



RESIDENTIAL ENERGY 2013

PLANNING & BUILDING DEPARTMENT • COUNTY OF SAN LUIS OBISPO
976 OSOS STREET • ROOM 200 • SAN LUIS OBISPO • CALIFORNIA 93408 • (805) 781-5600

GENERAL

PLEASE LOOK AT THE [2013 Residential Compliance Manual](#)

BER 01.

NEW ENERGY STANDARDS

California Energy Commission mandated changes in both residential and nonresidential energy requirements. These changes apply to all permits applied on July 1, 2014. The version of the computer program that you have used is no longer current. Provide new calculations using acceptable updated residential computer energy programs. As of July 1, 2014, they are the following:

CBECC-Res ver.3
(<http://www.bwilcox.com/BEES/BEES.html>)
EnergyPro V6.3 (<http://www.energysoft.com/>)
Right-Energy Title 24 v1.1
(<http://www.wrightsoft.com/>)

BER 02.

WHERE TO FIND THE REGULATIONS

Web site <http://www.energy.ca.gov/title24/>

BER 03.

ENERGY COMPLIANCE FORMS REQUIRED ON PLANS

Graphically incorporate all energy requirements within your plans. Attach/incorporate CF-1R and MF-1R energy forms within your plans.

BER 04.

DATE AND TIME

Do all pages of the CF1R have the same "Report Generated" date and time?

BER 05.

ENERGY-METHOD

Provide documentation for the PRESCRIPTIVE PACKAGE method of energy compliance OR the COMPUTER method of compliance.

BER 06.

SOFTWARE

Compliance software approved for 2013 Low-rise Residential Standards?

BER 07.

REGISTRATION NUMBER

If HERS verification is required, has the CF1R been registered with a HERS provider?

BER 08.

ELECTRONIC SIGNATURE

Is the CF1R signed and dated by both required roles? Documentation Author and Responsible Builder Designer or Owner

BER 09.

CF1R

Is the CF1R filled on the plans? CF1R-PRF-01 for New construction or CF1R-PRF-02 for Additions and/or Alterations

BER 10.

CF1R INPUTS CONFIRMED ON THE PLANS

Are the following CF1R inputs confirmed on the plans?

Climate Zone
Building Type
Project Scope
Total Conditioned Floor Area (ft²)
Addition Conditioned Floor Area (ft²)
Building Front Orientation
Number of Dwellings
Number of Stories
Principal heating source

BER 11.

ENERGY COMPLIANCE NOTES

Note on plans R-6 duct insulation minimum
Note on plans all hot water pipes 3/4 inches or greater to the kitchen shall be insulated.
Note on the plans that both hot and cold water pipes shall be insulated five feet minimum from the hot water heater.
Hydronic heated slab systems require slab edge insulation.

ROOFS, ATTICS, CEILINGS

BER 12.

CEILING AND RAFTER ROOF INSULATION

The opaque portions of ceilings separating conditioned spaces from unconditioned spaces or ambient air shall meet the requirements of Item 1 or 2 below (Section 150.0(a)):

1. Ceilings and rafter roofs shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-30 or greater for the insulation alone. Attic access doors shall have permanently attached insulation using adhesive or mechanical fasteners. The attic access shall be gasketed to prevent air leakage.
2. The weighted average U-factor shall not exceed 0.031 that would result from installing R-30 insulation between wood-framing members.

BER 13.

LOOSE-FILL INSULATION

When loose-fill insulation is installed, the minimum installed weight per square foot shall conform with the insulation manufacturer's installed design weight per square foot at the manufacturer's labeled R-value (Section 150.0(b)).

BER 14.

VAPORIZED RETARDER

In Climate Zones 1-16 with unvented crawl spaces the earth floor of the crawl space shall be covered with a Class I or Class II vapor retarder; or In a building having a controlled ventilation crawl space, a Class I or Class II vapor retarder shall be placed over the earth floor of the crawl space to reduce moisture entry and protect insulation from condensation (Section 150.0(g)).

BER 15.

SOLAR READY

Solar ready buildings shall meet the requirements of Section 110.10 applicable to the building project (Section 150.0(r)):

- b) The solar zone shall be located on the roof or overhang of the building and have a total area not less than 250 square feet.
- c) The construction documents shall indicate location for inverters and metering equipment and a pathway for routing of conduit from the solar zone to the point of interconnection with the electrical service. For single-family residences the point of interconnection will be the main service panel.
 - a. The construction documents shall also indicate a pathway for routing of plumbing from the solar zone to the water-heating system.
- d) A copy of the construction documents or a comparable document indicating the information from Section 110.10(b-c) shall be provided to the occupant.
- e) The main electrical service panel shall have a minimum busbar rating of 200 amps and a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. (The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location and labeled "For Future Solar Electric.")

