSES

#### (a) Mandatory Requirements for Refrigerated Warehouses, cont.

- Added efficiency requirements for fan-powered condensers
- Clarified requirements for variable speed screw compressors
- 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, condensers and variable speed compressors (NA 7.10)



## §120.6 (126)

### MANDATORY REQUIREMENTS FOR COVERED PROCESSES

#### (b) Mandatory Requirements for Commercial Refrigeration

- Applies to retail food stores  $\geq 8,000$  sf
- 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
- Liquid subcooling requirements for low temp, parallel compressor systems
- Display case lighting occupancy or time switch controls
- 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

- 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 Process Boilers

- Boilers  $\geq 2.5$ MMBtu/hr
- Must have combustion air positive shut-off
- Combustion air fan motors  $\geq 10$  hp shall be variable speed or have motor demand limit controls such that motor demand  $\leq 30\%$  design wattage at 50% airflow
- Boilers  $\geq 5$ MMBtu/hr must maintain excess O<sub>2</sub>  $\leq 5\%$  by volume
- Boilers  $\geq 10$ MMBtu/hr must maintain excess O<sub>2</sub>  $\leq 3\%$  by volume



## §120.6 (126)

### MANDATORY REQUIREMENTS FOR COVERED PROCESSES

#### (d) Mandatory Requirements for Compressed Air Systems

- Applies to compressed air systems  $\geq 25$  hp
- Trim compressor and primary storage required
- Compressed air system controller required
- Compressed air system acceptance testing



## §120.7 (NEW) MANDATORY INSULATION REQUIREMENTS

- Applies to newly constructed buildings only
- a) Roof Insulation
  - Metal buildings weighted average U-factor  $\leq 0.098$
  - Wood framed weighted average buildings U-factor  $\leq 0.075$
- b) Wall Insulation
  - Metal building weighted average U-factor  $\leq 0.113$
  - Metal framed weighted average U-factor  $\leq 0.098$
  - Mass wall: Light Mass U-factor  $\leq 0.44$ , Heavy Mass U-factor  $\leq 0.69$
  - Wood framed weighted average buildings U-factor  $\leq 0.110$
- c) Floor Insulation
  - Raised Mass Floors-  $\geq 3$  inches of lightweight concrete over a metal deck or the weighted average U-factor of 0.269
  - Other Floors-The weighted average U-factor of the floor assembly  $\leq 0.071$



## **§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 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



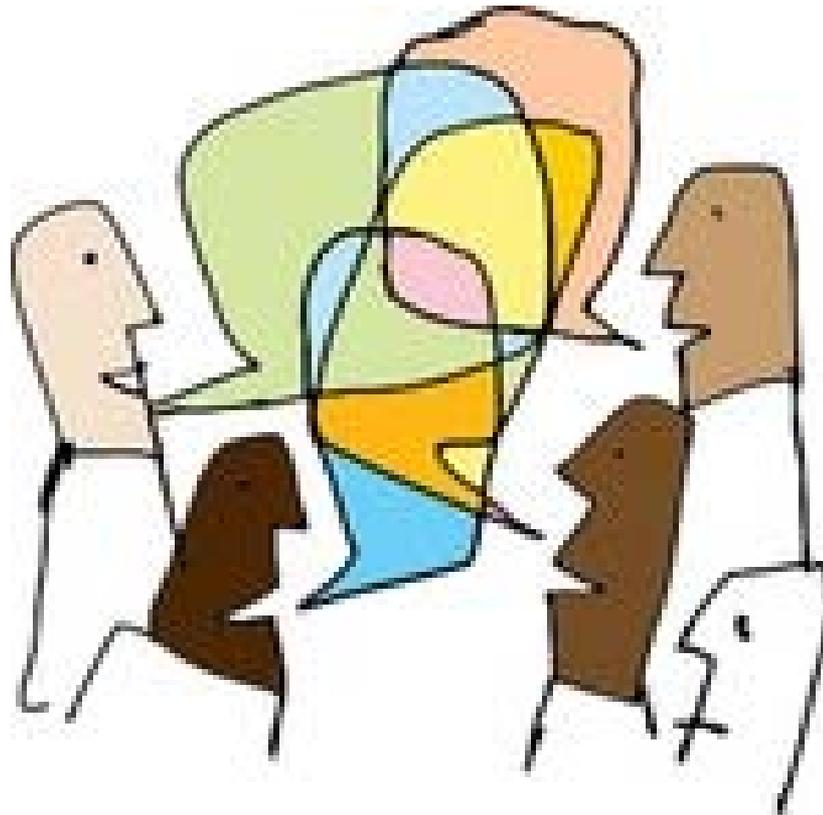
## §120.9 (NEW)

