

Use this checklist when the project involves one or more of the following:

- **Opaque Envelope:** Alters the home’s raised floor, attic ceiling, rafters or walls – exterior or demising (separates enclosed conditioned space from unconditioned space)
- **Lighting:** Replaces, alters or adds any “permanently-installed luminaires” within the home or attached to its exterior
- **Ventilation:** Replaces or adds kitchen hood; replaces, alters or adds bathroom exhaust system

Refer to other Permit Technician Checklists if the project also includes Fenestration, HVAC and Water Heater Alterations

** This checklist is not intended to support projects in which the enforcement agency requires building design plans and specifications to be submitted with the application for a building permit.*

ESSENTIALS

Opaque Envelope §150.0(a)(b)(c)(d)

1. Does the project trigger California’s Building Energy Efficiency Standards (Title 24, Part 6)?

YES NO

- The project triggers Title 24, Part 6 (the Energy Code) if the home’s raised floor, attic ceiling, rafter or any wall is opened up (made accessible) or rebuilt in the same location.

2. Does it meet Mandatory Energy Code requirements?

YES NO

- 1) All joints, penetrations and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, weather stripped or otherwise sealed.
- 2) Any altered walls, raised floors, attic ceilings, and rafters must be insulated (even if insulation was not previously installed) to the following requirements in order to comply:

Opaque Envelope Component	U-factor (area weighted average)		R-value	Section of Energy Code; Joint Appendix JA4
• Roof			(between wood framing)	
Attic Ceiling	≤ 0.043	or ^A	≥ R-22	150.0(a); JA4.2.1
Rafter	≤ 0.054		≥ R-19	150.0(a); JA4.2.2
• Wall (wood framed):			(between wood framing)	
2 x 4, above grade ^B	≤ 0.102	or ^A	≥ R-13	150.0(c); JA4.3.1
2 x 6, above grade	≤ 0.071		≥ R-20	
• Wall (masonry mass):				
Above Grade, insulation on interior	≤ 0.077	or ^A	≥ R-13	150.1(c)1Bii; JA4.3.6 and JA4.3.14
Above Grade, insulation on exterior	≤ 0.125		≥ R-8	
Below Grade, insulation on interior	≤ 0.077		≥ R-13	
Below Grade, insulation on exterior	≤ 0.200		≥ R-5	
• Raised Floor (wood framed) ^C	≤ 0.037	or ^A	≥ R-19	150.0(d); JA4.4.1-2

Lighting §150.0(k)

1. Does the project trigger California’s Energy Code (Title 24, Part 6)?

YES NO

- The project triggers Energy Code when luminaire(s) are altered, added or replaced involving “permanently installed lighting” (luminaire types that are hardwired to the home or any other structure).
 - The project does NOT trigger the Energy Code if it involves portable lighting plugged into a traditional outlet (such as a floor lamp).

2. Does it meet Mandatory Energy Code requirements? (Lighting has no Prescriptive requirements)

 YES NO

- First, installed luminaires must officially qualify as **“high efficacy.”**

Location	Automatically High Efficacy	Using JA8 Certified Lamps ^D (JA8-2019/2016-E must be used for enclosed lamps/ luminaires)
<ul style="list-style-type: none"> • Indoor 	<ul style="list-style-type: none"> • Pin-based linear fluorescent • Pin-based compact fluorescent • Inseparable SSL luminaires with colored light sources for decorative lighting purpose 	<ul style="list-style-type: none"> • LED luminaires with white integral sources that are not decorative • Screw base LED lamps • Pin-based LED lamps • Recessed/recessed ceiling downlights or enclosed lights that are not screw base, and that use an ICAT-rated can^E • Any light source not otherwise listed
<ul style="list-style-type: none"> • Outdoor 	<ul style="list-style-type: none"> • Pulse-start metal halide light sources • High pressure sodium light sources • Luminaires with hardwired high frequency generator and induction lamp • LED light sources that are installed outdoors 	