BER 16.

ADDITIONS

Additions to existing residential buildings shall meet the requirements of Sections 110.0 through 110.9, and Section 150.0(a) through (q), and either section 150.2(a)1 or 2. (Section 150.2(a))

BER 17.

ALTERATIONS

Replacements of the exterior surface of existing roofs shall meet the requirements of Section 110.8.

BER 18.

TRADEOFFS

The standard design for an altered component shall be the higher efficiency of existing conditions or the requirements stated in Table 150.2-B. For components not being altered, the

standard design shall be based on the existing conditions. When the third party verification option is specified as a requirement, all

components proposed for alteration must be verified. (Section 150.2(b)2)

**TABLE 150.2-B
STANDARD DESIGN FOR AN ALTERED COMPONENT**

ALTERED COMPONENT	STANDARD DESIGN WITHOUT THIRD PARTY VERIFICATION OF EXISTING CONDITIONS SHALL BE BASED ON	STANDARD DESIGN WITH THIRD-PARTY VERIFICATION OF EXISTING CONDITIONS SHALL BE BASED ON
Ceiling insulation, wall insulation, and raised-floor insulation	The requirements of Sections 150.0(a), (c), and (d)	The existing insulation R-value
Fenestration	The U-factor of 0.40 and SHGC value of 0.35. The glass area shall be the glass area of the existing building.	If the proposed U-factor is ≤ 0.40 and SHGC value is ≤ 0.35 , the standard design shall be based on the existing U-factor and SHGC values as verified. Otherwise, the standard design shall be based on the U-factor of 0.40 and SHGC value of 0.35. The glass area shall be the glass area of the existing building.
Window film	The U-factor of 0.40 and SHGC value of 0.35.	The existing fenestration in the alteration shall be based on Tables 110.6-A and 110.6-B.
Space-heating and space-cooling equipment	The requirements of Table 150.1-A.	The existing efficiency levels.
Air distribution system – duct sealing	The requirements of Section 150.2(b)1D.	
Air distribution system – duct insulation	The proposed efficiency levels.	The existing efficiency levels.
Water heating systems	The requirements of Section 150.1(b)1 without the solar water heating requirements.	The existing efficiency energy factor.
Roofing products	The requirements of Section 150.2(b)1H.	
All other measures	The proposed efficiency levels.	The existing efficiency levels.

WALLS

BER 19.

LOOSE-FILL INSULATION

When loose-fill insulation is installed, the minimum installed weight per square foot shall conform with the insulation manufacturer’s installed design weight per square foot at the manufacturer’s labeled R-value. (Section 150.0(b))

BER 20.

WALL INSULATION

Insulation installed in opaque portions of above grade framed walls separating conditioned spaces from unconditioned spaces or ambient air shall meet the requirements of Items 1, 2 or 3 below (Section 150.0(c)):

1. Walls shall be insulated between framing members with insulation having an installed thermal resistance of not less than R-13 in 2x4 inch framing or the U-factor shall not exceed U-0.102 that results from installing R-13 in a 2x4 inch wood framed assembly; and

2. Walls shall be insulated between framing members with insulation having an installed thermal resistance of not less than R-19 in framing of 2x6 inch or greater, or the U-factor shall not exceed the U-0.074 that results from installing R-19 in a 2x6 inch or greater wood framed assembly; and

3. Bay window roofs and floors shall be insulated to meet the wall insulation requirements of Table 150.1-A.

BER 21.

VAPOR RETARDER

In climate zones 1-16 with unvented crawl spaces the earth floor of the crawl space shall be covered with a class I or Class II vapor retarder; or In a building having a Controlled ventilation crawl space, a Class I or Class II vapor retarder shall be placed over the earth floor of the crawl space to reduce moisture entry and protect insulation from condensation, as specified in the exception to Section 150.0(d). (Section 150.0(g))

BER 22.

ADDITIONS - PERFORMANCE CALCULATIONS

Performance calculations shall meet the requirements of Section 150.1(a) through (c). (Section 150.2(a)2)

BER 23.

