2013 Energy Standards Overview for Envelope

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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)
Historical Impact of Energy Standards

- Achieved over $65 billion in savings to ratepayers since mid-70s
- Californians pay 20% less on residential electricity bills than the average U.S. household
- Energy savings avoided the need to build nearly 30 large (500 MW) power plants since the mid-70s
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
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
Residential Envelope Energy Standards
Mandatory Measures
Solar Ready

• New Mandatory measures in §110.10

• Applicable to subdivisions $\geq$ 10 homes and all low-rise multi-family buildings

• Requirements for:
  - Solar zone (location and area)
  - Orientation and Shading
  - Interconnection pathways
  - Structural Design Loads
  - Main electrical service panel
## Insulation

<table>
<thead>
<tr>
<th>2008 – §150(a), (c), (d)</th>
<th>2013 – §150.0(a), (c), (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ceiling insulation</strong></td>
<td><strong>Ceiling insulation</strong></td>
</tr>
<tr>
<td>➢ Minimum R-19 required</td>
<td>➢ Minimum R-30 required</td>
</tr>
<tr>
<td><strong>Wall Insulation</strong></td>
<td><strong>Wall insulation</strong></td>
</tr>
<tr>
<td>➢ Minimum R-13 required</td>
<td>➢ Minimum R-13 req. in 2 X 4</td>
</tr>
<tr>
<td><strong>Raised floor insulation</strong></td>
<td>➢ Minimum R-19 req. in 2 X 6</td>
</tr>
<tr>
<td>➢ Minimum R-13 Required</td>
<td>➢ Raised floor insulation</td>
</tr>
<tr>
<td><strong>Weighted avg. permitted to meet equivalent U-factor</strong></td>
<td>➢ Minimum R-19 required</td>
</tr>
</tbody>
</table>
Fenestration

- New mandatory measure in §150.0(q)
- Windows and skylights must have a U-factor of 0.58 or less
  - Can calculate weighted average U-factor to meet requirement
- EXCEPTION:
  - Up to 10 ft² of fenestration or 0.5% of the CFA, whichever is greater, may be exempt from the maximum U-factor requirement of 0.58
Residential Envelope Energy Standards
Prescriptive Measures (New construction)
# Insulation

## 2008 – §151(f)1
- **Package D requirements:**
  - Cavity insulation reqs. only for framed assembly types
    - R-value
  - Below grade wall insulation req. only in Cl. Zn. 13

## 2013 – §150.1(c)1
- **Package A requirements:**
  - Must meet R-value or U-factor
  - Cavity and continuous insulation requirements for walls
    - 2 X 6 walls must meet U-factor req.
  - Below grade insulation required in ALL Cl. Zns. (interior or exterior)
## Radiant Barrier

### 2008 – §151(f)2

- Required in Climate Zones 2, 4, and 8 through 15
- Specified in “Special Features” section on CF-1R
- Verified on CF-6R-ENV-01 form
- Must be installed under roof deck and on gable ends and walls

### 2013 – §150.1(c)2

- Required in Climate Zones 2 through 15
- Specified in Section F of the CF1R
- Verified separately on CF2R-ENV-04-E form
  - Including free ventilation area requirements
## Fenestration

### 2008 – §151(f)3, 4

- **Package D requirements:**
  - 0.40 U-factor in all Cl. Zns.
  - 0.40/0.35 SHGC in Cl. Zns. 2 and 4 through 15
  - 20% maximum glazing area
  - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 15

### 2013 – §150.1(c)3, 4

- **Package A requirements:**
  - 0.32 U-factor in all Cl. Zns.
  - 0.25 SHGC in Cl. Zns. 2, 4, and 6 through 16
  - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 16
### Cool Roofs

#### 2008 – §151(f)12

- Package D requirements:
  - Steep-sloped roofs < 5 lb/ft²:
    - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 – 15
  - Steep-sloped roofs ≥ 5 lb/ft²:
    - 0.15 SR and 0.75 TE, or 10 SRI in ALL Cl. Zns.
  - Low-sloped roofs:
    - 0.55 SR and 0.75 TE, or 64 SRI in Cl. Zns. 13 and 15

#### 2013 – §150.1(c)11

- Package A requirements:
  - Density criteria removed
  - Steep-sloped roofs:
    - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 - 15
  - Low-sloped roofs:
    - 0.63 SR and 0.75 TE, or 75 SRI in Cl. Zns. 13 and 15
Residential Envelope Energy Standards
Prescriptive Measures (Additions)
### Additions – Prescriptive

#### 2008 – §152(a)

- Meet Package D reqs.
  - Some envelope alternatives and exceptions for:
    - Additions < 100 ft²
    - Additions < 1,000 ft²
  - Table 8-2 in Manual
- CF-1R or CF-1R-ADD form req. at Plan Review
- CF-6Rs req. at Final