- Additionally, there are Mandatory lighting **control** requirements.^F

Location/Type of Lighting	Switching/Control Requirements
<ul style="list-style-type: none"> • Bathrooms • Garages (attached or detached) • Laundry rooms • Utility rooms 	<ul style="list-style-type: none"> • At least one fixture must be controlled by a vacancy sensor or an occupancy sensor programmed to work as a vacancy sensor at final inspection. • All other fixtures are dependent on the luminaire or lamp type.
<ul style="list-style-type: none"> • Under-cabinet lighting 	<ul style="list-style-type: none"> • Must be switched separately from other lighting systems and have its control installed based on luminaire or lamp type.
<ul style="list-style-type: none"> • Any “JA8-compliant” light source (see right column of table above) 	<ul style="list-style-type: none"> • Each must be controlled by a vacancy sensor, dimmer or occupancy sensor programmed to work as a vacancy sensor at final inspection. Exception: Closets < 70 ft² and hallways of any size
<ul style="list-style-type: none"> • Night lights • Step lights and path lights • Light sources in drawers, cabinets and linen closets 	<ul style="list-style-type: none"> • If consuming over 5 watts of power and emitting more than 150 lumens, JA8 luminaire and vacancy/occupancy sensors are required. • If consuming no more than 5 watts of power and emitting no more than 150 lumens, neither JA8 luminaires nor vacancy/occupancy sensors are required. • Drawers/cabinets/linen closets do need to be controlled in which light is off when cabinet or drawer is closed.
<ul style="list-style-type: none"> • Outdoor lighting (attached to structures) 	<ul style="list-style-type: none"> • Requires manual on/off switch AND either: Photocell with motion sensor or automatic time switch control; or Astronomical time switch control; or Energy Management Control System programmed to provide specified control functionality. Override controls must automatically return to normal operations within 6 hours.

Ventilation §150.0(o) per ASHRAE Standard 62.2

1. Does the project trigger California’s Energy Code (Title 24, Part 6)?

 YES NO

- The project triggers Energy Code when a kitchen or bathroom is remodeled and changes are made to the local exhaust systems (kitchen exhaust fan, kitchen hood utilized as local exhaust fan, or bathroom exhaust fan).

2. Does it meet Mandatory Energy Code requirements?

 YES NO

- **Bathroom:** Per ASHRAE 62.2 §5.1, each bathroom shall include a local mechanical exhaust that is either demand controlled (50 cfm) or continuous (20 cfm).
- **Kitchen:** Per ASHRAE 62.2 §5.1, each kitchen shall include a local mechanical exhaust that is either:
 - Demand Controlled Vented Kitchen Hood: Enclosed or nonenclosed kitchens with min. 100 cfm. The Energy Code will then require an HVI or AHAM certified kitchen hood meeting minimum airflow and sound rating of ≤ 3.0 sones to be verified by a HERS Rater.
 - Local Exhaust Fan: Either demand controlled (enclosed kitchen ≥ 300 cfm or 5 air changes per hour (ACH) / nonenclosed ≥ 300 cfm) or continuous for enclosed kitchens at 5 ACH.

3. Are the necessary Prescriptive forms included with the permit application?

There are no Certificate of Compliance (CF1R) forms required for opaque envelope, lighting or ventilation alterations, only a Certificate of Installation (CF2R) form. A Certificate of Verification (CF3R) will be required if a kitchen hood is used for local kitchen exhaust, to be completed prior to final building inspection. As a result, no additional forms must be submitted with the permit application, though a Mandatory Measure summary is recommended (see **“2019 Low-Rise Residential Mandatory Measures Summary”^G**).

A – G See page 3 for notes.