ALTERATIONS – PERFORMANCE APPROACH

Performance approach shall only be used for projects that include tradeoffs between two or more altered components that are listed in Table 150.2-B.

The altered components shall meet the applicable requirements of Sections 110.0 through 110.9, and Sections 150.0(a) through (q) and the higher efficiency of existing conditions or the requirements stated in Table 150.2-B. For components not being altered, the standard design shall be based on the existing conditions. When the third party verification option is specified as a requirement, all components proposed for alteration must be verified. (Section 150.2(b)2)

FLOORS

BER 24.

LOOSE-FILL INSULATION

When loose-fill insulation is installed, the minimum installed weight per square foot shall conform with the insulation manufacturer's installed design weight per square foot at the manufacturer's labeled R-value. (Section 150.0(b))

BER 25.

RAISED-FLOOR INSULATION

Raised floors separating conditioned space from unconditioned space or ambient air shall meet the requirements of Items 1 or 2 below:

1. Floors shall be insulated between wood-framing members with insulation having an installed thermal resistance of R-19 or greater.
2. The weighted average U-factor of floor assemblies shall not exceed 0.037 that would result from installing R-19 insulation between wood-framing members and accounting for the effects of framing members.

Raised-floor insulation shall be installed with a U-factor equal to or less than, or a R-value equal to or greater than that shown in Table 150.1-A. The maximum U-factors or minimum R-values shown are for insulation installed between wood-framing members. (Sections 150.0(d) and 150.1(c)1.C)

BER 26.

VAPOR RETARDER

In Climate Zones 1-16 with unvented crawl spaces the earth floor of the crawl space shall be covered with a Class I or Class II vapor retarder; or In a building having a controlled ventilation crawl space, a Class I or Class II vapor retarder shall be placed over the earth floor of the crawl space to reduce moisture entry and protect insulation from condensation, as specified in the exception to Section 150.0(d). (Section 150.0(g))

BER 27.

SLAB EDGE INSULATION

Material used for slab edge insulation shall meet the following minimum specifications:

1. Water absorption rate for the insulation material alone without facings no greater than 0.3 percent when tested in accordance with Test Method A – 24-Hour –Immersion of ASTM C 272.
2. Water vapor permeance no greater than 2.0 perm/inch when tested in accordance with ASTM E96.
3. Concrete slab perimeter insulation shall be protected from physical damage and ultraviolet light deterioration.
4. Insulation for a heated slab floor shall meet the requirements of Section 110.8(g).

Slab floor perimeter insulation shall be installed with a U-factor equal to or less than or R-value equal to or greater than shown in Table 150.1-A. The minimum depth of concrete-slab floor perimeter insulation shall be 16 inches or the depth of the footing of the building, whichever is less. (Section 150.1(c)1.D)

BER 28.

ADDITIONS

Additions to existing buildings shall meet the requirements in Section 150.2(a)1

BER 29.

ALTERATIONS

Alterations to existing residential buildings or alterations in conjunction with a change in building occupancy to a low-rise residential occupancy shall meet either the Prescriptive approach, or the Performance approach, detailed in Section 150.2(b)

FENESTRATION & DOORS

BER 30.

FENESTRATION PRODUCTS

Fenestration separating conditioned space from unconditioned space or outdoors shall meet the requirements of either Item 1 or 2 below:

1. Fenestration, including skylight products, must have a maximum U-factor of 0.58.
2. The weighted average U-factor of all fenestration, including skylight products shall not exceed 0.58.

Installed fenestration products shall have an area weighted average U-factor and SHGC no greater than the applicable value in Table 150.1-A and shall be determined in accordance with Sections 110.6(a)2 and 110.6(a)3. (Section 150.0(q))

BER 31.

FENESTRATION AREA

The maximum total fenestration area shall not exceed the percentage of conditioned floor area CFA as indicated in Table 150.1-A. Total fenestration includes skylights and west-facing glazing. (Section 150.1(c)3B)

BER 32.

WEST-FACING FENESTRATION

The maximum west-facing fenestration area shall not exceed the percentage of conditioned floor area as indicated in Table 150.1-A. West-facing fenestration area includes skylights tilted in any direction when the pitch is less than 1:2. (Section 150.2(c)3D)

BER 33.

