## **BUILDING ENERGY ANALYSIS REPORT**

## **PROJECT:**

123 State St. Addition 123 State St. Sunnyvale, CA 94087

## **Project Designer:**

John Doe Design 1234 Design St. San Diego, CA 92101 123-456-7899

## **Report Prepared by:**

David Hensel, PE Hensel Consulting Engineers, Inc. P.O. Box 1442 San Marcos, CA 92079 (619) 665-3259



#### Job Number:

18349

Date:

10/29/2018

The EnergyPro computer program has been used to perform the calculations summarized in this compliance report. This program has approval and is authorized by the California Energy Commission for use with both the Residential and Nonresidential 2016 Building Energy Efficiency Standards.

This program developed by EnergySoft Software - www.energysoft.com.

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Cover Page Table of Contents Form CF-1R-ADD-02-E Certificate of Compliance Form MF-1R Mandatory Measures Summary

#### STATE OF CALIFORNIA **Prescriptive Residential Additions That Do Not Require HERS Field Verification** CEC-CF1R-ADD-02-E (Revised 07/17)

CF1R-ADD-02-E

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#### CERTIFICATE OF COMPLIANCE

Prescriptive Residential Additions That Do Not Require HERS Field Verification

Date Prepared: 10/29/2018

This compliance document is only applicable to additions less than 1,000 ft<sup>2</sup> and do not require HERS field verification for compliance. When HERS verification is required, a CF1R-ADD-01 shall first be registered with a HERS Provider Data Registry.

Alterations to Space Conditioning Systems that are exempt from HERS verification requirements may use the CF1R-ADD-02 and CF2R- ADD-02 Compliance Documents. Possible exemptions from duct leakage testing include: less than 40 ft of ducts were added or replaced; or the existing duct system was insulated with asbestos; or the existing duct system was previously tested and passed by a HERS Rater. If space conditioning systems are altered and are not exempt from HERS verification, then a CF1R-ADD-01 must be completed and registered with a HERS Provider Data Registry.

Additions or alterations that utilize close Cell Spray Polyurethane Foam (ccSPF) with a density of 1.5 to less than 2.5 pounds per cubic foot having an R-value other than 5.8 per inch, or Open Cell Spray Polyurethane Foam (ocSPF) with a density of 0.4 to less than 1.5 pounds per cubic foot having an R-value of 3.6 per inch, shall complete and register a CF1R ADD-01 with a HERS Provider Data Registry.

If more than one person has responsibility for installation of the items on this certificate, each person shall prepare and sign a certificate applicable to the portion of construction for which they are responsible. Alternatively, the person with chief responsibility for construction shall prepare and sign this certificate for the entire construction. All applicable Mandatory Measures shall be met. Temporary labels shall not be removed before verification by the building inspector.

| A. 6 | eneral Information |                            |    |   |                              |
|------|--------------------|----------------------------|----|---|------------------------------|
| 01   | Project Name:      | 123 State St. Addition     | 02 | Date Prepared:  | 10/29/2018                   |
| 03   | Project Location:  | 123 State St.              | 04 | Building Front Orientation (deg):                           | (N) 10 deg                   |
| 05   | CA City:           | Sunnyvale                  | 06 | Number of Dwelling Units with Additions:                    | 1                            |
| 07   | Zip Code:          | 94087                      | 08 | Fuel Type:  | Electric (Natural Gas Availa |
| 09   | Climate Zone:      | 4                          | 10 | Total Conditioned Floor Area (ft <sup>2</sup> ) (Addition): | 364.0                        |
| 11   | Building Type:     | Single Family              | 12 | Slab Area (ft <sup>2</sup> ):                               | 364                          |
| 13   | Project Scope:     | Addition: CFA = 364.0 sqft | 14 | Exceptions to Fenestration U-factor and SHGC 150.1(c)3A:    |                              |
|      |                    |                            |    |   |                              |

# STATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Require HERS Field Verification CEC-CF1R-ADD-02-E (Revised 07/17)

CALIFORNIA ENERGY COMMISSION

CF1R-ADD-02-E

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CERTIFICATE OF COMPLIANCE

Project Name:

Prescriptive Residential Additions That Do Not Require HERS Field Verification

1142 Lexington Dr. Addition

Date Prepared: 10/29/2018

| B. Opa | que Surface Deta | ails – Framed | (Section 15    | 0.2(a))          |         |                          |          |             |             |             |                           |
|--------|------------------|---------------|----------------|------------------|---------|--------------------------|----------|-------------|-------------|-------------|---------------------------|
| 01     | 02               | 03            | 04             | 05               |         | 06                       | 07       | 08          | 09          | 10          | 11                        |
|        |                  |               |                |                  |         |                          | Proposed |             |             | Required    |                           |
|        |                  |               | Frame<br>Depth | Frame<br>Spacing | Cavity  | Continuous<br>Insulation |          | Appendix JA | 4 Reference | U-Factor or |                           |
| Tag/ID | Assembly Type    | Frame Type    | (inches)       | (inches)         | R-value | R-value                  | U-Factor | Table       | Cell        | R-value     | Comments                  |
| 1      | Roof             | Wood          | 2x4            | 24" O.C.         | 22      | 0.0                      | 0.041    | 4.2.1       | A18         | 0.043       | Altered R-22 Roof Attic   |
| 2      | Wall             | Wood          | 2x4            | 16" O.C.         | 15      | 0.0                      | 0.095    | 4.3.1       | A4          | 0.095       | New R-15 Wall (Extension) |
| 3      | Wall             | Wood          | 2x4            | 16" O.C.         | 13      | 0.0                      | 0.102    | 4.3.1       | A3          | 0.110       | Altered R-13 Wall         |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |
|        |                  |               |                |                  |         |                          |          |             |             |             |                           |

#### CA Building Energy Efficiency Standards - 2016 Residential Compliance

## STATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Requ CEC-CF1R-ADD-02-E (Revised 07/17)

CERTIFICATE OF COMPLIANCE

Prescriptive Residential Additions That Do Not Require HERS Field Verification Project Name:

1142 Lexington Dr. Addition

| C. Opa  | que Surface Deta | ails – Non-framed (Se | ction 150.1(          | (c)1)                         |                                     |          |                        |                            |                            |          |
|---------|------------------|-----------------------|-----------------------|-------------------------------|-------------------------------------|----------|------------------------|----------------------------|----------------------------|----------|
| 01      | 02               | 03                    | 04                    | 05                            | 06                                  | 07       | 08                     | 09                         | 10                         | 11       |
|         |                  |                       |                       |                               | F                                   | Proposed |                        |                            | Required                   |          |
| Tag/ID  | Assembly Type    | Assembly Materials    | Thickness<br>(inches) | Core<br>Insulation<br>R-value | Continuous<br>Insulation<br>R-value | U-Factor | Apper<br>Refe<br>Table | ndix JA4<br>erence<br>Cell | U-Factor from<br>Package A | Comments |
| Not app | licable to scope |                       | (                     |                               |                                     |          |                        |                            |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        |                            |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        |                            |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        | Ť                          |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        |                            |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        |                            |                            |          |
|         |                  |                       |                       |                               |                                     |          |                        |                            |                            |          |