Notes

- A** There are two basic methods for meeting Mandatory insulation requirements for types of opaque construction assemblies listed in this table. These requirements apply specifically to opaque areas of the building envelope that separate conditioned space from unconditioned space or outside air.
- 1) The most flexible method is to calculate the overall U-factor for each altered construction assembly in the proposed project, and then show that the area weighted average U-factor for each general type of assembly (wall, roof/ceiling or raised floor) is less than the maximum U-factor allowed in the Energy Code. This is the only method available for metal-framed assemblies, or structural insulated panels (SIPs). If the applicant uses averaged U-factor values to demonstrate compliance for insulation installation, the **CF1R-ENV-02-E** (Area Weighted Average Calculation Worksheet) must be used to document how the averaged U-factor is achieved.
 - 2) The simplest method only applies to wood-framed walls, roofs and floors, and it is just to install insulation with the minimum required R-value between the wood framing. For example, the minimum insulation level for a 2 x 4 wood-frame wall is R-13, so any 2 x 4 wood-frame wall with R-13 insulation or more meets the Mandatory insulation level regardless of any other materials in the overall construction assembly. This method cannot be used for metal-framed construction.
- B** An exception occurs for existing walls already insulated to a maximum U-factor of U-0.110 or between framing members with a minimum insulation of R-11.
- C** A building with controlled ventilation or an unvented crawlspace may omit raised-floor insulation if all of the following conditions are met: foundation walls insulated to meet minimums shown in Energy Code Table 150.1-A; a Class I or II vapor retarder is placed over the entire floor of the crawlspace; vents between the crawlspace and outside air are fitted with automatically operated louvers that are temperature actuated; and requirements are met from Title 24, Part 6 Reference Residential Appendix RA4.5.1.
- D** Light sources in this column of this table must be certified to the Energy Commission as High Efficacy Light Sources in accordance with Title 24, Part 6 Reference Joint Appendix JA8 (JA8), and be marked by the manufacturer directly on the product as meeting JA8 with a marking of either "JA8-2019," "JA8-2019-E," "JA8-2016" or "JA8-2016-E" (where "E" stands for elevated temperature test, such as for use in recessed cans). Products certified under the 2019 Energy Code will have updated "JA8-2019" or "JA8-2019-E" marking. JA8 light sources are listed in the Energy Commission's **Modernized Appliance Efficiency Database System (MAEDbS™)**.
cacertappliances.energy.ca.gov/Login.aspx
- E** Relocating existing recessed fixtures does not require ICAT rating, but does require a JA8 lamp.
- F** For more detailed information on required lighting controls presented in an "at-a-glance" table, see page 4 of Energy Code Ace's Fact Sheet entitled **2019 Residential Indoor and Outdoor Lighting**.
energycodeace.com/download/35157/file_path/fieldList/FactSheet.Res-Lighting.2019
- G** The California Energy Commission provides a high-level summary of the 2019 Energy Code's Low-rise Residential Mandatory Measures at: www.energy.ca.gov/sites/default/files/2020-03/2019_Residential_Mandatory_Measures_Summary_ada.pdf

Required Documentation

Are Certificates of Compliance (CF1R forms) required?

- The CF1R-ALT-05-E may be used to show compliance to envelope alterations, though it is not required.
- There are no CF1R forms that would apply to lighting or ventilation alterations.

Will Home Energy Rating System (HERS) verification be required?

- When a kitchen hood is used for the local kitchen exhaust system, then HERS verification is required.
- There are no HERS measures associated with Residential envelope and lighting alteration projects.

What forms will the building inspector require?

- The inspector will look for the following forms, which are completed by the installing contractor:
 - **Envelope:**
 - CF2R-ENV-03-E: Certificate of Installation for Insulation Installation – for Non-HERS Registered Projects **or**
 - CF2R-ALT-05-E: Certificate of Installation for Prescriptive Residential Alterations That Do Not Require HERS Field Verification
 - **Lighting:**
 - CF2R-LTG-01-E: Certificate of Installation for Prescriptive Lighting for Single-Family Dwellings
 - **Ventilation:**
 - CF2R-MCH-27a-H: Certificate of Installation for Indoor Air Quality and Mechanical Ventilation
 - CF3R-MCH-27a-H: Certificate of Verification for Indoor Air Quality and Mechanical Ventilation (completed by HERS Rater when kitchen hood is local exhaust)

Roofing Alterations and Radiant Barriers

Would any Opaque Envelope Alterations also trigger a radiant barrier requirement?