SHADING

Where Table 150.1-A requires a maximum solar heat gain coefficient (SHGC), the requirements

shall be met by one of the following (Section 150.1(c)4):

- A. Complying with the required SHGC pursuant to Section 150.1(c)3A, or
- B. An exterior operable shading louver or other exterior shading device that meets the required SHGC; or
- C. A combination of Items A and B to achieve the same performance as achieved in Section 150.1(c)3A.
- D. For south-facing glazing only, optimal overhangs shall be installed so that the south-facing glazing is fully shaded at solar noon on August 21 and substantially exposed to direct sunlight at solar noon on December 21.
- E. Exterior shading devices must be permanently secured with attachments or fasteners that are not intended for removal.

BER 34.

ALTERATIONS

Alterations that add vertical fenestration and skylight area shall meet the total fenestration area and west facing fenestration area, U-factor, and solar heat gain coefficient requirements of Section 150.1(c)3 and Table 150.1-A. (Section 150.2(b)1.A)

BER 35.

REPLACEMENT FENESTRATION

Replacement of fenestration, where existing fenestration area in an existing wall or roof is replaced with a new manufactured fenestration product and up to the total fenestration area removed in the existing wall or roof, the replaced fenestration shall meet the U-factor and solar heat gain coefficient requirements of Sections 150.1(c)3A and 150.1(c)4. (Section 150.2(b)1.B)

BER 36.

PRESCRIPTIVE PACKAGE – WINDOWS (CLIMATE ZONE 4)

In climate zone 4 when using the prescriptive package, it is necessary for you to specify that your windows meet the following (Table 150.1-A):

Show glass area a maximum 20% of the total conditioned floor area.

Show the west facing glass area as maximum of 5% of floor area, or use performance method.

Specify the “Solar Heat Gain Coefficient” (SHGC) as 0.25
Specify the maximum U-Factor to be 0.32

BER 37.

PRESCRIPTIVE PACKAGE – WINDOWS (CLIMATE ZONE 5)

In climate zone 5 when using the prescriptive package, it is necessary for you to specify that your windows meet the following (Table 150.1-A):
Show glass area a maximum 20% of the total conditioned floor area.
Specify the maximum U-Factor to be 0.32

BER 38.

GREEN BUILDING ORDINANCE REQUIREMENT – “RADIANT BARRIER”

In Climate Zones 4 and 5 a radiant barrier is required on the roof. This radiant must be installed on envelope side of the structure such as the framing side of the roof sheathing and gable ends of roofs. Specify an approved roof sheathing with a radiant barrier such as (OSB) Oriented Standard Board with an approved reflective material applied on the downward facing side.

BER 39.

PRESCRIPTIVE PACKAGE – THERMAL MASS

Thermal mass is required in Climate Zones 4 and 5. Show the location of the thermal mass on the floor plans.

HERS VERIFICATION FOR BUILDING ENVELOPE

BER 40.

QUALITY INSULATION INSTALLATION PROCEDURES

This procedure is to be followed by the insulation installer and a qualified Home Energy Rating system rater must verify its conformance for meeting the requirements for roof/ceiling, wall, raised-floor, and slab floor perimeter insulation. (RA3.5)

BER 41.

FIELD VERIFICATION AND DIAGNOSTIC TESTING OF BUILDING AIR LEAKAGE

The Home Energy Rating System rater shall measure the building air leakage rate to ensure measured air leakage is less than or equal to the building air leakage rate stated on the Certificate

of Compliance, and all other required compliance documentation. HERS verified building air leakage shall be documented on compliance forms. (RA3.8)

MECHANICAL

BER 42.

SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT

Any service water-heating system or equipment may be installed only if the manufacturer has certified that the system or equipment complies with all the **efficiency** and **installation** requirements of Section 110.3.

BER 43.

STORAGE TANK INSULATION

Storage gas water heaters with an energy factor equal to or less than the federal minimum standards shall be externally wrapped with insulation having an installed thermal resistance of R-12 or greater.

Unfired hot water tanks, such as storage tanks and backup storage tanks for solar water-heating systems, shall be externally wrapped with insulation having an installed thermal resistance of R-12 or greater or have internal insulation of at least R-16 and a label on the exterior of the tank showing the insulation R-value. (Section 150.0(j))

BER 44.

NATURAL GAS SYSTEM

Any natural gas system or equipment listed below may be installed only if it does not have a continuously burning pilot light (Section 110.5):

- a) Fan-type central furnaces.
- b) Household cooking appliances
- c) Pool heaters
- d) Spa heaters

BER 45.

