# 2013 Energy Standards Overview for Nonresidential Alterations

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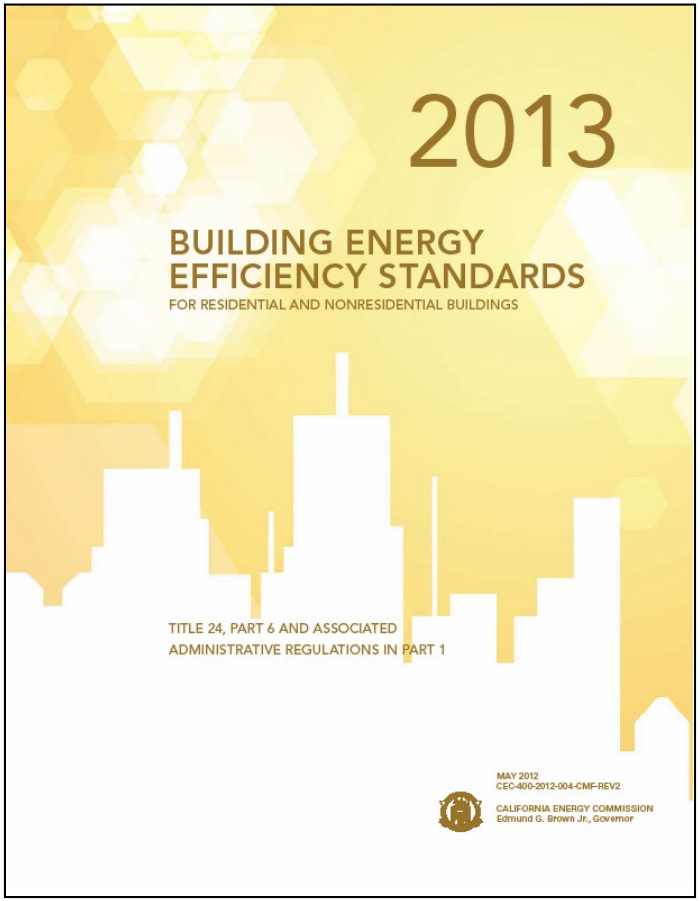
# A Little CEC History

- Section 25402 of the Public Resources Code (known as the **Warren Alquist Act**)
- The act created the Energy Commission in 1974 and gave it authority to develop and maintain Building Energy Efficiency Standards
- Requires the Standards and new requirements to be cost effective over the economic life of the structure
- Requires the Energy Commission to update the Standards periodically (about every 3 years)

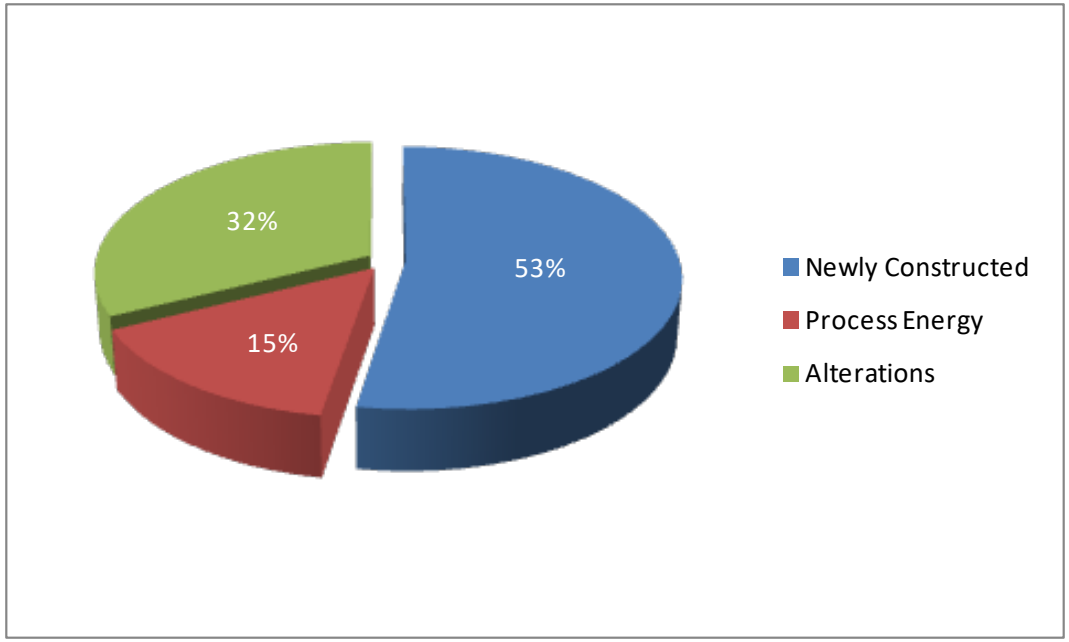
# 2013 Building Energy Efficiency Standards