### MANDATORY REQUIREMENTS FOR COMMERCIAL BOILERS

- Boilers  $\geq 2.5$ MMBtu/hr
- Must have combustion air positive shut-off
- Combustion air fan motors  $\geq 10$  hp shall be variable speed or have motor demand limit controls such that motor demand  $\leq 30\%$  design wattage at 50% airflow
- Boilers  $\geq 5$ MMBtu/hr must maintain excess O<sub>2</sub>  $\leq 5\%$  by volume
- Exception to O<sub>2</sub> control for boilers with  $\geq 85\%$  thermal efficiency



## §110-120 COMMENTS





## §110.9 (119)

### LIGHTING CONTROL SYSTEMS & DEVICES

- Edited for clarity
- Self-contained lighting control devices moved from Title 24 to Title 20
- Lighting control systems remain in Title 24
- Lighting controls systems no longer required to be certified to the Energy Commission, but must have Installation Certificate



## §110.9 (119)

### LIGHTING CONTROL SYSTEMS & DEVICES

- Track lighting integral current limiter moved elements from §130(c)
- Supplementary overcurrent protection panel moved from §130(c)
- Residential High Efficacy Light Emitting Diode (LED) certified according to JA-8



## §110.9 (119)

### LIGHTING CONTROL SYSTEMS & DEVICES

- Removed: Minimum Relative System Efficiency (RSE) for Dimmable Fluorescent Ballasts
  - Was used only for earning PAF for dimmable linear fluorescent T5/T8
  - Removed to not conflict with pending federal Ballast Luminous Efficiency (BLE) requirements



## §130.0 (130)

### LIGHTING CONTROLS AND EQUIPMENT

- Luminaire classification & power - Edited for Clarity
  - Incandescent, Ballasts, Low-Voltage, Track Lighting, LED, & Miscellaneous
  - Simplified - recessed luminaires with medium screw base sockets  $\geq 50$  W per socket.
  - No “permanent” adaptors
  - Lamps do not change classification of luminaire type
- Lighting controls shall comply with §110.9



## §130.0 (130) LIGHTING CONTROLS AND EQUIPMENT

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



## §130.1 (131)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

- (a) Area Controls - Edited and rearranged for clarity
  - 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)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (b) Multi-Level Lighting Controls.

- General lighting;  $\geq 100$  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)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (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 ≤ five minutes
  - Note: The Standards have never recognized countdown timer switches as complying with the shutoff requirements
  - This actually adds an allowance that did not exist before



## §130.1 (131)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (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)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (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 building plans.
- Luminaires in the Skylit Daylit Zone controlled separately from Primary Sidelit Daylit Zones
- Automatic Daylighting Control Device Installation & Operationn
- Parking Garage Daylighting Requirements



## §130.1 (131)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (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.



## §130.1 (131)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

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



## §130.1 (131)

### INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

- Controls for Outdoor Lighting
  - Photocontrol or astronomical time control – turn off automatically during daytime.
  - Outdoor lighting controlled independently from other electrical loads.
  - Luminaires mounted  $\leq 24$  feet reduced from 40-80% with motion sensors
  - Outdoor Sales Frontage, Outdoor Sales Lots, & Outdoor Sales Canopies lighting, require distributed part-night device or motion sensor
  - Building Facade, Ornamental Hardscape & Outdoor Dining lighting, require distributed part-night device, motion sensor, or centralized time clock



## §130.3 (133)

### SIGN LIGHTING CONTROLS

- Edited for clarity
- No substantive changes



## §130.4 (134)

### LIGHTING CONTROL ACCEPTANCE AND INSTALLATION CERTIFICATE REQUIREMENTS

- Acceptance Requirements
  - NA-7
    - Automatic daylight controls
    - Shutoff controls
    - Demand Responsive Controls
    - Outdoor lighting controls