WATER HEATING SYSTEM

Systems using gas or propane water heaters to serve individual dwelling units shall include the following components (Section 150.0(n)):

- A. A 120V electrical receptacle that is within 3 feet from the water heater and accessible to the water heater with no obstructions; and
- B. A category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed; and
- C. A condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance; and
- D. A gas supply line with a capacity of at least 200,000 Btu/hr.

Water heating recirculation loops serving multiple dwelling units shall meet the requirements of Section 110.3(c)5.

Solar water-heating systems and collectors shall be certified and rated by the Solar Rating and Certification Corporation (SRCC) or by a testing agency approved by the executive director.

- b. A water heating recirculation loop that meets the requirements of Sections 110.3(c)2 and 110.3(c)5 and is equipped with an automatic control system that controls the recirculation pump operation based on measurement of hot water demand and hot water return temperature and has two recirculation loops each serving half of the building; and
- c. A solar water-heating system meeting the installation criteria specified in Reference Residential Appendix RA4 and with a minimum solar savings fraction of 0.20 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.35 in Climate Zones 10 through 16. The solar savings fraction shall be determined using a calculation method approved by the Commission.

- D. For systems serving individual dwelling units, an electric-resistance storage or instantaneous water heater may be installed as the main water heating source only if natural gas is unavailable, the water heater is located within the building envelope, and a solar water-heating system meeting the installation criteria specified in the Reference Residential Appendix RA4 and within a minimum solar savings fraction of 0.50 is installed. The solar savings fraction shall be determined using a calculation method approved by the Commission. Recirculation pumps shall not be used. (Section 150.1(C)8)

BER 46.

DOMESTIC WATER-HEATING SYSTEMS

- A. For systems serving individual dwelling units, a single gas or propane storage type water heater with an input of 75,000 Btu per hour or less, and that meets the tank insulation requirements of Section 150.0(j) and the requirements of Sections 111 and 113 shall be installed. For recirculation distribution systems, only Demand Recirculation Systems with manual control pumps shall be used.
- B. For systems serving individual dwelling units, a single gas or propane instantaneous water heater with an input of 75,000 Btu per hour or less and no storage tank, and that meets the requirements of Sections 110.1 and 110.3 shall be installed. For recirculation distribution systems, only demand recirculation systems with manual control pumps shall be used.
- C. For systems serving multiple dwelling units, a central water heating system that includes the following:
 - a. Gas or propane water heaters, boilers or other water heating equipment that meet

BER 47.

ADDITIONS

When a second water heater is installed as part of the addition, one of the following types of water heaters shall be installed and assumed to comply (Section 150.2(a)1.D):

- 1. A natural gas or propane water-heating system that meets the requirements of Section 150.1(c)8; or

2. If no natural gas is connected to the building, an electric water heater has an energy factor equal to or greater than required under the appliance efficiency regulations. Recirculation pumps shall not be used; or
3. A water-heating system determined by the executive director to use no more energy than the one specified in item 1 above; or if no natural gas is connected to the building, a water-heating system determined by the executive director to use no more energy than the one specified in Item 2 above; or
4. Using the existing building plus addition compliance or addition alone compliance as defined in Section 150.2(a)2 demonstrate that the proposed water heating system uses no more energy than the system defined in Item 1 above regardless of the type or number of water heaters installed.

BER 48.

ALTERATIONS

Replacement service water-heating systems or components shall meet the requirements of Section 150.0(j)2 and either be (Section 150.2(b)1.G):

1. A natural gas or propane water-heating system that meets the requirements of Section 150.1(c)8. No recirculation system shall be installed; or
2. If no natural gas is connected to the building, an electric water heater has an energy factor equal to or greater than required under the Appliance Efficiency Regulations. For storage type water heaters the capacity shall not exceed 60 gallons. No recirculation system shall be installed; or
3. A water-heating system determined by the executive director to use no more energy than the one specified in Item 1 above; or if no natural gas is connected to the building, a water-heating system determined by the executive director to use no more energy than the one specified in item 2 above; or

4. Using the existing building plus addition compliance approach as defined in Section 150.2(b)2 demonstrate the proposed water heating system uses no more energy than the system defined in Item 1 above regardless of the type or number of water heaters installed.

BER 49.

BUILDING COOLING AND HEATING LOADS

Building heating and cooling loads shall be determined using a method based on any one of the following:

- A. The ASHRAE Handbook, Equipment Volume, Applications Volume and Fundamentals Volume; or
- B. The SMACNA Residential Comfort System Installation Standards Manual; or
- C. The ACCA Manual J.