- **Effective on July 1, 2014**
  - Building permit applications submitted on or after this date
- **Larger projects in plan review may be affected:**
  - Need to resubmit if permits pulled on/after effective date



# 2013 Nonresidential Energy Savings

- **Overall, 30% "better" than 2008 Standards**
- **2013 Nonres. Standards will save:**
  - 372 GWH/yr
  - 6.7 Mtherms/yr
  - 84 MW (first year)



# What the future holds

- AB 32 – Reduce carbon footprint
- CPUC/CEC Strategic Plan:
  - Net-zero energy use for residential buildings by 2020
  - Net-zero energy use for nonresidential buildings by 2030
- Energy Standards will "evolve/expand" and become more stringent to reach these goals

# *Prescriptive Measures for Nonresidential* ***Alterations***

# Lighting Alterations

## 2008 – *§149(b)1I*

- Must meet mandatory and prescriptive reqs. for alterations:
  - That increase the lighting load (watts/ft$^2$)
  - Where 50% or more of the lighting fixtures are replaced, removed, or re-installed
- Must meet mandatory reqs. for wiring alterations

## 2013 – *§141.0(b)2I*

- Lighting system alterations must meet reqs. in TABLE 141.0-E
  - Threshold criteria of 10% for altered fixtures
- Luminaire modifications-in-place must meet reqs. in TABLE 141.0-F
  - Threshold criteria of 40 luminaires for altered fixtures
- Acceptance test by CLCATT

# Lighting System Alterations Defined

ii. **Lighting System Alterations** shall meet the applicable requirements in TABLE 141.0-E and the following:

a. Lighting System Alterations include alterations where an existing lighting system is modified, luminaires are replaced, or luminaires are disconnected from the circuit, removed and reinstalled, whether in the same location or installed elsewhere.

**EXCEPTION 1 to Section 141.0(b)2Iii:** Alterations that qualify as a Luminaire Modification-in-Place.

**EXCEPTION 2 to Section 141.0(b)2Iii:** Portable luminaires, luminaires affixed to moveable partitions, and lighting excluded in accordance to Section 140.6(a)3.

# Lighting System Alteration Triggers

*TABLE 141.0-E Requirements for Luminaire Alterations*

| Quantity of existing affected luminaires per Enclosed Space [1] | Resulting Lighting Power for Each Enclosed Space | Applicable Mandatory Control Provisions for Each Enclosed Space | Multi-level Lighting Control Requirements for Each Altered Luminaire |
|---|---|---|---|
| **Alterations that do not change the area of the enclosed space or the space type** | | | |
| Sum total < 10% of existing luminaires | Existing lighting power is permitted | Existing provisions are permitted | Existing controls are permitted |
| Sum total ≥ 10% of existing luminaires | ≤ 85% of allowed lighting power per Section 140.6 Area Category Method | §130.1(a), (c) | Two level lighting control [2] or §130.1(b) |
| | > 85% of allowed lighting power per Section 140.6 Area Category Method | §130.1(a), (c), (d) [3] | §130.1(b) |
| **Alterations that change the area of the enclosed space or the space type or increase the lighting power in the enclosed space** | | | |
| Any number | Comply with Section 140.6 | §130.0(d) [3] §130.1(a), (c), (d) [3], (e) | §130.1(b) |

1. Affected luminaires include any luminaire that is changed, replaced, removed, relocated; or, connected to, altered or revised wiring, except as permitted by EXCEPTIONS 1 and 2 to Section 141.0(b)**2Iii:**
2. Two level lighting control shall have at least one control step between 30 percent and 70 percent of design lighting power in a manner providing reasonably uniform illuminations
3. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are altered.