| D. Opa  | que Surf       | ace Details – Mas | s Walls (Secti        | on 150.1(c)1)         |            |           |            |           |                |                  |             |           |          |            |
|---------|----------------|-------------------|-----------------------|-----------------------|------------|-----------|------------|-----------|----------------|------------------|-------------|-----------|----------|------------|
| 01      | 02             | 03                | 04                    | 05                    | 0          | 6         | 0          | 7         | 08             | 09               | 10          | 0         |          | 11         |
|         |                |                   |                       |                       |            |           | Propos     | ed        |                |                  |             | Req       | uired    |            |
|         | Walls          |                   | Mass                  | Furring Strip         | Interior I | nsulation | Exterior I | nsulation | Appen<br>Refei | dix JA4<br>rence | Interior Ir | nsulation | Exterior | Insulation |
| Tag/ID  | Above<br>Grade | Mass Type         | Thickness<br>(inches) | Thickness<br>(inches) | R-value    | U-factor  | R-value    | U-factor  | Table          | Cell             | R-value     | U-factor  | R-value  | U-factor   |
| Not app | licable t      | o scope           |                       |                       |            |           |            |           |                |                  |             |           |          |            |
|         |                |                   |                       |                       |            |           |            |           |                |                  |             |           |          |            |
|         |                |                   |                       |                       |            |           |            |           |                |                  |             |           |          |            |
|         |                |                   |                       |                       |            |           |            |           |                |                  |             |           |          |            |
|         |                |                   |                       |                       |            |           |            |           |                |                  |             |           |          |            |

| uire HERS Field Verification |  |
|------------------------------|--|
|                              |  |

Date Prepared:

CALIFORNIA ENERGY COMMISSION CF1R-ADD-02-E

10/29/2018

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| STATE OF CALIFORNIA Prescriptive Residential A CEC.CE1B.4DD.02-E (Beviced 07/17) | dditions That                 | Do Not Requ                     | uire HERS Fie                | eld Verification                |                                       |               |
|--|-------------------------------|---------------------------------|------------------------------|---------------------------------|---------------------------------------|---------------|
| CERTIFICATE OF COMPLIANCE  |                               |                                 |                              |                                 |                                       | CF1R-ADD-02-E |
| Prescriptive Residential Additions T   | hat Do Not Require            | e HERS Field Verifi             | cation                       |                                 |                                       | (Page 4 of 9) |
| Project Name: 1142 Lexington Dr. Ac  | ddition                       |                                 |                              |                                 | Date Prepared: 10/29/2018             |               |
| E. Slab Insulation (Table 150.1-A  | \)                            |                                 |                              |                                 |                                       |               |
| 01   | 02                            | 03                              | 04                           | 05                              | 06                                    |               |
| Floor Type   | Prop<br>Insulation<br>R-value | oosed<br>Insulation<br>U-factor | Req<br>Insulation<br>R-value | uired<br>Insulation<br>U-factor | Comments                              |               |
| Unheated Slab-on-Grade   | 0                             | 0.730                           |                              |                                 |                                       |               |
|  |                               |                                 |                              |                                 |                                       |               |
|  |                               |                                 |                              |                                 |                                       |               |
|  |                               |                                 |                              |                                 |                                       |               |
| Note:<br>• Heated slab floors require mand                                       | latory slab insulation        | (see Table 110.8-A)             |                              |                                 |                                       |               |
| F. Radiant Barrier (Section 150.3  | 1(c)2)                        |                                 |                              |                                 |                                       |               |
| •  | 01                            |                                 |                              |                                 | 02                                    |               |
| Radiant Barrier installed below  | the roof deck and o           | n all gable end walls           |                              |                                 | Comments                              |               |
| All New Roc  | of areas with Attic           | s                               |                              | Radiant                         | Barrier required in this Climate Zone |               |

#### A radiant barrier is required (for Climate Zones 2-15)

- Radiant barriers shall meet specific eligibility and installation criteria to receive energy credit for compliance with the Building Energy Efficiency Standards for low-rise residential buildings. Refer to RA4.2.1
- The emittance of the radiant barrier shall be less than or equal to 0.05 as tested in accordance with ASTM C1371 or ASTM E408.
- For Prescriptive Compliance the attic shall be ventilated to provide a minimum free ventilation area of not less than one square foot of vent area for each 300 ft2 of attic floor area with no less than 30 percent upper vents. Ridge vents or gable end vents are recommended to achieve the best performance. The material should be cut to allow for full airflow to the venting.

|                      | Orienta  | ations ft <sup>2</sup>                           | Area O   | nly ft <sup>2</sup>                              | Maximum               | Maximum                 | Maximum           | Maximum             |  |  |  |
|----------------------|--|--|--|--|-----------------------|-------------------------|-------------------|---------------------|--|--|--|
| Addition             | The G  | Greater  | The Gr   | eater  | Allowed               | Allowed                 | Allowed           | Allowed             |  |  |  |
| Type ft <sup>2</sup> | Maximum<br>Calculated<br>based on<br>Allowed % | Maximum<br>Calculated<br>Allowed ft <sup>2</sup> | Maximum<br>Calculated<br>based on<br>Allowed % | Maximum<br>Calculated<br>Allowed ft <sup>2</sup> | U-factor<br>(Windows) | U-factor<br>(Skylights) | SHGC<br>(Windows) | SHGC<br>(Skylights) |  |  |  |
| 364.0                | 109.2  | 75.0   | 60.0   | 60.0   | 0.320                 | 0.550                   | 0.250             | 0.300               |  |  |  |

05

06

#### STATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Require HERS Field Verification CEC-CF1R-ADD-02-E (Revised 07/17)

CALIFORNIA ENERGY COMMISSION

Prescriptive Residential Additions That Do Not Require HERS Field Verification

Project Name:

01

02

CERTIFICATE OF COMPLIANCE

1142 Lexington Dr. Addition

10/29/2018

10

Comments

Skylight Exception <= 16 sqft

Date Prepared:

|                                    | s Floudeus (   |                         |                 | .1(0)11)                  |                              |                           |                      |                   |                           |                      |                   |
|------------------------------------|----------------|-------------------------|-----------------|---------------------------|------------------------------|---------------------------|----------------------|-------------------|---------------------------|----------------------|-------------------|
| 01                                 | 02             | 03                      | 04              | 05                        | 06                           | 07                        | 08                   | 09                | 10                        | 11                   | 12                |
| Mass Roof                          |                |                         |                 |                           |                              | Prope                     | osed                 |                   |                           | Required             |                   |
| 25lb/ft <sup>2</sup> or<br>Greater | Roof Pitch     | Method of<br>Compliance | Product<br>Type | CRRC Product ID<br>Number | Initial Solar<br>Reflectance | Aged Solar<br>Reflectance | Thermal<br>Emittance | SRI<br>(Optional) | Aged Solar<br>Reflectance | Thermal<br>Emittance | SRI<br>(Optional) |
| Not applica                        | ble to scope   | ₽                       |                 |                           |                              |                           |                      |                   |                           |                      |                   |
|                                    |                |                         |                 |                           |                              |                           |                      |                   |                           |                      |                   |
|                                    |                |                         |                 |                           |                              |                           |                      |                   |                           |                      |                   |
|                                    |                |                         |                 |                           |                              |                           |                      |                   |                           |                      |                   |
|                                    |                |                         |                 |                           |                              |                           |                      |                   |                           |                      |                   |
|                                    |                |                         |                 |                           |                              |                           |                      |                   |                           |                      |                   |
| Notes:                             |                |                         |                 |                           |                              |                           |                      |                   |                           | •                    | •                 |
| <ul> <li>Anv r</li> </ul>          | oof area cover | ed by building ir       | ntegrated ph    | otovoltaic panels and so  | plar thermal pan             | els are exempt fro        | om the above Co      | ol Roof requirem  | nents.                    |                      |                   |