The cooling and heating loads are two of the criteria that shall be used for equipment sizing and selection. (Section 150.0(h))

BER 50.

DESIGN CONDITIONS

For the purpose of sizing the space conditioning (HVAC) system, the indoor design temperatures shall be 68°F for heating and 75°F for cooling. Outdoor design conditions shall be selected from Reference Joint Appendix JA2, which is based on data from the ASHRAE climatic Data for Region X. The outdoor design temperatures for heating shall be no lower than the Heating Winter Median of Extremes values. The outdoor design temperatures for cooling shall be no greater than 1.0 percent Cooling Dry Bulb and Mean Coincident Wet Bulb Values. (Section 150.0(h))

BER 51.

OUTDOOR CONDENSING UNITS – CLEARANCES

Installed air conditioner and heat pump outdoor condensing units shall have a clearance of at least five (5) feet from the outlet of any dryer vent. (Section 150.0(h))

BER 52.

CENTRAL FORCED-AIR HEATING FURNACES

Central forced-air heating furnaces installations shall be configured to operate in conformance with the furnace manufacturer's maximum inlet-

to-outlet temperature rise specifications. (Section 150.0(h))

BER 53.

CMC COMPLIANCE

All air-distribution system ducts and plenums, including but not limited to, mechanical closets and air handler boxes, shall be installed, sealed and insulated to meet the requirements of the CMC Sections 601.0, 602.0, 603.0, 604.0, 605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. (Section 150.0(m))

BER 54.

FACTORY-FABRICATED DUCT SYSTEMS

- A. All factory-fabricated duct systems shall comply with UL181 for ducts and closure systems, including collars, connections and splices, and be labeled as complying with UL 181. UL 181 testing may be performed by UL laboratories or a laboratory approved by the executive Director
- B. All pressure-sensitive tapes, heat-activated tapes and mastics used in the manufacture of rigid fiber glass ducts shall comply with UL 181 and UL 181A.
- C. All pressure-sensitive tapes and mastics used with flexible ducts shall comply with UL 181 and UL 181 B.
- D. Joints and seams of duct systems and their components shall not be sealed with cloth-back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands. (Section 150.0(m))

BER 55.

FIELD-FABRICATED DUCT SYSTEMS

- A. Factory-made rigid fiberglass and flexible ducts for field-fabricated duct systems shall comply with UL 181.
- B. Joints and seams of duct systems and their components shall not be sealed with cloth-back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands.

C. Drawbands shall be either stainless steel worm-drive hose clamps or UV-resistant nylon duct ties, they shall have a minimum tensile strength rating of 150 pounds, and be tightened as recommended by the manufacturer with an adjustable tensioning tool.

D. Aerosol sealants shall meet the requirements of UL 723, and be applied according to manufacturer specifications. (Section 150.0(m))

BER 56.

“PLENUM AREAS”

Framed-in areas (Plenums, Wall Cavities, Drop Ceilings, Soffits, etc.) cannot be used as ducts. Return/supply air plenums and ducts serving the mechanical equipment must be fully ducted from the equipment to the conditioned space. Please detail this and/or note this on the plans adjacent to the location of the mechanical equipment. (Section 150.0(m))

BER 57.

DUCT INSULATION R-VALUE RATINGS

All duct insulation product R-values shall be based on insulation only and tested C-75°F mean temperature. (Section 150.0(m).4)

BER 58.

GRAVITY VENTILATION DAMPERS

All gravity ventilating systems that serve conditioned space shall be provided with either automatic or readily accessible, manually operated dampers in all openings to the outside except combustion inlet and outlet air openings and elevator shaft vents. (Section 150.0(m).8)

BER 59.

PROTECTION OF INSULATION

Insulation shall be protected from damage, including sunlight moisture, equipment maintenance and wind. (Section 150.0(m).9)

BER 60.

AIR FILTRATION

Mechanical systems that supply air to an occupiable space through ductwork exceeding 10ft in length and through thermal conditioning

component, except evaporative coolers, shall be provided with air filter devices in accordance with 150.0(m) Item 12.

BER 61.

SPACE-CONDITIONING DUCTS

All ducts shall either be in directly conditioned space as confirmed by field verification and diagnostic testing in accordance with Reference Residential Appendix RA3.1.4.3.8 or be insulated to a minimum installed level as specified by Table 150.1-A. All ducts shall meet all applicable mandatory requirements of Section 150.0(m). (Section 150.1(c).9)

BER 62.