# Luminaire Modifications-In-Place Defined

iii. **Luminaire Modifications-in-Place** shall meet the applicable requirements in TABLE 141.0-F and the following:

a. To qualify as a Luminaire Modification-in-Place, luminaires shall only be modified by one or more of the following methods:

1. Replacing lamps and ballasts with like type or quantity in a manner that preserves the original luminaire listing.

2. Changing the number or type of light source in a luminaire including: socket renewal, removal or relocation of sockets or lampholders, and/or related wiring internal to the luminaire including the addition of safety disconnecting devices.

3. Changing the optical system of a luminaire in part or in whole.

4. Replacement of whole luminaires one for one in which the only electrical modification involves disconnecting the existing luminaire and reconnecting the replacement luminaire.

# Luminaire Modifications-In-Place Triggers

*TABLE 141.0-F Requirements for Luminaire Modifications-in-Place*

For compliance with this Table, building space is defined as any of the following:

1. A complete single story building
2. A complete floor of a multifloor building
3. The entire space in a building of a single tenant under a single lease
4. All of the common, not leasable space in single building

| **Quantity of affected luminaires per Building Space per annum** | **Resulting Lighting Power per Each Enclosed Space Where ≥ 10% of Existing Luminaires are Luminaire Modifications-in-Place** | **Applicable mandatory control provisions for each enclosed space [1]** | **Applicable multi-level lighting control requirements for each modified luminaire [2]** |
|---|---|---|---|
| Sum total < 40 Luminaire Modifications-in-Place | Existing lighting power is permitted | Existing provisions are permitted | Existing controls are permitted |
| Sum total ≥ 40 Luminaire Modifications-in-Place | ≤ 85% of allowed lighting power per Section 140.6 Area Category Method | §130.1(a), (c) | Two level lighting control [3] Or §130.1(b) |
| | > 85% of allowed lighting power per Section 140.6 Area Category Method | §130.0(d) [4] §130.1(a), (c), (d) [4] | §130.1(b) |

1. Control requirements only apply to enclosed spaces for which there are Luminaire Modifications-in-Place.
2. Multi-level controls are required only for luminaires for which there are Luminaire Modifications-in-Place.
3. Two level lighting control shall have at least one control step between 30 percent and 70 percent of design lighting power in a manner providing reasonably uniform illuminations.
4. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are modified-in-place.

# Lighting Alterations and the Permit Process

- **Specify at permit req. Certificate of Compliance:**
  - NRCC-LTI-01 (all alt.)
  - NRCC-LTI-02 (mandatory)
  - NRCC-LTI-03 (watts/ft$^2$)
  - Must match specs. on electrical plans
- **Submit at Final req. NRCI and NRCA forms**
  - NRCI-LTI-05 (PAF)
  - NRCA-LTI-02 (Controls)

# HVAC Alterations

## 2008 – §149(b)1C, D, E

- Reqs. for
  - New space conditioning systems
  - Duct alterations
  - HVAC changeouts
    - Duct leakage testing
    - Acceptance testing
- MECH-1C-ALT from

## 2013 – *§141.0(b)2C, D, E*

- Reqs./criteria for all HVAC alterations did not change
- Acceptance testing will need to be performed by a CMATT when req.
  - When industry thresholds are met
- NRCC-MCH-ALT form under development

# HVAC Alteration Triggers and Requirements

- **New or replacement equipment**
  - Minimum efficiency values – §110.2 or Title 20)
  - Duct leakage testing if applicable – §140.4(l)
  - Applicable acceptance testing
  - Chilled water plants limited to 300 tons of air-cooled chillers
- **New or replacement ducts**
  - Minimum duct insulation – §120.4
  - Duct leakage testing if applicable – §140.4(l)
    - Less than 6% for new/replacement duct systems
    - Less than 15% for altered duct systems

# HVAC Alterations and the Permit Process

- **Specify at permit on NRCC-MCH:**
  - HVAC type and req. Acceptance tests
- **Ensure/Submit at Final:**
  - NRCA-MCH-02 (new systems)
  - NRCA-MCH-04 and NRCV-MCH-04 (duct leakage)
  - NRCA-MCH-05 (economizers)
    - NRCA forms must be signed my CMATT when req.