## §130.4 (134)

### LIGHTING CONTROL ACCEPTANCE AND INSTALLATION CERTIFICATE REQUIREMENTS

- Installation Certificate Requirements
  - Lighting control systems
  - Energy Management Control System
  - Line-voltage track lighting integral current limiters
  - Line-voltage track lighting supplementary overcurrent protection panels
  - Interlocked lighting systems
  - Lighting controls to earn a Power Adjustment Factor (PAF)
  - Additional wattage for videoconference studio



## §130.5 (NEW) 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, kitchenette in office spaces, & copy room.
- Demand Response Signals (specifications)
- Energy Management Control System (EMCS) provides all applicable functionality



## §110.9 and §130.0 to 130.5 COMMENTS





## §140.1 (141)

### PERFORMANCE APPROACH: ENERGY BUDGETS

- Clarified the basis of the performance compliance approach
- Clarified that the Compliance Software approval process is documented in the Nonresidential ACM Approval Manual



## §140.3 (143)

### PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES Roofs

- **Nonresidential**
  - Steep-sloped roofs in all climate zones shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16. (For **High-rise Residential** only in CZ 2 through 15)
  - Low-sloped roofs in all climate zones shall have a minimum aged solar reflectance of 0.65 and a minimum thermal emittance of 0.75, or a minimum SRI of 78. (For **High-rise Residential** only in CZ 2 through 15)
    - (to be added in the 15-day) Added continuous insulation as a prescriptive alternative to low-slope cool roof requirements.

Aged Solar Reflectance	Insulation R-value
0.64-0.60	4
0.59-0.55	8
0.54-0.50	12



## §140.3 (143)

### PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

#### 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)
- For dynamic glazing: the lowest-rate labeled U-factor, SHGC and the highest VT listed on the fenestration's NFRC label shall be used to demonstrate compliance



## §140.3 (143)

### PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

#### 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)

### PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

#### Section 140.3(a)9 – Air Barrier

- A continuous air barrier to control air leakage into and out of condition space shall be installed to the building envelope in Climate Zones 10-16, (except for High-Rise Residential and Relocatable Classrooms):
  - Can be met by testing of materials, assemblies, or the entire building.

#### 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 (143)

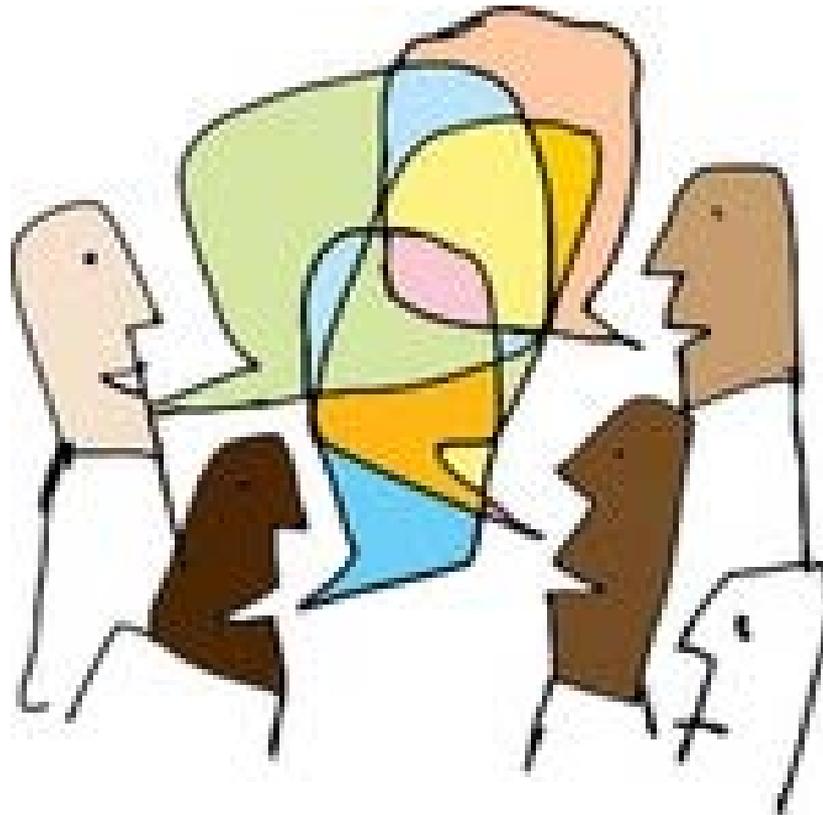
### PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