07

08

09

• Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

04

Maximum Allowed West-Facing Fenestration

H. Fenestration/Glazing Allowed Areas and Efficiencies (Section 150.2(a)1)

03

Maximum Allowed

Fenestration Area for All

| G. Roofing                         | g Products (  | Cool Roof) (S           | ection 150      | 0.1(c)11)                 |                              |                           |                      |                   |                           |                      |              |
|------------------------------------|---------------|-------------------------|-----------------|---------------------------|------------------------------|---------------------------|----------------------|-------------------|---------------------------|----------------------|--------------|
| 01                                 | 02            | 03                      | 04              | 05                        | 06                           | 07                        | 08                   | 09                | 10                        | 11                   | 12           |
| Mass Roof                          |               |                         |                 |                           |                              | Propo                     | osed                 |                   |                           | Required             |              |
| 25lb/ft <sup>2</sup> or<br>Greater | Roof Pitch    | Method of<br>Compliance | Product<br>Type | CRRC Product ID<br>Number | Initial Solar<br>Reflectance | Aged Solar<br>Reflectance | Thermal<br>Emittance | SRI<br>(Optional) | Aged Solar<br>Reflectance | Thermal<br>Emittance | SR<br>(Optio |
| Not applica                        | able to scope | •                       |                 |                           |                              |                           |                      |                   |                           |                      |              |
|                                    |               |                         |                 |                           |                              |                           |                      |                   |                           |                      |              |
|                                    |               |                         |                 |                           |                              |                           |                      |                   |                           |                      |              |
|                                    |               |                         |                 |                           |                              |                           |                      |                   |                           |                      |              |