# Fenestration Alterations

## 2008 – *§149(b)1A*

- Replacement and added fenestration must:
  - ➢ Meet U-Factor and SHGC reqs. in §143
  - ➢ Meet 40% total and west facing area reqs. when glazing is added
    - ▪ Exempt from SHGC req. when less than 150 $ft^2$ of glazing is replaced
    - ▪ Exempt from SHGC req. when 50 $ft^2$ of glazing or less is added

## 2013 – *§141.0(b)2A*

- Replacement and added fenestration must:
  - ➢ Meet U-factor and SHGC reqs. in TABLE 141.0-A
  - ➢ Meet VT reqs. in §140.3
    - ▪ Exempt from SHGC and VT reqs. when less than 150 $ft^2$ of glazing is replaced
    - ▪ Exempt from SHGC and VT when 50 $ft^2$ of glazing or less if added

# Fenestration Alteration Requirements

*TABLE 141.0-A Altered Window Maximum U-Factor and Minimum RSHGC*

| Climate Zone | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U-factor | 0.47 | 0.47 | 0.58 | 0.47 | 0.58 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 |
| RSHGC | 0.41 | 0.31 | 0.41 | 0.31 | 0.41 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.41 |
| VT | See TABLE 140.3-B, C, and D for all Climate Zones | | | | | | | | | | | | | | | |

| | | | | All Climate Zones | | | |
|---|---|---|---|---|---|---|---|
| | | | | Fixed Window | Operable Window | Curtainwall or Storefront | Glazed Doors |
| Envelope | Fenestration | Vertical | Area-Weighted Performance Rating | Max U-factor | 0.36 | 0.46 | 0.41 | 0.45 |
| | | | | Max RSHGC | 0.25 | 0.22 | 0.26 | 0.23 |
| | | | Area-Weighted Performance Rating | Min VT | 0.42 | 0.32 | 0.46 | 0.17 |
| | | | Maximum WWR% | 40% | | | |
| | | | | | Glass, Curb Mounted | Glass, Deck Mounted | Plastic, Curb Mounted |
| | | Skylights | Area-Weighted Performance Rating | Max U-factor | 0.58 | 0.46 | 0.88 |
| | | | | Max SHGC | 0.25 | 0.25 | NR |
| | | | Area-Weighted Performance Rating | Min VT | 0.49 | 0.49 | 0.64 |
| | | | Maximum SRR% | 5% | | | |

# Fenestration Alterations and the Permit Process

- **Specify at permit on NRCC-ENV-01:**
  - Efficiency values and glazing area meet reqs.
- **Ensure/Submit at Final:**
  - Replaced/added fen. meets values/areas on NRCC-ENV-01
  - NRCI-ENV-01 form
  - NRCA-ENV-02 req. if site-built fenestration installed

# Re-roofs

## 2008 – *§149(b)1B*

- When more than 50% or 2,000 ft$^2$ replaced (whichever is less), must be cool roof
  - Same as prescriptive reqs. for both low-sloped and steep-sloped roofs (new const.)
  - Roof insulation alternative in TABLE 149-A

## 2013 – *§141.0(b)2B*

- Same threshold criteria
  - Same efficiency reqs. as prescriptive reqs. for new construction
  - Density criteria was removed
- Solar reflectance trade-off in TABLE 141.0-B