#### 2013 – §150.2(a)

- Meet Package A reqs.
  - Env. alternatives/exception for:
    - Additions ≤ 400 ft²
    - Additions > 400 ft² and ≤ 700 ft²
    - Additions > 700 ft²
  - Tables 9-3A – C in Manual
- Can exempt additions < 300 ft² from CF1R and CF2R forms if HERS not req.
Residential Envelope Energy Standards
Prescriptive Measures (Alterations)
# Fenestration

## 2008 – §152(b)1A, B

- **Package D requirements:**
  - Replacement fen. must meet U-Factor and SHGC reqs.
  - Added fen. must meet efficiency and area reqs.
    - Exception: when fen. added ≤ 50 ft²
- CF-1R-ALT required
- CF-6R-ENV-01 required

## 2013 – §150.2(b)1A, B

- **Package A requirements:**
  - Replacement fen. must meet efficiency reqs.
    - Exceptions for vertical glazing and skylights
  - Added fen. must meet efficiency and area reqs.
    - Exceptions for vertical glazing and skylights
- Can exempt from CF1R and CF2R forms
# Re-roofs

<table>
<thead>
<tr>
<th>2008 – §152(b)1H</th>
<th>2013 – §150.2(b)1H</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When more than 50% or 1,000 ft² replaced (whichever is less), must be cool roof</td>
<td>• When more than 50% replaced, must be cool roof</td>
</tr>
<tr>
<td>➢ Steep-sloped roofs: same reqs. as prescriptive (new const.)</td>
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</tr>
<tr>
<td>▪ Numerous alternatives</td>
<td>▪ Alternatives revised/added</td>
</tr>
<tr>
<td>➢ Low-sloped roofs: same reqs. as prescriptive (new const.)</td>
<td>➢ Low-sloped roofs: same reqs. as prescriptive (new const.)</td>
</tr>
<tr>
<td>▪ Exempt if no ducts in attic</td>
<td>▪ New roof deck alternative in TABLE 150.2-A</td>
</tr>
</tbody>
</table>
Nonresidential Envelope Energy Standards Mandatory Measures
Solar Ready

• New Mandatory measures in §110.10

• Applicable to hotel/motel and high-rise multi-family buildings ≤ 10 stories; and all other nonres. buildings ≤ 3 stories

• Requirements for:
  - Solar zone (location and area)
  - Orientation and Shading
  - Interconnection pathways
  - Structural Design Loads
  - Main electrical service panel
Insulation

• New mandatory insulation reqs. in §120.7

• Maximum U-factor for roofs/ceilings
  ➢ Incl. metal buildings and wood framed

• Maximum U-factor for walls
  ➢ Incl. metal buildings and framed, light and heavy mass, wood framed, and spandrel panels and glass curtain walls

• Maximum U-factor for floors and soffits
  ➢ Incl. raised mass floors

* Can req. a note block on structural/architectural plans
Nonresidential Envelope Energy Standards
Prescriptive Measures
(New construction)
## Cool Roofs, Fenestration, etc.

<table>
<thead>
<tr>
<th>2008 – §143(a)</th>
<th>2013 – §140.3(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cool roof reqs. dependent on:</td>
<td>• Cool roofs:</td>
</tr>
<tr>
<td>➢ Slope</td>
<td>➢ Density criteria removed</td>
</tr>
<tr>
<td>➢ Climate zone</td>
<td>➢ Solar reflectance trade-off in TABLE 140.3</td>
</tr>
<tr>
<td>➢ Density (lb/ft²)</td>
<td>• Windows/skylights</td>
</tr>
<tr>
<td>• Windows/skylights must meet U-factor and SHGC reqs.</td>
<td>➢ Must meet min. VT reqs.</td>
</tr>
<tr>
<td>• Reqs. in TABLE 143-A through 143-C</td>
<td>• New air barrier reqs.</td>
</tr>
<tr>
<td></td>
<td>➢ Approved materials in TABLE 140.3-A</td>
</tr>
<tr>
<td></td>
<td>• Reqs. in TABLE 140.3-B through 140.3-D</td>
</tr>
</tbody>
</table>
Nonresidential Envelope Energy Standards
Prescriptive Measures (Alterations)
## Re-roofs

### 2008 – §149(b)1B
- When more than 50% or 2,000 ft² 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
  - Remember that density criteria was removed
- Solar reflectance trade-off in TABLE 141.0-B
For more information

• **2013 Standards Website at:**

• **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/
2016 Standards

• Want to help forge the next set of Standards?
  ➢ http://www.energy.ca.gov/title24/2016standards/prerulemaking/documents/

• Where do I submit comments?