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CF1R-ADD-02-E

| ICATE OF COM             | PLIANCE   |   |   |   |  |  |  |   |   |  |  | CF1R-ADD-02   |
|--------------------------|---|---|---|---|--|--|--|---|---|--|--|---|
| ptive Residentia         | al Additions Tha  | at Do Not Red   | quire HERS Fie  | eld Verificat   | tion   |  |  |   |   |  |  | (Page 6 of  |
| <sup>ne:</sup> 1142 Lexi | ngton Dr. Add   | ition   |   |   |  |  |  | Date P  | repared: 10/29  | /2018  |  |   |
|                          |   |   |   |   |  |  |  |   |   |  |  |   |
| estration Prop           | osed Areas ar   | nd Efficienci   | ies   |   |  |  |  |   |   |  |  |   |
| f meeting Excep          | otion 1 to 150.1  | (c)3A, Install  | $ing \le 3ft^2 glas$  | s in door, it   | is assumed to  | o meet the mir   | nimum requi  | red U-facto   | or (0.32) & SH  | HGC (0.25).  |  |   |
| f meeting Excer          | otion 1 to 150.1  | (c)3A, Install  | ing ≤ 3ft <sup>-</sup> tub  | ular skylight   | t, it is assume  | d to meet the  | minimum re   | quired U-fa   | actor (0.55) 8  | & SHGC (0.3  | 30).   | 1.4   |
| 02                       | 03  | 04  | 05  | 06  | 07   | U8<br>Proposed   | 09   | 10  | 11  | 12   | 13   | 14  |
| Fenestration             |   | Dynamic   | Orientation   | Number  | Proposed   | West Facing  | Proposed   | 6   | Proposed  |  | Exterior   | Combined  |
| Туре                     | Frame Type  | Glazing   | N, S, W, E  | OT<br>Panes   | Area ft <sup>2</sup>   | Fenestration   | U-factor   | Source  | SHGC  | Source   | Snading<br>Device  | CF1R-FNV-03   |
| New                      |   |   | (6)   | 0   | 25.0   | Area ft <sup>2</sup>   | 0 220  |   |   |  | Device   | 0.05  |
| New                      | Non-Metal   |   | (5)   | 2   | 25.0   | 00.7   | 0.320  | NFRC  | 0.25  | NFRC   | n/a  | 0.25  |
| New                      | Non-Metal   |   | (VV)  | 2   | 22.7   | 22.7   | 0.320  | NFRC  | 0.25  | NFRC   | n/a  | 0.25  |
|                          |   |   |   |   |  |  |  |   |   |  |  |   |
|                          |   |   |   |   |  |  |  |   |   |  |  |   |
|                          |   |   |   |   |  |  |  |   |   |  |  |   |
|                          |   |   |   |   |  |  |  |   |   |  |  |   |
| Total Proposed           | Fenestration Are  | а   |   |   |  |  |  |   |   |  | 47.7   |   |
| Maximum Allow            | wed Fenestration  | Area  |   |   |  |  |  |   |   |  | 109.2  |   |
| Compliance Sta           | tement  | Total Prop  | oosed Fenestra  | tion Area ≤ N   | Aaximum Allow  | ved Fenestration   | Area   |   |   |  | 🗹 Yes  | i □ No  |
| Total Proposed           | West-Facing Fen   | estration Area  | 3   |   |  |  |  |   |   |  | 22.7   |   |
| Maximum Allov            | wed West-Facing   | Fenestration A  | Area  |   |  |  |  |   |   |  | 60.0   |   |
| Compliance Sta           | tement  | Total Prop  | posed West-Fac  | cing Fenestra   | ition Area ≤ Ma  | ximum Allowed  | West-Facing  | Fenestratior  | n Area  |  | 🗹 Yes  | □ No  |
| Proposed Fene            | stration U-factor   | (Windows)   |   | -   |  |  |  |   |   |  | 0.320  |   |
| Required Fenes           | stration U-factor (   | Windows)  |   |   |  |  |  |   |   |  | 0.320  |   |
| Compliance Sta           | itement   | Proposed  | Fenestration L  | J-factor ≤ Re   | quired Fenestra  | ation U-factor   |  |   |   |  | ☑ Ye   | s 🗆 No  |
| Proposed Fene            | stration SHGC (W  | indows)   |   |   |  |  |  |   |   |  | 0.250  |   |
| Required Fenes           | stration SHGC (Wi   | indows)   |   |   |  |  |  |   |   |  | 0.250  |   |
| Compliance Sta           | tement  | Proposed  | Fenestration S  | HGC ≤ Reaui   | red Fenestratio  | on SHGC  |  |   |   |  | ☑ Yes  | i □ No  |
| Proposed Fene            | stration U-factor   | (Skylights)   |   |   |  |  |  |   |   |  | 0 000  |   |
|                          |   | A MERINA A LADOR DI MANATA  |   |   |  |  |  |   |   |  |  |   |
|                          | ADD-02-E (Hevise<br>ICATE OF COMI<br>ptive Residentia<br>estration Prop<br>f meeting Excep<br>f meeting Excep<br>02<br>Fenestration<br>Type<br>New<br>New<br>New<br>New<br>Compliance Sta<br>Proposed Fenes<br>Compliance Sta<br>Proposed Fenes<br>Compliance Sta<br>Proposed Fenes<br>Compliance Sta | ADD-02-E (Revised 0/17)         ICATE OF COMPLIANCE         ptive Residential Additions That         neeting Exception Dr. Add         restration Proposed Areas and         f meeting Exception 1 to 150.1         f meeting Exception 1 to 150.1         f meeting Exception 1 to 150.1         02       03         Fenestration       Frame Type         New       Non-Metal         New       Non-Metal         New       Non-Metal         New       Non-Metal         Compliance Statement       Total Proposed Fenestration Are         Maximum Allowed West-Facing Fen       Maximum Allowed West-Facing Fen         Compliance Statement       Proposed Fenestration U-factor         Proposed Fenestration U-factor       Required Fenestration SHGC (W         Required Fenestration SHGC (W       Compliance Statement         Proposed Fenestration SHGC (W       Required Fenestration U-factor | CATE OF COMPLIANCE         ptive Residential Additions That Do Not Regard         ne:       1142 Lexington Dr. Addition         astration Proposed Areas and Efficience         f meeting Exception 1 to 150.1(c)3A, Install         02       03         02       03         New       Non-Metal         Naximum Allowed Fenestration Area         Maximum Allowed Fenestration Area         Maximum Allowed West-Facing Fenestration Area         Maximum Allowed Senestration U-factor (Windows)         Required Fenestration U-factor (Windows) | IADD-02-E (Revised 07/17)ICATE OF COMPLIANCEptive Residential Additions That Do Not Require HERS Finiter 1142 Lexington Dr. Additionrestration Proposed Areas and Efficienciesfmeeting Exception 1 to 150.1(c)3A, Installing $\leq 3ft^2$ glassf meeting Exception 1 to 150.1(c)3A, Installing $\leq 3ft^2$ tub02030405Fenestration<br>TypeFrame TypeDynamic<br>GlazingOrientation<br>N, S, W, ENewNon-Metal(W)NewNon-Metal(W)NewNon-Metal(W)Image: NewNon-MetalImage: NewNewNon-MetalImage: NewNem | IADD-02-E (Revised 07/17)         ICATE OF COMPLIANCE         ptive Residential Additions That Do Not Require HERS Field Verificat         Image: 1142 Lexington Dr. Addition         estration Proposed Areas and Efficiencies         f meeting Exception 1 to 150.1(c)3A, Installing $\leq 3ft^2$ glass in door, it f         f meeting Exception 1 to 150.1(c)3A, Installing $\leq 3ft^2$ tubular skylight         02       03       04       05       06         Fenestration Type       Frame Type       Dynamic Glazing       Orientation Number of Panes         New       Non-Metal       (S)       2         New       Non-Metal       (W)       2         Image: New | ICATE OF COMPLIANCE<br>ptive Residential Additions That Do Not Require HERS Field Verification<br><sup>Fer</sup> 1142 Lexington Dr. Addition<br>setration Proposed Areas and Efficiencies<br>f meeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> glass in door, it is assumed to<br>f meeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> tubular skylight, it is assumed<br>02 03 04 05 06 07<br>Fenestration<br>Type Frame Type Dynamic<br>Glazing N, S, W, E 0<br>Panes Area ft <sup>2</sup><br>New Non-Metal (S) 2 25.0<br>New Non-Metal (S) 2 25.0<br>New Non-Metal (W) 2 22.7<br>Total Proposed Fenestration Area<br>Maximum Allowed Fenestration Area<br>Maximum Allowed Fenestration Area<br>Maximum Allowed West-Facing Fenestration Area<br>Maximum Allowed West-Facing Fenestration Area<br>Compliance Statement Total Proposed Fenestration Area ≤ Maximum Allow<br>Total Proposed Fenestration U-factor (Windows)<br>Required Fenestration U-factor (Windows)<br>Required Fenestration SHGC (Windows)<br>Required Fenestration SHGC (Windows)<br>Required Fenestration SHGC (Windows)<br>Required Fenestration SHGC (Windows) | $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | ICATE OF COMPLIANCE<br>ICATE OF COMPLIANCE<br>stration Proposed Areas and Efficiencies<br>freeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> glass in door, it is assumed to meet the minimum requi<br>freeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> tubular skylight, it is assumed to meet the minimum requi<br>freeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> tubular skylight, it is assumed to meet the minimum requi<br>freeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> tubular skylight, it is assumed to meet the minimum requi<br>freeting Exception 1 to 150.1(c)3A, Installing ≤ 3ft <sup>2</sup> tubular skylight, it is assumed to meet the minimum requi<br>freestration<br>Type<br>Frame Type<br>Frame Type<br>Proposed<br>Frame Type<br>Frame Type<br>Non-Metal<br>New<br>Non-Metal<br>Non-Metal<br>New<br>Non-Metal<br>Non-Metal<br>New<br>Non-Metal<br>Non-Metal<br>Compliance Statement<br>Total Proposed Fenestration Area<br>Compliance Statement<br>Total Proposed Fenestration Area<br>Compliance Statement<br>Total Proposed Fenestration U-factor (Windows)<br>Required Fenestration U-factor (Windows)<br>Required Fenestration SHGC (Windows)<br>Required Fenestration SHGC (Windows)<br>Compliance Statement<br>Proposed Fenestration SHGC (Windows)<br>Compliance Statement<br>Pro | AdD/Dec [MeW800 U/1/)<br>[CATE OF COMPLIANCE<br>prive Residential Additions That Do Not Require HERS Field Verification<br>** 1142 Lexington Dr. Addition<br>** 100 00 00 00 00 00 00 00 00 00 00 00 00 | Add/doc [revealed (revealed Ori/)]<br>CATE OF COMPLIANCE<br>prive Residential Additions That Do Not Require HERS Field Verification<br>** 1142 Lexington Dr. Addition<br>** 1029<br>** | Nature         Description         Description <thdescription< th=""> <thdescription< th=""> <thd< td=""><td>CALL OF COMPLANCE       CALL OF COMPLANCE         ptive Residential Additions That Do Not Require HERS Field Verification          aus research<br/>10/29/2018          estration Proposed Areas and Efficiencies<br/>imeeting Exception 1 to 150.1(c)3A, Installing ≤ 3R<sup>2</sup> glass in door, it is assumed to meet the minimum required U-factor (0.32) &amp; SHGC (0.30).<br/>The time time time time time time time tim</td></thd<></thdescription<></thdescription<> | CALL OF COMPLANCE       CALL OF COMPLANCE         ptive Residential Additions That Do Not Require HERS Field Verification          aus research<br>10/29/2018          estration Proposed Areas and Efficiencies<br>imeeting Exception 1 to 150.1(c)3A, Installing ≤ 3R <sup>2</sup> glass in door, it is assumed to meet the minimum required U-factor (0.32) & SHGC (0.30).<br>The time time time time time time time tim |

Proposed Fenestration U-factor ≤ Required Fenestration U-factor

Proposed Fenestration SHGC ≤ Required Fenestration SHGC

#### STATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Require HERS Field Verification

-02-Е of 9)

CA Building Energy Efficiency Standards - 2016 Residential Compliance

Proposed Fenestration SHGC (Skylights)

Required Fenestration SHGC (Skylights)