# Re-roof Requirements

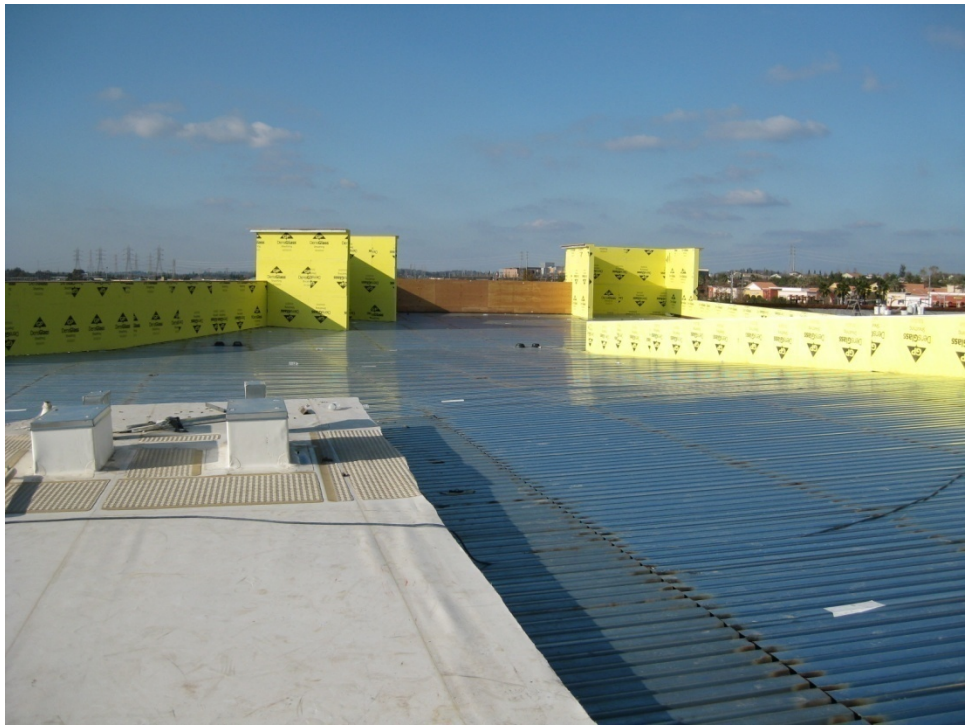
| *TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING HIGH-RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS)* | | | | Climate Zone | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Envelope | Maximum U-factor | Roofs/ Ceilings | Metal Building | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 | 0.065 |
| | | | Wood Framed and Other | 0.049 | 0.039 | 0.039 | 0.039 | 0.049 | 0.075 | 0.067 | 0.067 | 0.039 | 0.039 | 0.039 | 0.039 | 0.039 | 0.039 | 0.039 | 0.039 |
| | | Walls | Metal Building | 0.113 | 0.061 | 0.113 | 0.061 | 0.061 | 0.113 | 0.113 | 0.061 | 0.061 | 0.061 | 0.061 | 0.061 | 0.061 | 0.061 | 0.057 | 0.061 |
| | | | Metal-framed | 0.098 | 0.062 | 0.082 | 0.062 | 0.062 | 0.098 | 0.098 | 0.062 | 0.062 | 0.062 | 0.062 | 0.062 | 0.062 | 0.062 | 0.062 | 0.062 |
| | | | Mass Light[1] | 0.196 | 0.170 | 0.278 | 0.227 | 0.440 | 0.440 | 0.440 | 0.440 | 0.440 | 0.170 | 0.170 | 0.170 | 0.170 | 0.170 | 0.170 | 0.170 |
| | | | Mass Heavy[1] | 0.253 | 0.650 | 0.650 | 0.650 | 0.650 | 0.690 | 0.690 | 0.690 | 0.690 | 0.650 | 0.184 | 0.253 | 0.211 | 0.184 | 0.184 | 0.160 |
| | | | Wood-framed and Other | 0.102 | 0.059 | 0.110 | 0.059 | 0.102 | 0.110 | 0.110 | 0.102 | 0.059 | 0.059 | 0.059 | 0.059 | 0.059 | 0.059 | 0.042 | 0.059 |
| | | Floors/ Soffits | Mass | 0.092 | 0.092 | 0.269 | 0.269 | 0.269 | 0.269 | 0.269 | 0.269 | 0.269 | 0.269 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.058 |
| | | | Other | 0.048 | 0.039 | 0.071 | 0.071 | 0.071 | 0.071 | 0.071 | 0.071 | 0.071 | 0.071 | 0.039 | 0.071 | 0.071 | 0.039 | 0.039 | 0.039 |
| | Roofing Products | Low-sloped | Aged Solar Reflectance | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| | | | Thermal Emittance | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| | | Steep-Sloped | Aged Solar Reflectance | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| | | | Thermal Emittance | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0. 75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| | Air Barrier | | | NR | NR | NR | NR | NR | NR | NR | NR | NR | REQ | REQ | REQ | REQ | REQ | REQ | REQ |
| | Exterior Doors, Maximum U-factor | | Non-Swinging | 0.50 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | 0.50 |
| | | | Swinging | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |

# Solar Reflectance Trade-Off

*TABLE 141.0-B Roof/Ceiling Insulation Tradeoff for Aged Solar Reflectance*

| Aged Solar Reflectance | Climate Zone 1, 3-9 U-factor | Climate Zone 2, 10-16 U-factor |
|---|---|---|
| 0.62- 0.60 | 0.075 | 0.052 |
| 0.59-0.55 | 0.066 | 0.048 |
| 0.54-0.50 | 0.060 | 0.044 |
| 0.49-0.45 | 0.055 | 0.041 |
| 0.44-0.40 | 0.051 | 0.039 |
| 0.39-0.35 | 0.047 | 0.037 |
| 0.34-0.30 | 0.044 | 0.035 |
| 0.29-0.25 | 0.042 | 0.034 |

# Re-roofs and the Permit Process



- **Specify at permit on NRCC-ENV-01** *(Section E):*
  - SR and TE values meet requirements
  - If alternative is used
- **Ensure/Submit at Final:**
  - Installed cool roof values meet or exceed NRCC-ENV-01
    - *(CRRC product label)*
  - NRCI-ENV-02 form

# Electrical Power Alterations

- **New mandatory requirements in §130.5**
- **New or replacement electrical service**
  - Must be metered according to TABLE 130.5-A
- **New or replacement switchboards, panels, motor controls**
  - Must be disaggregated according to TABLE 130.5-B
- **New 120-volt receptacles**
  - Must be controlled, or be within 6 feet of controlled receptacle if uncontrolled

# Metering Requirements

*TABLE 130.5-A MINIMUM REQUIREMENTS FOR METERING OF ELECTRICAL LOAD*

| Meter Type | Services rated 50 kVA or less | Services rated more than 50kVA and less than or equal to 250 kVA | Services rated more than 250 kVA and less than or equal to 1000kVA | Services rated more than 1000kVA |
|---|---|---|---|---|
| Instantaneous (at the time) kW demand | Required | Required | Required | Required |
| Historical peak demand (kW) | Not required | Not required | Required | Required |
| Resettable kWh | Required | Required | Required | Required |
| kWh per rate period | Not required | Not required | Not required | Required |

# Disaggregation Requirements

*TABLE 130.5-B MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD*

| Load Type | Services rated 50 kVA or less | Services rated more than 50kVA and less than or equal to 250 kVA | Services rated more than 250 kVA and less than or equal to 1000kVA | Services rated more than 1000kVA |
|---|---|---|---|---|
| Lighting including exit and egress lighting and exterior lighting | Not required | All lighting in aggregate | All lighting disaggregated by floor, type or area | All lighting disaggregated by floor, type or area |
| HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers, and circulation pumps associated with HVAC | Not required | All HVAC in aggregate | All HVAC in aggregate and each HVAC load rated at least 50 kVA | All HVAC in aggregate and each HVAC load rated at least 50kVA |
| Domestic and service water system pumps and related systems and components | Not required | All loads in aggregate | All loads in aggregate | All loads in aggregate |
| Plug load including appliances rated less than 25 kVA | Not required | All plug load in aggregate<br>Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf | All plug load separated by floor, type or area<br>Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf | All plug load separated by floor, type or area<br>All groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf |
| Elevators, escalators, moving walks and transit systems | Not required | All loads in aggregate | All loads in aggregate | All loads in aggregate |
| Other individual nonHVAC loads or appliances rated 25kVA or greater | Not required | All | Each | Each |
| Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens | Not required | All | Each | Each |
| Renewable power source (net or total) | Each group | Each group | Each group | Each group |
| Loads associated with renewable power source | Not required | All loads in aggregate | All loads in aggregate | All loads in aggregate |
| Charging stations for electric vehicles | All loads in aggregate | All loads in aggregate | All loads in aggregate | All loads in aggregate |

# Elect. Power Alterations and the Permit Process

- **Specify at permit on NRCC-ELC-01 and ensure at Final:**
  - Elect. services are metered
  - Switchboards, panels, etc. are disaggregated
  - 120 volt receptacles are controlled or within 6 feet of controlled receptacle if uncontrolled


# For more information

- **2013 Standards Website at:**
  - http://www.energy.ca.gov/title24/2013standards/index.html
- **Training**
  - http://www.energy.ca.gov/title24/training/
- **List servers and Newsletter (*Blueprint*)**
  - http://www.energy.ca.gov/efficiency/listservers.html
- **Ace Web Toolkit**
  - http://www.energycodeace.com/content/home/