HVAC SYSTEM BYPASS DUCTS

Unless otherwise specified on the certificate of compliance, bypass ducts that deliver conditioned supply air directly to the space conditioning system return duct airflow shall not be used. All zonally controlled forced air systems shall be verified by a HERS Rater utilizing the procedure in Reference Residential Appendix Section RA3.1.4.6 to conform compliance with Section 150.1(c)13.

BER 63.

ENTIRELY NEW OR COMPLETE REPLACEMENT DUCT SYSTEM

If the new ducts form an entirely new or replacement duct system directly connected to the air handler, the measured duct leakage shall be equal to or less than 6 percent of the system air handler airflow.

Entirely new or complete replacement duct systems installed as part of an alteration shall be constructed of at least 75 percent new duct material, and up to 25 percent may consist of reused parts from the dwelling unit's existing duct system if the reused parts are accessible and can be sealed to prevent leakage. (Section 150.2(b).D Item a)

BER 64.

EXTENSION OF AN EXISTING DUCT SYSTEM

If the new ducts are an extension of an existing duct system, the combined new and existing duct system shall meet one of the following requirements (Section 150.2(b).D Item b):

1. The measured duct leakage shall be equal to or less than 15 percent of nominal system air handler airflow.
2. The measured duct leakage to outside shall be equal to or less than 10 percent of nominal system airflow.
3. If it is not possible to meet the duct sealing requirements in either of the items above, then all accessible leaks shall be sealed and verified through a visual inspection and a smoke test by a certified HERS Rater utilizing the methods specified in Reference Residential Appendix RA3.1.4.3.5.

BER 65.

ALTERED SPACE-CONDITIONING SYSTEM-DUCT SEALING

In all climate zones, when a space-conditioning system is altered by the installation or replacement or space-conditioning system equipment, the duct system that is connected to the altered space-conditioning system equipment shall be sealed, as confirmed through field verification and diagnostic testing in accordance with the applicable procedures for duct sealing of altered existing duct systems. (Section 150.2(b).D Item E)

BER 66.

VENTILATION FOR INDOOR AIR QUALITY

All dwelling units shall meet the requirements of ASHRAE Standard 62.2. Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings. Window operation is not a permissible method of providing the whole-building ventilation airflow required in Section 4 of that ASHRAE Standard 62.2. Continuous operation of central forced air system air handlers used in central fan integrated ventilation systems is not a permissible method of providing the whole-building ventilation airflow required in Section 4 of ASHRAE Standard 62.2. (Section 150.0(o))

BER 67.

CENTRAL FAN INTEGRATED VENTILATION SYSTEMS

Central forced air system fans used in central fan integrated ventilation systems shall demonstrate,

in air distribution mode, an air-handling unit fan efficacy less than or equal to 0.58 W/CFM as confirmed through field verification and diagnostic testing in accordance with all applicable procedures specified in Reference Residential Appendix RA3.3. (Section 150.1(c).10)

BER 68.

VENTILATION COOLING

Single-family homes shall comply with the whole house fan (WHF) requirements shown in Table 150.1-A. When a WHF is required, comply with (Section 150.1(c).12):

- A. Have installed one or more WHFs whose total air flow CFM as listed in the CEC Directory is at least 2 CFM/ft² of conditioned floor area; and
- B. Have at least 1 square foot of attic vent free area for each 375 CFM of rated whole house fan air flow CFM; and
- C. Provide homeowners who have WHFs with a one page "How to operate your whole house fan" information sheet.

LIGHTING

BER 69.

LUMINAIRE EFFICACY

Installed luminaires shall be classified as high-efficacy or low-efficacy for compliance with Section 150.0(k) in accordance with Table 150.0-A or Table 150.0-B, as applicable. (Section 150.0(k).1.A)

BER 70.

HYBRID LUMINAIRES

When a high efficacy and low efficacy lighting system are combined together in a single luminaire, the high efficacy and low efficacy lighting systems shall separately comply with the applicable provisions of Section 150.0(k). (Section 150.0(k).1.B)

BER 71.

LUMINAIRE WATTAGE AND CLASSIFICATION

The wattage and classification of permanently installed luminaires in residential kitchen shall be determined in accordance with Section 130.0(c). In residential kitchens, the wattage of electrical

boxes finished with a blank cover or where no electrical box can be used for a luminaire or a surface mounted ceiling fan, shall be calculated as 180 watts of low efficacy lighting per electrical box. (Section 150.0(k).1.C)

BER 72.