29

30

31

32

**Compliance Statement** 

**Compliance Statement** 

🗹 Yes 🛛 No

🗹 Yes 🛛 No

0.000

0.300



| ons That Do Not Require HERS F  | ield Verification  | CALIF  | ORNIA ENEI  | RGY COMM   |  |
|---|--|--|---|--|--|
|   |  |  |   | CF1  | LR-ADD-02-E  |
| Not Require HERS Field Verification   |  |  |   |  | (Page 7 of 9)  |
| 1142 Lexington Dr. Addition   | Date Prepared:   |  | 10/29/  | 2018   |  |
| Heating/Cooling (Prescriptive Section 150.<br>I be exempt from HERS verification requirements a<br>sting systems are altered and are not exempt from<br>Illing unit in the building, check the box that indicat<br>ed;<br>placed;<br>he existing duct system was insulated with asbestos<br>he existing duct system was previously tested and p | .2(b))<br>s prerequisite for use of the CF1R-ADD-02 and CF2<br>HERS verification, then a CF1R-ADD-01 shall be con<br>es the exemption from HERS verification complian<br>;<br>passed by a HERS Rater.  | R-ADD-02 Cor<br>npleted and r<br>ce:   | npliance Dc<br>egistered w  | ocuments.<br>ith a HERS  | lf new<br>Provider   |
| 02  | 03   |  | 04  | 4  |  |
| SC System Identification or Name  | SC System Location or Area Served  | Exemp  | otion from I  | IERS Verifi  | cation   |
| Ductless SS HP  | 364  | 🗹 a  | □b  | Сc   | □ d  |
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|   | Dns That Do Not Require HERS F         Not Require HERS Field Verification         1142 Lexington Dr. Addition         feating/Cooling (Prescriptive Section 150)         I be exempt from HERS verification requirements a sting systems are altered and are not exempt from HIIng unit in the building, check the box that indicated;         placed;         e existing duct system was insulated with asbestos the existing duct system was previously tested and p         02         SC System Identification or Name         Ductless SS HP | Does That Do Not Require HERS Field Verification         Not Require HERS Field Verification         1142 Lexington Dr. Addition         Lexengt from HERS verification requirements as prerequisite for use of the CF1R-ADD-02 and CF2 sting systems are altered and are not exempt from HERS verification, then a CF1R-ADD-01 shall be coriling unit in the building, check the box that indicates the exemption from HERS verification complian ad;         placed;       e existing duct system was insulated with asbestos;         te existing duct system was previously tested and passed by a HERS Rater.         02       03         SC System Identification or Name       SC System Location or Area Served         Ductless SS HP       364         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1 | Data Do Not Require HERS Field Verification         Not Require HERS Field Verification         1142 Lexington Dr. Addition         Determediation         Ductless SS HP       364       Paa         Ductless SS HP       364       Paa         Ductless SS HP       364       Paa         Ductless SS HP       a         a       a         a       a         a       a         Colspan= 2       Colspan= 2       Colspan= 2       Colspan= 2       Colspan= 2       Colspan= 2       a         a       a       a | CALIFORNIA ENER         CALIFORNIA ENER         Not Require HERS Field Verification         1142 Lexington Dr. Addition       Data Prepared       10/29/         Heating/Cooling (Prescriptive Section 150.2(b))         be exempt from HERS verification requirements as prerequisite for use of the CF1R-ADD-01 shall be completed and registered willing unit in the building, check the box that indicates the exemption from HERS verification compliance:       O         uing unit in the building, check the box that indicates the exemption from HERS verification compliance:       03       00         yiaccij       ee existing duct system was insulated with asbestos;       ee existing duct system was previously tested and passed by a HERS Rater.       00       00         SC System Identification or Name       SC System Location or Area Served       Exemption from HER         Ductless SS HP       364       III a       III a         III a       III a       III a       III a         III a       III a       III a       III a       III a         III a       III a       III a       III a       III a         IIII a       IIII a       IIII a       IIII a       IIII a       IIII a         IIII a       IIII a       IIII a       IIII a       IIII a       IIII a         < | Data Do Not Require HERS Field Verification         CRIFORNUME ENERGY COMM         Not Require HERS Field Verification         1142 Lexington Dr. Addition       Pate Product       10/29/2018         Heating/Cooling (Prescriptive Section 150.2(b))         Lexington MERS verification requirements as prerequisite for use of the CF1R-ADD-02 and CF2R-ADD-02 Compliance Documents.         Interview of the System Verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification compliance:         adjuster of the Box that Indicates the Exemption from HERS verification compliance:         adjuster of the Box that Indicates the exemption from HERS verification or Name         C System Identification or Name       C System Identificatin or Indicates the exemption from HERS veri |

| Project Name: 11 | 42 Lexington Dr       | . Addition      |            |             |               |             |           |       | Date I | Prepared:10/29 | 9/2018     |         |            |          |
|------------------|-----------------------|-----------------|------------|-------------|---------------|-------------|-----------|-------|--------|----------------|------------|---------|------------|----------|
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
| K. Water Hea     | ting Systems (S       | ection 150.2(a) | 1D)        |             | hu dua nia an |             |           |       |        |                |            |         |            |          |
| List water neate | rs and bollers for bo |                 | ater (DHW) | neaters and |               |             |           | 00    | 10     | 11             | 12         | 12      | 14         | 15       |
| 01               | 02                    | 03              | 04         | 05          | 06            | 07<br>Water | 08        | 09    | 10     | 11             | 12         | 13      | 14         | 15       |
|                  | Water Heating         |                 | Water      |             | # of          | Heater      |           |       |        |                |            |         |            | Back-Up  |
|                  | System                | Water Heating   | Heating    | Water       | Water         | Storage     |           | Rated | Rated  | Heating        | Heating    | Standby | Exterior   | Solar    |
| Dwelling Unit    | Identification or     | System Location | System     | Heater      | Heaters       | Volume      |           | Input | Input  | Efficiency     | Efficiency | Loss    | Insulation | Savings  |
| Name             | Name<br>Takagi/       | or Area Served  | Туре       | Туре        | in System     | (gal)       | Fuel Type | Туре  | Value  | Туре           | Value      | (%)     | R-Value    | Fraction |
| Addition         | T-KJr2-OS-N           | New             | DHW        | Tankless    | 1             | 0           | Gas       | 0.82  | EF     | -              | -          | -       | -          | -        |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |
|                  |                       |                 |            |             |               |             |           |       |        |                |            |         |            |          |

## STATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Require HERS Field Verification

CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE

Prescriptive Residential Additions That Do Not Require HERS Field Verification

CF1R-ADD-02-E (Page 8 of 9)



| TATE OF CALIFORNIA Prescriptive Residential Additions That Do Not Require H  | IERS Field Verification   |
|--|---|
| EC-CF1R-ADD-02-E (Revised 07/17)   |   |
| Prescriptive Residential Additions That Do Not Require HERS Field Verification   |   |
| Project Name: 1142 Lovington Dr. Addition  | Date Prepared: 10/20/2018   |
| 1142 Lexington DI. Addition  | 10/29/2010  |
| DOCUMENTATION AUTHOR'S DECLARATION STATEMENT   |   |
| <ol> <li>I certify that this Certificate of Compliance documentation is accurate and complet</li> </ol>  | e.  |
| Documentation Author Name: David Hensel, PE  | Documentation Author Signature: David Hand Constant   |
| Company:<br>Hensel Consulting Engineers, Inc.  | Signature Date: 10/29/2018  |
| Address: P.O. Box 1442   | CEA/ HERS Certification Identification (if applicable):<br>M32901   |
| City/State/Zip: San Marcos, CA 92079   | Phone: (619) 665-3259   |
| RESPONSIBLE PERSON'S DECLARATION STATEMENT   |   |
| <ol> <li>The information provided on this Certificate of Compliance is true and correct.</li> <li>I am eligible under Division 3 of the Business and Professions Code to accept respondesigner).</li> <li>That the energy features and performance specifications, materials, components, Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the Califort.</li> <li>The building design features or system design features identified on this Certificate worksheets, calculations, plans and specifications submitted to the enforcement a</li> <li>I will ensure that a registered copy of this Certificate of Compliance shall be made for all applicable inspections. I understand that a registered copy of this Certificate owner at occupancy.</li> </ol> | onsibility for the building design or system design identified on this Certificate of Compliance (responsible<br>and manufactured devices for the building design or system design identified on this Certificate of<br>ornia Code of Regulations.<br>e of Compliance are consistent with the information provided on other applicable compliance documents,<br>gency for approval with this building permit application.<br>available with the building permit(s) issued for the building, and made available to the enforcement agency<br>e of Compliance is required to be included with the documentation the builder provides to the building<br>Responsible Designer Signature: |
| John Doe   | John Doe  |
| Company :<br>John Doe Design   | Date Signed: 10/29/2018   |
| Address: 1234 Design St.   | License: 123456   |
| City/State/Zip:  | Phone: 123-456-7899   |

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.