#### (c) Minimum Daylight Requirements for Large Enclosed Spaces

- 8,000 ft<sup>2</sup> threshold changed to > 5,000 ft<sup>2</sup>
- ≥ 50% floor area in the skylit daylight area changed to:
- ≥ 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



## §140.3 COMMENTS





## §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

- For DDC, added control requirements to reduce the degree to which primary air is reheated



## §140.4 (144)

### PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

#### (e) Economizers

- Updated Table 140.4-A ECONOMIZER TRADE-OFF TABLE - efficiency trade-offs updated to meet new economizer requirements
- Updated Table 140.4-B AIR ECONOMIZER HIGH LIMIT SHUT OFF CONTROL REQUIREMENTS – eliminated fixed, electronic, differential enthalpy control device types (except fixed enthalpy + fixed dry-bulb control type)
- Economizers and return air dampers on individual cooling fan systems have requirements for warranty, drive mechanism, reliability, leakage, adjustable setpoint, damper control sensor location, sensor accuracy, sensor calibration data, prevention of sensor false readings, relief air system
- Interlocked controls such that mechanical cooling only comes on when economizer at 100%
- DX systems with economizers must be able to stage or modulate cooling capacity
  - ✓ Constant Volume  $\geq$  75,000 Btuh: starting JAN 2014 – 2 stages
  - ✓ Constant Volume  $\geq$  65,000 Btuh: starting JAN 2016 – 2 stages
  - ✓ Variable Volume  $\geq$  65,000 Btuh: starting JAN 2014 – 3 or 4 stages, depending on size



## §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

- Fan control systems must vary the airflow rate as a function of actual load – either two speed or variable speed, with fan motor demand limitations:
  - ✓ Constant volume: 2 stage fan control,  $\leq 66\%$  design fan speed with  $\leq 40\%$  design fan power at stage 1
  - ✓ Variable volume: Proportional fan control, 50% design air volume with  $\leq 30\%$  design fan power
- DX systems  $\geq 75,000$  Btuh; CHW & Evap  $\geq 1$ HP fan motor : starting JAN 2014
- DX systems  $\geq 65,000$  Btuh; CHW & Evap  $\geq 1/4$ HP fan motor: starting JAN 2016



## §140.4 COMMENTS





## §140.6 (146)

### PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

- Edited for clarity
- Excluded office portable lighting changed from 0.2 W/sf to 0.3 W/sf
- Two interlocked lighting systems edited for clarity, and require Installation Certificate if invoked
- Reduction of wattage through controls (PAF) edited for clarity and consistency with changes to Table 140.6-A
- No more daylighting PAFs
- New PAF for OS in open offices



## §140.6 (146)

### PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

- Lighting wattage excluded.
  - Removed lighting for videoconferencing studio, moved to Area Category Table
  - Added exclusion for 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 REQUIREMENTS FOR INDOOR LIGHTING

- TABLE 140.6-A – Lighting Power Adjustment Factors (PAF)
- TABLE 140.6-B – Complete Building Method LPD Values W/ft<sup>2</sup>
- TABLE 140.6-C – Area Category Method LPD Values W/ft<sup>2</sup>
- 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)** **REQUIREMENTS FOR OUTDOOR LIGHTING**

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



## **§140.8 (148)**

### **REQUIREMENTS FOR SIGNS**

- Edited for clarity
- No substantive changes



## §140.6-140.8 COMMENTS





OUT TO LUNCH





## §140.9 (NEW)

### PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

#### (a) Prescriptive Requirements for Computer Rooms

- 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

#### (b) Prescriptive Requirements for Commercial Kitchens

- Reduce short-circuiting of kitchen exhaust hoods – replacement air limit to 10% of hood exhaust airflow rate
- Maximum exhaust flow rate requirements – TABLE 140.9–A
- Limitations on heated or cooled makeup air for spaces with exhaust hoods
- For kitchens with Type I + Type II exhaust hoods > 5,000 cfm
  - ✓ Transfer air is  $\geq 50\%$  of replacement air
  - ✓ Demand ventilation controls on  $\geq 75\%$  of exhaust air system
  - ✓ Energy recovery devices with recovery effectiveness  $\geq 40\%$  on 50% of total exhaust airflow
  - ✓ 75% or more of makeup air volume is unheated or uncooled
- Kitchen exhaust system acceptance testing



## §140.9 (NEW)

### PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

#### (c) Prescriptive Requirements for Laboratory Exhaust Systems

- For laboratory circulation rates  $\leq 10$  air changes per hour
- 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 0.75, or SRI of 75
  - Provide added continuous insulation as a prescriptive alternative to low-sloped cool roof requirements for the reflectance range of 0.25 to 0.62

Aged Solar Reflectance	Insulation R-value	Aged Solar Reflectance	Insulation R-value
0.62-0.60	2	0.44-0.40	12
0.59-0.55	4	0.39-0.35	16
0.54-0.50	6	0.34-0.30	20
0.49-0.45	8	0.29-0.25	24

- 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 0.75, or a minimum SRI of 16.



