

# 2015 CBES Stretch Guidelines

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Incorporated by Criterion 9(F) Procedure adopted May 10, 2016; revised May 20<sup>th</sup>, 2016; effective June 1, 2016

Item #	Base Code Description	Stretch Guideline Description	Source	Link to Proposed Language
1.	Buildings must comply with either: a. Materials or Assemblies <i>or</i> b. Air leakage testing to 0.50 CFM/SF of shell area	Buildings must comply with either: a. Materials or Assemblies plus air barrier commissioning <i>or</i> b. Air leakage testing to 0.40 CFM/SF of shell area	ICC G4-2012 Guideline for Commissioning	<a href="#">C701</a>
2.	Table C402.1	Meet specified insulation R-values/u-factors for opaque building envelope	Climate zone 6 and 7 in 2015 IECC	<a href="#">Table C702.1</a>
3.	Table C402.4	Meet specified u-factors and SHGC values for building envelope fenestration	Better than Climate zone 6 in 2015 IECC	<a href="#">Table C702.4</a>
4.	C403.2.9 Duct and plenum insulation and sealing. No limit on amount of outside ductwork.	Meet all base code duct insulation requirements plus additional requirement of no more than 5% of the ductwork may be located outside the building thermal envelope.	<a href="#">Advanced Buildings New Construction Guide</a>	<a href="#">C703.2.9</a>
5.	C403.2.7 Energy recovery ventilation systems. Climate Zone 6 requirements.	HVAC Energy Recovery	Climate zones 7 and 8 in 2015 IECC	<a href="#">C703.2.7</a>

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6.	Projects must choose one package.	Additional Efficiency Package Options: Choose any two packages. If package requiring Section 406.5 is not chosen, choose two packages and meet <i>Section C706.2 Requirements for renewable-ready energy systems</i>	N/A	<a href="#">C706.1</a>
7.	None	Computer/Server Rooms	New Buildings Institute Core Performance Tier 2	<a href="#">C707.1</a>
8.	None	Electric Vehicle Charging Stations	N/A	<a href="#">C708.1</a>

## Air Barrier Compliance Stretch Code Requirement

Base Code Reference Section	Stretch Code Section	Comments
C402.5 Air leakage—thermal envelope	C701	Buildings must comply with either: a. Materials or Assemblies plus air barrier commissioning <i>or</i> b. Air leakage testing to 0.40 CFM/SF of shell area

**C701 Air leakage—thermal envelope (Mandatory).** The *thermal envelope* of buildings shall comply with Sections C402.5.1 through C402.5.8 of the base code, in addition to stretch code section C701.1, or the building *thermal envelope* shall be tested and deemed to comply with the provisions of these sections when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/per square foot of shell area (excluding area of slab and below grade walls) at 50 Pa in accordance with ASTM E 779 or an equivalent method approved by the code official or authority having jurisdiction. Where compliance is based on such testing, the building shall also comply with Sections C402.5.5, C402.5.6 and C402.5.7.

**C701.1 Continuous Air Barrier Commissioning.** Prior to the final inspection, the owner or owner designated registered design professional shall provide evidence of commissioning of the continuous air barrier by an approved commissioning authority. As part of the continuous air barrier commissioning, a building air leakage test shall be performed and the resulting air leakage rate of the building thermal envelope shall be reported in units of cfm/per square foot of shell area (excluding area of slab and below grade walls) at 50 Pa in accordance with ASTM E 779 or an equivalent method approved by the code official or authority having jurisdiction. There is no maximum air leakage rate specified for compliance. A final commissioning report shall be delivered to the building owner, registered design professional and contractor and shall include at a minimum:

1. A field inspection checklist showing the requirements necessary for proper installation of the continuous air barrier.
2. The results of the required building air leakage testing (no maximum air leakage rate specified for compliance).
3. Reports from field inspections during project construction showing compliance with continuous air barrier requirements including but not limited to proper material handling and storage, use of approved materials and

approved substitutes, proper material and surface preparation, air barrier continuity at building thermal envelope penetrations

**C701.2 Building Envelope Commissioning Guideline.** In addition to complying with C701.1, projects shall follow all applicable items in Table C701.2.

**TABLE C701.2 BUILDING ENVELOPE Commissioning Checklist**

<b>RELATED SYSTEMS, EQUIPMENT, ASSEMBLIES AND COMPONENTS</b>	<b>TASKS/COMMENTS</b>
• Foundations subsoil drainage system	• Verify compliance with approved plans, specifications and construction documents.
• Foundation damp-proofing and waterproofing	
• Flashing at: exterior doors, skylights, wall flashing and drainage systems	
• Exterior wall coverings	
• Moisture envelopes	• Meet Owner's Project Requirements (OPR), Basis of Design (BOD), Cx specifications.
• Exterior below-grade walls	• Check for proper drainage system at exterior wall perimeter to keep water from entering the building.