<u>NOTE:</u> Low-rise residential buildings subject to the Energy Standards must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information. \*Exceptions may apply. (Revised 04/2017)

| Building Envelope Measures: |  |  |
|-----------------------------|--|--|
| § 110.6(a)1:                | Air Leakage. Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 cfm/ft <sup>2</sup> or less when tested per NFRC-400 or ASTM E283 or AAMA/WDMA/CSA 101/I.S.2/A440-2011.*  |  |
| § 110.6(a)5:                | Labeling. Fenestration products must have a label meeting the requirements of § 10-111(a).   |  |
| § 110.6(b):                 | Field fabricated exterior doors and fenestration products must use U-factors and solar heat gain coefficient (SHGC) values from TABLES 110.6-A and 110.6-B for compliance and must be caulked and/or weatherstripped.*   |  |
| § 110.7:                    | Air Leakage. All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.   |  |
| § 110.8(a):                 | Insulation Certification by Manufacturers. Insulation specified or installed must meet Standards for Insulating Material.  |  |
| § 110.8(g):                 | Insulation Requirements for Heated Slab Floors. Heated slab floors must be insulated per the requirements of § 110.8(g).   |  |
| § 110.8(i):                 | Roofing Products Solar Reflectance and Thermal Emittance. The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) when the installation of a cool roof is specified on the CF1R.  |  |
| § 110.8(j):                 | Radiant Barrier. A radiant barrier must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.  |  |
| § 150.0(a):                 | <b>Ceiling and Rafter Roof Insulation.</b> Minimum R-22 insulation in wood-frame ceiling; or the weighted average U-factor must not exceed 0.043. Minimum R-19 or weighted average U-factor of 0.054 or less in a rafter roof alteration. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling.* |  |
| § 150.0(b):                 | Loose-fill Insulation. Loose fill insulation must meet the manufacturer's required density for the labeled R-value.  |  |
| § 150.0(c):                 | Above Grade Wall Insulation. Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less (R-19 in 2x6 or U-factor of 0.074 or less). Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102, equivalent to an installed value of R-13 in a wood framed assembly.*   |  |
| § 150.0(d):                 | Raised-floor Insulation. Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor.*   |  |
| § 150.0(f):                 | Slab Edge Insulation. Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3%; have a water vapor permeance no greater than 2.0 perm/inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).   |  |
| § 150.0(g)1:                | Vapor Retarder. In Climate Zones 1-16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to § 150.0(d).  |  |
| § 150.0(g)2:                | Vapor Retarder. In Climate Zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.  |  |
| § 150.0(q):                 | <b>Fenestration Products.</b> Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.58; or the weighted average U-factor of all fenestration must not exceed 0.58.  |  |
| Fireplaces, Decor           | rative Gas Appliances, and Gas Log Measures:   |  |
| § 150.0(e)1A:               | Closable Doors. Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.   |  |
| § 150.0(e)1B:               | Combustion Intake. Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device.*   |  |
| § 150.0(e)1C:               | Flue Damper. Masonry or factory-built fireplaces must have a flue damper with a readily accessible control.*   |  |
| § 150.0(e)2:                | Priot Light. Continuous burning pilot lights and the use of indoor air for cooling a firebox jacket, when that indoor air is vented to the outside of the building, are prohibited.  |  |
| Space Conditioni            | ng, Water Heating, and Plumbing System Measures:   |  |
| § 110.0-§ 110.3:            | <b>Certification.</b> Heating, ventilation and air conditioning (HVAC) equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the Energy Commission.  |  |
| § 110.2(a):                 | HVAC Efficiency. Equipment must meet the applicable efficiency requirements in TABLE 110.2-A through TABLE 110.2-K.*   |  |
| § 110.2(b):                 | <b>Controls for Heat Pumps with Supplementary Electric Resistance Heaters.</b> Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone; and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.  |  |
| § 110.2(c):                 | Thermostats. All unitary heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat.*   |  |
| § 110.3(c)5:                | Water Heating Recirculation Loops Serving Multiple Dwelling Units. Water heating recirculation loops serving multiple dwelling units must meet the air release valve, backflow prevention, pump priming, pump isolation valve, and recirculation loop connection requirements of § 110.3(c)5.  |  |
| § 110.3(c)7:                | Isolation Valves. Instantaneous water heaters with an input rating greater than 6.8 kBTU/hr (2 kW) must have isolation valves with hose bibbs or other fittings on both cold water and hot water lines of water heating systems to allow for water tank flushing when the valves are closed.   |  |
| § 110.5:                    | Pilot Lights. Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (appli-<br>ances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu/hr are exempt); and pool and spa heaters.*   |  |
| § 150.0(h)1:                | Building Cooling and Heating Loads. Heating and/or cooling loads are calculated in accordance with ASHRAE Handbook, Equipment<br>Volume, Applications Volume, and Fundamentals Volume; SMACNA Residential Comfort System Installation Standards Manual; or ACCA<br>Manual J using design conditions specified in § 150.0(h)2.  |  |