## §141.0 (149)

### ADDITIONS, ALTERATIONS, AND REPAIRS

#### **Section 141.0(b)1D - Altered Duct Systems that meet the criteria of Section 140.4(I)**

- Clarified the qualifications for entirely new or replacement duct system.
- Deleted the 60% reduction of duct leakage compliance option
- Added the smoke test protocol to the verification of all accessible leaks compliance option



## §141.0 (149)

### ADDITIONS, ALTERATIONS, AND REPAIRS

- Lighting System Alterations - Each room with > 10%
  - General Lighting 85% VS 100% of applicable general lighting  
= two-level lighting control - vs -Table 130.1-A
- Luminaire Modifications-in-Place - Each room with > 10%
  - WHEN > 40 “Building”
  - General Lighting 85% VS 100% of applicable general lighting  
= two-level lighting control - vs -Table 130.1-A



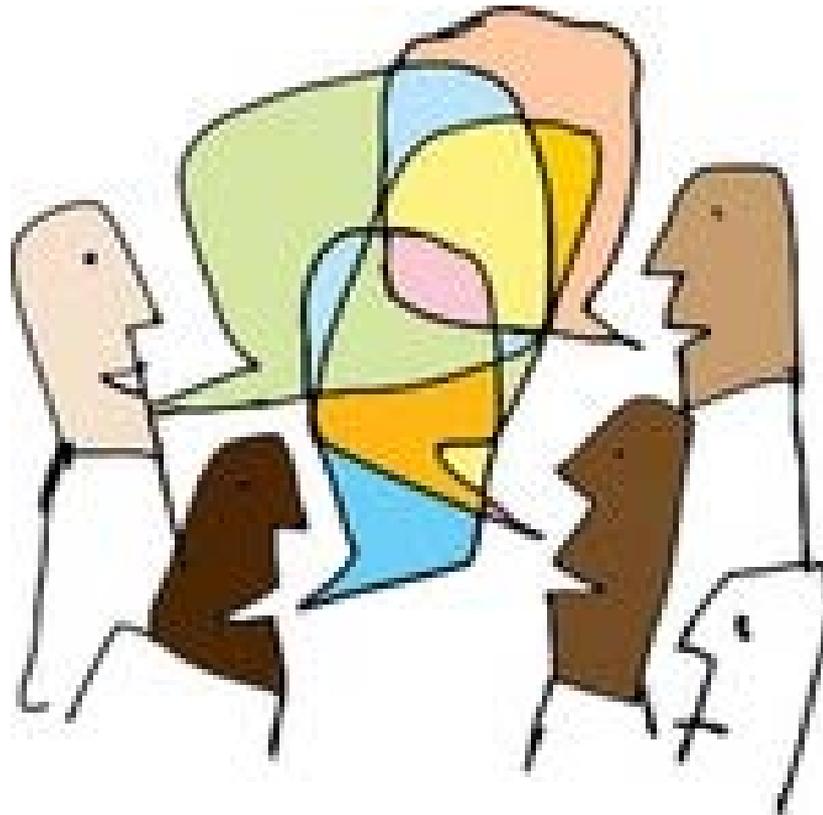
## §141.0 (149)

### ADDITIONS, ALTERATIONS, AND REPAIRS

- Performance Approach
  - Modified to simplify implementation
  - Added summary table of standard design and proposed design requirements based on the altered component



# §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:
  - ✓ Installed outdoor lighting power  $\leq 90\%$  of Part 6 allowance
  - ✓ Service water heating in restaurants  $\geq 8,000$  SF
    - Natural gas water heater with minimum 95% thermal efficiency
    - OR
    - Solar water-heating system that provides a minimum solar savings fraction of 0.15



## Green Building Standards – Energy Efficiency **COMMENTS**