**TABLE C701.2 BUILDING ENVELOPE Commissioning Checklist  
(Continued)**

RELATED SYSTEMS, EQUIPMENT, ASSEMBLIES AND COMPONENTS	TASKS/COMMENTS
<ul style="list-style-type: none"> <li>External floor and soffits, slab-on-grade</li> </ul>	<ul style="list-style-type: none"> <li>Check for thermal resistance or insulation when required.</li> <li>Slabs: Check drainage for moisture penetration.</li> </ul>
<ul style="list-style-type: none"> <li>Exterior walls</li> </ul>	<ul style="list-style-type: none"> <li>Check drawings for wall assembly requirements and any sound transmission class (STC) requirements in accordance with ASTM E 90 and ASTM E 413.</li> </ul>
<ul style="list-style-type: none"> <li>Exterior glazed window fenestration: windows, glazed doors and skylights</li> </ul>	<p>Drawing reviews and contractor submittal reviews:</p> <ul style="list-style-type: none"> <li>Check that fenestration products are labeled with a U-factor (see NFRC 100) and a solar heat gain coefficient (SHGC) (see NFRC 200), and certification for the air infiltration requirement of 0.3 cfm/ft<sup>2</sup> of the 2010 California Energy Code (CEC) or other approved standards.</li> <li>Check for proper flashing and caulking at walls and roof assemblies.</li> </ul> <p>Glazed doors:</p> <ul style="list-style-type: none"> <li>Check for proper flashing, and seals and gaskets; and proper pull force, if provided with a closer.</li> <li>Check for proper door swing.</li> <li>Check for STC requirements, if applicable.</li> </ul>
<ul style="list-style-type: none"> <li>Site-built fenestration: curtain walls and store-front systems, and atrium roof systems</li> </ul>	<ul style="list-style-type: none"> <li>Check for a label certificate issued by the National Fenestration Rating Council (NFRC) or a label certificate issued by the glazing fabricator that meets the default U-factor of the 2008 CEC and SHGC; or an NFRC component modeling approach (CMA) label certificate or another approved standard.</li> <li>Check for proper door swing.</li> <li>Check for STC requirements, if applicable.</li> </ul>
<ul style="list-style-type: none"> <li>Field-fabricated fenestrations: fenestration made at the site, not preformed or cut</li> </ul>	<ul style="list-style-type: none"> <li>Check for compliance with the default U-factor and the default SHGC in accordance with the tables of the 2008 CEC or another approved standard.</li> </ul>
<ul style="list-style-type: none"> <li>Exterior doors</li> </ul>	<ul style="list-style-type: none"> <li>Check for proper flashing installation at header, walls and floor.</li> <li>Check for U-factor requirements for swinging and nonswinging doors.</li> <li>Check for appropriate manufacturer's referenced standard [American Architectural Manufacturer's Association (AAMA); Canadian Standards Association (CSA); and Window and Door Manufacturer's Association (WDMA) or other approved standard] product data sheets.</li> </ul>
<ul style="list-style-type: none"> <li>Sealants, control joints and flashing (stationary and moveable)</li> </ul>	<ul style="list-style-type: none"> <li>Check for proper installation in accordance with the manufacturer's written instructions.</li> </ul>
<ul style="list-style-type: none"> <li>Shading devices (stationary and</li> </ul>	<ul style="list-style-type: none"> <li>Check for proper anchoring to building with proper flashing at wall connections.</li> </ul>
<ul style="list-style-type: none"> <li>Structural systems</li> </ul>	<ul style="list-style-type: none"> <li>Check for proper anchoring in accordance with construction documents, including metal connectors and beam supports.</li> </ul>
<ul style="list-style-type: none"> <li>Materials and finishes</li> </ul>	<ul style="list-style-type: none"> <li>Check for compliance with allowed volatile organic compound limits and proper manufacturer's installation application.</li> </ul>