| § 150.0(h)3A:            | Clearances. Installed air conditioner and heat pump outdoor condensing units must have a clearance of at least 5 feet from the outlet of any dryer vent.   |
|--------------------------|--|
| § 150.0(h)3B:            | Liquid Line Drier. Installed air conditioner and heat pump systems must be equipped with liquid line filter driers if required, as specified by manufacturer's instructions.   |
| § 150.0(j)1:             | Storage Tank Insulation. Unfired hot water tanks, such as storage tanks and backup storage tanks for solar water-heating systems, must have<br>R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.  |
| § 150.0(j)2A:            | Water piping and cooling system line insulation. For domestic hot water system piping, whether buried or unburied, all of the following must be insulated according to the requirements of TABLE 120.3-A: the first 5 feet of hot and cold water pipes from the storage tank; all piping with a nominal diameter of 3/4 inch or larger; all piping associated with a domestic hot water recirculation system regardless of the pipe diameter; piping from the heating source to storage tank or between tanks; piping buried below grade; and all hot water pipes from the heating source to kitchen fixtures.*  |
| § 150.0(j)2B:            | Water piping and cooling system line insulation. All domestic hot water pipes that are buried below grade must be installed in a water proof and non-crushable casing or sleeve.*  |
| § 150.0(j)2C:            | Water piping and cooling system line insulation. Pipe for cooling system lines must be insulated as specified in § 150.0(j)2A. Distribution piping for steam and hydronic heating systems or hot water systems must meet the requirements in TABLE 120.3-A.*   |
| § 150.0(j)3:             | Insulation Protection. Insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.  |
| § 150.0(j)3A:            | Insulation Protection. Insulation exposed to weather must be installed with a cover suitable for outdoor service. For example, protected by aluminum, sheet metal, painted canvas, or plastic cover. The cover must be water retardant and provide shielding from solar radiation that can cause degradation of the material.  |
| § 150.0(j)3B:            | Insulation Protection. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must have a Class I or Class II vapor retarder.   |
| § 150.0(n)1:             | Gas or Propane Systems. Systems using gas or propane water heaters to serve individual dwelling units must include all of the following: a 120V electrical receptacle within 3 feet of the water heater; 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; a condensate drain that is no more than 2 inches higher than the base of the water heater, and allows natural draining without pump assistance; and a gas supply line with a capacity of at least 200,000 Btu/hr.   |
| § 150.0(n)2:             | Recirculating Loops. Recirculating loops serving multiple dwelling units must meet the requirements of § 110.3(c)5.  |
| § 150.0(n)3:             | Solar Water-heating Systems. Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC) or by a listing agency that is approved by the Executive Director.  |
| Ducts and Fans Measures: |  |
| § 110.8(d)3:             | Ducts. Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.   |
| § 150.0(m)1:             | <b>CMC Compliance.</b> All air-distribution system ducts and plenums must be installed, sealed, and insulated to meet the requirements of CMC §§ 601.0, 602.0, 603.0, 604.0, 605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. Portions of supply-air and return-air ducts and plenums must be insulated to a minimum installed level of R-6.0 (or higher if required by CMC § 605.0) or a minimum installed level of R-4.2 when entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8). Connections of metal ducts and inner core of flexible ducts must be mechanically fastened. Openings must be sealed with mastic, tape, or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B or aerosol sealant that meets the requirements of UL 723. If mastic or tape is used to seal openings greater than ¼ inch, the combination of mastic and either mesh or tape must be used. Building cavities, support platforms for air handlers, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms must not be compressed to cause reductions in the cross-sectional area of the ducts. |
| § 150.0(m)2:             | Factory-Fabricated Duct Systems. Factory-fabricated duct systems must comply with applicable requirements for duct construction, connections, and closures; joints and seams of duct systems and their components must not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.  |
| § 150.0(m)3:             | Field-Fabricated Duct Systems. Field-fabricated duct systems must comply with applicable requirements for: pressure-sensitive tapes, mastics, sealants, and other requirements specified for duct construction.  |
| § 150.0(m)7:             | Backdraft Dampers. All fan systems that exchange air between the conditioned space and the outside of the building must have backdraft or automatic dampers.   |
| § 150.0(m)8:             | Gravity Ventilation Dampers. Gravity ventilating systems serving conditioned space must have either automatic or readily accessible,<br>manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.  |
| § 150.0(m)9:             | Protection of Insulation. Insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service. For example, protected by aluminum, sheet metal, painted canvas, or plastic cover. Cellular foam insulation must be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation.   |
| § 150.0(m)10:            | Porous Inner Core Flex Duct. Porous inner core flex duct must have a non-porous layer between the inner core and outer vapor barrier.  |
| § 150.0(m)11:            | Duct System Sealing and Leakage Test. When space conditioning systems use forced air duct systems to supply conditioned air to an occupiable space, the ducts must be sealed and duct leakage tested, as confirmed through field verification and diagnostic testing, in accordance with § 150.0(m)11and Reference Residential Appendix RA3.   |
| § 150.0(m)12:            | Air Filtration. Mechanical systems that supply air to an occupiable space through ductwork exceeding 10 feet in length and through a thermal conditioning component, except evaporative coolers, must be provided with air filter devices that meet the design, installation, efficiency, pressure drop, and labeling requirements of § 150.0(m)12.  |



| § 150.0(m)13:    | <b>Duct System Sizing and Air Filter Grille Sizing.</b> Space conditioning systems that use forced air ducts to supply cooling to an occupiable space must have a hole for the placement of a static pressure probe (HSPP), or a permanently installed static pressure probe (PSPP) in the supply plenum. The space conditioning system must also demonstrate airflow $\geq$ 350 CFM per ton of nominal cooling capacity through the return grilles, and an air-handling unit fan efficacy $\leq$ 0.58 W/CFM as confirmed by field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.3. This applies to both single zone central forced air systems and every zone for zonally controlled central forced air systems. |
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| §150.0(o):       | Ventilation for Indoor Air Quality. All dwelling units must meet the requirements of ASHRAE Standard 62.2. Neither window operation nor continuous operation of central forced air system air handlers used in central fan integrated ventilation systems are permissible methods of providing whole-building ventilation.   |
| § 150.0(o)1A:    | Field Verification and Diagnostic Testing. Whole-building ventilation airflow must be confirmed through field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.7.  |
| Pool and Spa Sys | tems and Equipment Measures:   |
| § 110.4(a):      | <b>Certification by Manufacturers.</b> Any pool or spa heating system or equipment must be certified to have all of the following: a thermal efficiency that complies with the Appliance Efficiency Regulations; an on-off switch mounted outside of the heater that allows shutting off the heater without adjusting the thermostat setting; a permanent weatherproof plate or card with operating instructions; and must not use electric resistance heating.  |
| § 110.4(b)1:     | Piping. Any pool or spa heating equipment must be installed with at least 36 inches of pipe between the filter and the heater, or dedicated suction and return lines, or built-in or built-up connections to allow for future solar heating.   |
| § 110.4(b)2:     | Covers. Outdoor pools or spas that have a heat pump or gas heater must have a cover.   |
| § 110.4(b)3:     | Directional inlets and time switches for pools. Pools must have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.  |
| § 110.5:         | Pilot Light. Natural gas pool and spa heaters must not have a continuously burning pilot light.  |
| § 150.0(p):      | Pool Systems and Equipment Installation. Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves.*  |
| Lighting Measure | S:   |
| § 110.9:         | Lighting Controls and Components. All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9.*  |
| § 110.9(e):      | JA8 High Efficacy Light Sources. To qualify as a JA8 high efficacy light source for compliance with § 150.0(k), a residential light source must<br>be certified to the Energy Commission according to Reference Joint Appendix JA8.  |
| § 150.0(k)1A:    | Luminaire Efficacy. All installed luminaires must be high efficacy in accordance with TABLE 150.0-A.   |
| § 150.0(k)1B:    | Blank Electrical Boxes. The number of electrical boxes that are more than 5 feet above the finished floor and do not contain a luminaire or other device must be no greater than the number of bedrooms. These electrical boxes must be served by a dimmer, vacancy sensor control, or fan speed control.  |
| § 150.0(k)1C:    | Recessed Downlight Luminaires in Ceilings. Luminaires recessed into ceilings must meet all of the requirements for: insulation contact (IC) labeling; air leakage; sealing; maintenance; and socket and light source as described in § 150.0(k)1C. A JA8-2016-E light source rated for elevated temperature must be installed by final inspection in all recessed downlight luminaires in ceilings.  |
| § 150.0(k)1D:    | Electronic Ballasts. Ballasts for fluorescent lamps rated 13 watts or greater must be electronic and must have an output frequency no less than 20 kHz.  |
| § 150.0(k)1E:    | Night Lights. Permanently installed night lights and night lights integral to installed luminaires or exhaust fans must be rated to consume no more than 5 watts of power per luminaire or exhaust fan as determined in accordance with § 130.0(c). Night lights do not need to be controlled by vacancy sensors.  |
| § 150.0(k)1F:    | Lighting Integral to Exhaust Fans. Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods)<br>must meet the applicable requirements of § 150.0(k).  |
| § 150.0(k)1G:    | Screw based luminaires. Screw based luminaires must not be recessed downlight luminaires in ceilings and must contain lamps that comply with Reference Joint Appendix JA8. Installed lamps must be marked with "JA8-2016" or "JA8-2016-E" as specified in Reference Joint Appendix JA8.  |
| § 150.0(k)1H:    | Enclosed Luminaires. Light sources installed in enclosed luminaires must be JA8 compliant and must be marked with "JA8-2016-E."  |
| § 150.0(k)2A:    | Interior Switches and Controls. All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.  |
| § 150.0(k)2B:    | Interior Switches and Controls. Exhaust fans must be switched separately from lighting systems.*   |
| § 150.0(k)2C:    | Interior Switches and Controls. Luminaires must be switched with readily accessible controls that permit the luminaires to be manually switched ON and OFF.  |
| § 150.0(k)2D:    | Interior Switches and Controls. Controls and equipment must be installed in accordance with manufacturer's instructions.   |
| § 150.0(k)2E:    | Interior Switches and Controls. No control must bypass a dimmer or vacancy sensor function if the control is installed to comply with<br>§ 150.0(k).   |
| § 150.0(k)2F:    | Interior Switches and Controls. Lighting controls must comply with the applicable requirements of § 110.9.   |
| § 150.0(k)2G:    | Interior Switches and Controls. An energy management control system (EMCS) may be used to comply with dimmer requirements if it: functions as a dimmer according to § 110.9; meets the Installation Certificate requirements of § 130.4; meets the EMCS requirements of § 130.5(f); and meets all other requirements in § 150.0(k)2.   |
| § 150.0(k)2H:    | Interior Switches and Controls. An EMCS may be used to comply with vacancy sensor requirements in § 150.0(k) if it meets all of the following: it functions as a vacancy sensor according to § 110.9; the Installation Certificate requirements of § 130.4; the EMCS requirements of § 130.5(f); and all other requirements in § 150.0(k)2.  |
| § 150.0(k)2I:    | Interior Switches and Controls. A multiscene programmable controller may be used to comply with dimmer requirements in § 150.0(k) if it provides the functionality of a dimmer according to § 110.9, and complies with all other applicable requirements in § 150.0(k)2.   |