ELECTRONIC BALLASTS

Ballasts for fluorescent lamps rated 13 watts or greater shall be electronic and shall have an output frequency no less than 20 kHz. (Section 150.0(k).1.D)

BER 73.

NIGHT LIGHTS

Permanently installed night lights and night lights integral to installed luminaires or exhaust fans shall be rated to consume no more than five watts of power per luminaire or exhaust fan as determined in accordance with Section 130.09(c). Night lights shall not be required to be controlled vacancy sensors. (Section 150.0(k).1.E)

BER 74.

SWITCHING DEVICES AND CONTROLS

- A. High efficacy luminaires shall be switched separately from low efficacy luminaires.
- B. Exhaust fans shall be switched separately from lighting system.
- C. Luminaires shall be switched with readily accessible controls that permit the luminaires to be manually switched ON and OFF.
- D. Lighting controls and equipment shall be installed in accordance with the manufacturer's instructions
- E. No controls shall bypass a dimmer or vacancy sensor function where that dimmer or vacancy sensor has been installed to comply with Section 150.0(k)
- F. Lighting controls shall comply with the applicable requirements of Section 110.9.
- G. An energy management control system (EMCS) may be used to comply with dimmer requirements
- H. An energy management control system (EMCS) may be used to comply with vacancy sensor requirements

- I. A multiscene programmable controller may be used to comply with dimmer requirements (Section 150.0(k).2)

BER 75.

KITCHEN LIGHTING

A minimum of 50 percent of the total rated wattage of permanently installed lighting in kitchens shall be high efficacy. (Section 150.0(k).3)

BER 76.

BATHROOM LIGHTING

A minimum of one high efficacy luminaire shall be installed in each bathroom and all other lighting installed in each bathroom shall be high efficacy or controlled by vacancy sensors. (Section 150.0(k).5)

BER 77.

GARAGE, LAUNDRY, UTILITY ROOM LIGHTING

Lighting installed in attached and detached garages, laundry rooms and utility rooms shall be high efficacy luminaires and controlled by vacancy sensors. (Section 150.0(k).6)

BER 78.

LIGHTING FOR ALL OTHER ROOMS

Lighting installed in rooms or areas other than in kitchens, bathrooms, garages, laundry rooms and utility rooms shall be high efficacy or shall be controlled by either dimmers or vacancy sensors. (Section 150.0(k).7)

BER 79.

RECESSED LUMINAIRES IN CEILINGS

Luminaires recessed into ceilings shall meet all of the following requirements:

- A. Be listed, as defined in Section 100.1, for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/ rating laboratory; and
- B. Have a label that certifies that the luminaire is airtight with air leakage less than 2.0 CFM at 75 pascals when tested in accordance with ASTM E283. An exhaust fan housing shall not be required to be certified airtight; and
- C. Be sealed with a gasket or caulk between the luminaire housing and ceiling, and shall have

all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk; and

- D. For recessed compact fluorescent luminaires with ballasts to qualify as high efficacy for compliance with Section 150.0(k)m the ballasts shall be certified to the Commission to comply with the applicable requirements in Section 110.9; and

- E. Allow ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling. (Section 150.0(k).8)

BER 80.

SINGLE-FAMILY RESIDENTIAL OUTDOOR LIGHTING

Outdoor lighting permanently mounted to a residential building or other buildings on the same lot shall be high efficacy, OR have all of the following controls: Motion sensor; plus photocontrol; astronomical time clock or EMCS; plus a manual ON/OFF switch that does not override to ON the automatic controls. (Section 150.0(k).9.A)

BER 81.

LOW-RISE MULTIFAMILY DWELLINGS

Outdoor lighting for private patios, entrances, balconies and porches; and outdoor lighting for residential parking lots and residential carports with less than eight vehicles per site shall comply with Section 150.0(k)9A; or the applicable requirements in Sections 110.9, 130.0, 130.2, 130.4, 140.7 and 141.0. (Section 150.0(k).9.B)

BER 82.

FIREPLACE ENERGY CONSERVATION

Specify on the floor plan that all fireplaces shall have approved closeable metal or glass doors and outside combustion air. Outside combustion air is not required on interior fireplaces installed over a concrete slab on grade. (Section 150.0(e))