## Opaque Envelope Stretch Code Requirements

**TABLE C702.1 BUILDING ENVELOPE REQUIREMENTS—OPAQUE ASSEMBLIES AND ELEMENTS**

Component	Maximum Overall U-Factor		Example Minimum R-Values	
	All other	Group R	All other	Group R
<b>Roofs</b>				
Insulation entirely above deck	U-0.028		R-35ci	
Metal buildings	U-0.029		R-30 + R-11LS	
Attic and Other	U-0.021		R-49	
<b>Walls, Above grade</b>				
Mass	U-0.071		R-15.2ci	
Metal building	U-0.052		R-19.5ci or R-13 + R-13ci	
Metal-framed	U-0.049		R-13 + R-12.5ci or R-18ci	
Wood-framed and other	U-0.051		R-15ci or R-13 + R-7.5ci or R-19 + R-5ci	
<b>Walls, Below Grade</b>				
Below-grade wall	C-0.092		R-10ci	
<b>Floors</b>				
Mass	U-0.055	U-0.051	R-15ci	R-16.7ci
Joist/Framing-metal	U-0.032		R-38	
Joist/Framing – Wood & Other	U-0.027		R-38	
<b>Slab-on-Grade Floors</b>				
Unheated slabs	F-0.48	F-0.45	R-10 for 48 in. below	R-15 for 48 in. below
Heated slabs	F-0.55		R-10 for entire slab	
<b>Opaque Doors</b>				
Swinging	U-0.37		N/A	
Non-Swinging	N/A		R-4.75	
Upward-acting, Sectional	N/A		R-10	

## Building Envelope Fenestration Stretch Code Requirements

TABLE C702.4

### BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS

Vertical Fenestration		
U-factor		
Fixed fenestration	>0.35 <sup>1</sup>	
Operable fenestration	0.42	
Entrance doors	0.77	
SHGC		
Orientation <sup>a</sup>	S/E/W	N
PF < 0.2	0.40	0.53
0.2 ≤ PF < 0.5	0.48	0.58
PF ≥ 0.5	0.64	0.64
Skylights		
U-factor	0.50	
SHGC	0.40	

PF = Projection factor.

<sup>a</sup>“N” indicates vertical fenestration oriented within 45 degrees of true north. “SEW” indicates orientations other than “N.”

<sup>1</sup>[ENERGY STAR Product Specification Residential Windows, Doors, and Skylights Version 6.0](#) Equivalent Energy Performance Specification can be used for residential applications.

## Exterior Duct Limitation Stretch Code Requirements

**C703.2.9 Roof-top unit, duct and plenum insulation and sealing.** Supply and return air ducts and plenums shall be insulated with a minimum of R-8 insulation where located in unconditioned spaces within the building and where located outside the building with a minimum of R-12 insulation. No more than 5% of the ductwork may be located outside the building thermal envelope. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior by a minimum of R-12 insulation.

*Exceptions:*

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum is not greater than 15°F (8°C).

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

## HVAC Energy Recovery Stretch Code Requirements

**C703.2.7 Energy recovery ventilation systems.** Where the supply airflow rate of a fan system meets or exceeds the values specified in Tables C703.2.7(1) or for ventilation systems operating not less than 8,000 hours per year, the system shall include an energy recovery system. *[All other base code requirements apply]*

**TABLE C703.2.7(1) ENERGY RECOVERY REQUIREMENT**  
(Ventilation systems operating less than 8,000 hours per year)

PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE	≥ 10% and < 20%	≥ 20% and < 30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50%
DESIGN SUPPLY FAN AIRFLOW RATE (cfm)	≥ 4,500	≥ 4,000	≥ 2,500	≥ 1,000	> 0

For SI: 1 cfm = 0.4719 L/s.

## Additional Efficiency Package Options

**C706.1 Requirements for renewable-ready energy systems.** Building projects with footprint greater than 20,000 square feet, shall install *on-site renewable energy* systems with a minimum rating of 3.7 W/ft<sup>2</sup> or 13 Btu/h-ft<sup>2</sup> (40 W/m<sup>2</sup>) multiplied by the horizontally-projected gross roof area. This system must meet a minimum of 6% of the projected energy use of the building for mechanical and service water heating and lighting or cover an area not to exceed 75% of gross roof area less the area covered by rooftop equipment, skylights, occupied roof decks and planted areas. This system can be ground mounted as long as all relevant permits are obtained.

### Exceptions:

1. Additions under 20,000 square feet, alterations and repairs to existing buildings.

**If the building location, required orientation or design cannot accommodate the required on-site renewables then other options should be explored and proposed by the design team to the relevant authority.**

**C706.2 Requirements.** Buildings shall comply with at least two of the following package options:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.

Where the on-site supply of renewable energy is not chosen, the roof will be designed to meet future renewable energy installations load and roof penetration needs. Placement of rooftop units and ancillary equipment will be done in a manner to maximized available space for any future renewable installations, or appropriate space set aside for a ground mounted system included in any relevant designs used for



permitting. If the building location, required orientation or design cannot accommodate an on-site renewables then other options should be explored and proposed by the design team to the relevant authority.