| § 150.0(k)2J:     | Interior Switches and Controls. In bathrooms, garages, laundry rooms, and utility rooms, at least one luminaire in each of these spaces must be controlled by a vacancy sensor.  |
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| § 150.0(k)2K:     | Interior Switches and Controls. Dimmers or vacancy sensors must control all luminaires required to have light sources compliant with<br>Reference Joint Appendix JA8, except luminaires in closets less than 70 square feet and luminaires in hallways.  |
| § 150.0(k)2L:     | Interior Switches and Controls. Undercabinet lighting must be switched separately from other lighting systems.   |
| § 150.0(k)3A:     | <b>Residential Outdoor Lighting.</b> For single-family residential buildings, outdoor lighting permanently mounted to a residential building, or to other buildings on the same lot, must meet the requirement in item § 150.0(k)3Ai (ON and OFF switch) and the requirements in either item § 150.0(k)3Aii (photocell and motion sensor) or item § 150.0(k)3Aiii (photo control and automatic time switch control, astronomical time clock, or EMCS).   |
| § 150.0(k)3B:     | <b>Residential Outdoor Lighting.</b> For low-rise multifamily residential buildings, 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 must comply with either § 150.0(k)3A or with the applicable requirements in §§ 110.9, 130.0, 130.2, 130.4, 140.7 and 141.0.   |
| § 150.0(k)3C:     | <b>Residential Outdoor Lighting.</b> For low-rise residential buildings with four or more dwelling units, outdoor lighting not regulated by § 150.0(k)3B or § 150.0(k)3D must comply with the applicable requirements in §§ 110.9, 130.0, 130.2, 130.4, 140.7 and 141.0.   |
| § 150.0(k)3D:     | <b>Residential Outdoor Lighting.</b> Outdoor lighting for residential parking lots and residential carports with a total of eight or more vehicles per site must comply with the applicable requirements in §§ 110.9, 130.0, 130.2, 130.4, 140.7, and 141.0.   |
| § 150.0(k)4:      | Internally illuminated address signs. Internally illuminated address signs must comply with § 140.8; or must consume no more than 5 watts of power as determined according to § 130.0(c).  |
| § 150.0(k)5:      | Residential Garages for Eight or More Vehicles. Lighting for residential parking garages for eight or more vehicles must comply with the applicable requirements for nonresidential garages in §§ 110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.  |
| § 150.0(k)6A:     | Interior Common Areas of Low-rise Multi-Family Residential Buildings. In a low-rise multifamily residential building where the total interior common area in a single building equals 20 percent or less of the floor area, permanently installed lighting for the interior common areas in that building must be high efficacy luminaires and controlled by an occupant sensor.   |
| § 150.0(k)6B:     | Interior Common Areas of Low-rise Multi-Family Residential Buildings. In a low-rise multifamily residential building where the total interior common area in a single building equals more than 20 percent of the floor area, permanently installed lighting in that building must:<br>i. Comply with the applicable requirements in §§ 110.9, 130.0, 130.1, 140.6 and 141.0; and<br>ii. Lighting installed in corridors and stairwells must be controlled by occupant sensors that reduce the lighting power in each space by at least 50 percent. The occupant sensors must be capable of turning the light fully on and off from all designed paths of ingress and egress.  |
| Solar Ready Build | Jings:   |
| § 110.10(a)1:     | Single Family Residences. Single family residences located in subdivisions with ten or more single family residences and where the application for a tentative subdivision map for the residences has been deemed complete by the enforcement agency must comply with the requirements of § 110.10(b) through § 110.10(e).   |
| § 110.10(a)2:     | Low-rise Multi-family Buildings. Low-rise multi-family buildings must comply with the requirements of § 110.10(b) through § 110.10(d).   |
| § 110.10(b)1:     | Minimum Area. The solar zone must have a minimum total area as described below. The solar zone must comply with access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9 or other Parts of Title 24 or in any requirements adopted by a local jurisdiction. The solar zone total area must be comprised of areas that have no dimension less than 5 feet and are no less than 80 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas specified on the roof or overhang of the building and have a total area no less than 250 square feet. For low-rise multi-family buildings the solar zone must be located on the roof or overhang of the building, or on the roof or overhang of another structure located within 250 feet of the building, or on covered parking installed with the building project, and have a total area no less than 15 percent of the total roof area of the building any skylight area. |
| § 110.10(b)2:     | Orientation. All sections of the solar zone located on steep-sloped roofs must be oriented between 110 degrees and 270 degrees of true north.  |
| § 110.10(b)3A:    | Shading. The solar zone must not contain any obstructions, including but not limited to: vents, chimneys, architectural features, and roof mounted equipment.  |
| § 110.10(b)3B:    | Shading. Any obstruction located on the roof or any other part of the building that projects above a solar zone must be located at least twice the distance, measured in the horizontal plane, of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane.   |
| § 110.10(b)4:     | Structural Design Loads on Construction Documents. For areas of the roof designated as solar zone, the structural design loads for roof dead load and roof live load must be clearly indicated on the construction documents.  |
| § 110.10(c):      | Interconnection Pathways. The construction documents must indicate: a 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); and a pathway for routing of plumbing from the solar zone to the water-heating system.  |
| § 110.10(d):      | <b>Documentation.</b> A copy of the construction documents or a comparable document indicating the information from § 110.10(b) through § 110.10(c) must be provided to the occupant.  |
| § 110.10(e)1:     | Main Electrical Service Panel. The main electrical service panel must have a minimum busbar rating of 200 amps.  |
| § 110.10(e)2:     | Main Electrical Service Panel. The main electrical service panel must have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space must be: positioned at the opposite (load) end from the input feeder location or main circuit location; and permanently marked as "For Future Solar Electric".   |