## **Computer/Server Rooms Stretch Code Requirements**

**C707.1 Economizers.** Each individual cooling fan system primarily serving computer room(s) shall include either:

1. An integrated air economizer capable of providing 100 percent of the expected system cooling load as calculated in using, an outside air temperatures of 55°F dry-bulb/50°F wet-bulb and below; or
2. An integrated water economizer capable of providing 100 percent of the expected system cooling load as calculated using, an outside air temperatures of 40°F dry-bulb/35°F wet-bulb and below.

### **Exceptions:**

1. Individual computer rooms under 5 tons.
2. New cooling systems serving an existing computer room in an existing building up to a total of 50 tons of new cooling equipment per building.
3. New cooling systems serving a new computer room in an existing building up to a total of 20 tons of new cooling equipment per building.
4. A computer room may be served by a fan system without an economizer if it is also served by a fan system with an economizer that also serves non-computer room(s) provided that all of the following are met:
  - 4.1. The economizer system is sized to meet the design cooling load of the computer room(s) when the non-computer room(s) are at 50% of their design load; and.
  - 4.2. The economizer system has the ability to serve only the computer room(s), e.g. shut off flow to non-computer rooms when unoccupied; and.
  - 4.3. The non-economizer system does not operate when the cooling load of the non-computer room(s) served by the economizer system is less than 50% of design load.

**C707.1.2 HVAC controls.** Each computer room zone shall have controls that prevent reheating, recooling, and simultaneous provisions of heating and cooling to the same zone, such as mixing or simultaneous supply of air that has been previously mechanically heated and air that has been previously cooled, either by cooling equipment or by economizer systems.

**C707.1.3 Humidification.** Non-adiabatic humidification (e.g. steam, infrared) is prohibited. Where humidification is needed, only adiabatic humidification (e.g. direct evaporative, ultrasonic) is permitted.

**C707.1.4 Fan power limitation.** The total fan power at design conditions of each fan system shall not exceed 27 W/kBtu·h of net sensible cooling capacity.

**C707.1.5 Fan power controls.** Each unitary air conditioner with mechanical cooling capacity exceeding 60,000 Btu/hr and each chilled water fan system shall be designed to vary the airflow rate as a function of actual load and shall have controls and/or devices (such as two-speed or variable speed control) that will result in fan motor demand of no more than 50 percent of design wattage at 66 percent of design fan speed.

**C707.1.6 Air sealing.** Computer rooms with air-cooled computers in racks and with a design load exceeding 175 kW/room shall include air barriers such that there is no significant air path for computer discharge air to recirculate back to computer inlets without passing through a cooling system.

**Exception:** Computer racks with a design load less than 1 kW/rack.

## Electric Vehicle Charging Stations

**C708.1 Electric Vehicle Charging.** New commercial, industrial and other non-residential uses listed herein shall provide the electrical service capacity to serve the number of Electric Vehicle Charging Parking Spaces in Table C708.1. Electrical service capacity includes use of a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service.

50% of the parking spaces, rounded up to the nearest whole number, shall have Electric Vehicle Supply Equipment (EVSE) or receptacles necessary to function as available electric vehicle charging upon building occupancy. The remainder shall be pre-wire to allow for installations at such time as they are needed for use by customers, employees or other users.

Parking spaces with EVSE shall be marked for EV use only.

Level 1 Electric Vehicle Charging Parking requires one 120V 20 amp grounded AC receptacle, NEMA 5-20R or equivalent, within 5 feet of the centerline of each EV Charging Parking Space.

Level 2 Electric Vehicle Charging Parking requires one 208/240V 40 amp grounded connection for electric vehicle charging through dedicated Electric Vehicle Supply Equipment (EVSE) with J1772 connector or AC receptacle, NEMA 14-50 or equivalent, within 5 feet of the centerline for each EV Charging Parking Space.

This guideline does not stipulate how use of the EVSE is provided.

**TABLE C708.1 ELECTRIC VEHICLE CHARGING PARKING SPACES**

Facility Type	Minimum Number of Electric Vehicle Charging Parking Spaces					
	Whole numbers represent actual number of required spaces Fractional percentages shall be rounded up to nearest whole number					
	<25 Parking Spaces in Lot		≥25 and < 500 Parking Spaces in Lot		≥ 500 Parking Spaces in Lot	
	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2
Retail	0	0	2%	1%	1%	5
Hotel / Motel	1	0	2%	1%	1%	5
Restaurant	1	1	2%	2%	1%	5
Hospital / Health Care	1	0	2%	2%	1%	5
Office	1	0	4%	1%	2%	5
School / University	0	0	4%	2%	2%	5
Industrial	0	0	4%	1%	1%	5

If the design intent is to only provide level 2 charging stations then the level 1 and level 2 requirements should be added together.