- Radiant barrier requirements apply if an existing roof had a radiant barrier and some of the roof sheathing was replaced. In this case, the new sheathing would need a radiant barrier. Another scenario could be if a vented attic (which formerly had a radiant barrier) was damaged and had to be completely removed and rebuilt. All radiant barriers require an emittance of 0.05 or less. For more on reroofing requirements, see the “Reroofing Alterations” checklist.

Projects That Replace Only Lamps or a Single Luminaire

What if the Alteration project only involves replacing one luminaire? Does this trigger the Energy Code?

- Yes, if the work is being done under a Building Permit, even just one luminaire replacement triggers the Mandatory requirements of Title 24, Part 6. When a light bulb/lamp is changed when not in conjunction with a Building Permit, these requirements do not apply.

Confirming Luminaire JA8 Compliance

What resources can I direct permit applicants to in order to find out whether a particular make and model of luminaire is certified to the Energy Commission as JA8 compliant?

- Certified products will appear on the Energy Commission’s [Modernized Appliance Efficiency Database System \(MAEDbS™\)](#), a publicly-available database that lists all regulated products that are legally allowed to be sold or offered for sale in California: cacertappliances.energy.ca.gov/Login.aspx
- Products certified under the 2019 Energy Code will have updated “JA8-2019” or “JA8-2019-E” marking.

Confirming Kitchen Hood Compliance

What resources can I direct permit applicants to in order to find out whether a particular make and model of a kitchen hood meets the airflow and sound requirements?

- Certified products will appear on the [Home Ventilating Institute \(HVI\)](#) or the [Association of Home Appliance Manufacturers \(AHAM\)](#) websites (HVI: www.hvi.org/; AHAM: www.aham.org/)

Performance Approach “Trade Offs”

Does the Performance Approach allow for “trade offs” for opaque envelope, lighting or ventilation alterations?

- No. All residential envelope, lighting and ventilation alteration requirements are classified as Mandatory requirements. There are no tradeoffs allowed between Mandatory measures and other Prescriptive building features.

The Energy Code (Title 24, Part 6 Energy Standards)

- Energy Code Section **150.2(b)1** – Energy Efficiency Standards for **Prescriptive Alterations** to Existing Low-Rise Residential Buildings energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1502energyefficiencystandardsforadditionsandalterationsto.htm
- Energy Code Section **150.0(a,b,c,d,k,o)** – Low-Rise Mandatory Features and Devices – **Ceiling and Rafter Roof Insulation; Loose-fill Insulation; Wall Insulation; Raised-floor Insulation; Lighting; Ventilation** energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code Section **110.7** – **Mandatory Requirements** to Limit Air Leakage energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1107mandatoryrequirementstolimitairleakage.htm
- Energy Code Section **110.8(a,d,g,i,j)** – **Mandatory Requirements** for Insulation, Roofing Products and Radiant Barriers energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1108mandatoryrequirementsforinsulationroofingproductsandr1.htm
- Energy Code Section **110.9** – **Mandatory Requirements** for Lighting Controls and Systems, Ballasts and Luminaires energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1109mandatoryrequirementsforlightingcontrols.htm
- Energy Code Section **130.0(c,d,e)** – Lighting Systems and Equipment – General energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Code **Table 150.0-A** – Classification of **High-Efficacy Light Sources** energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1500mandatoryfeaturesanddevices.htm#table1500aclassificationofhighefficacylightsources.htm
- Energy Code **Table 150.1-A** – **Component Package: Single Family Standard Building Design** energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1501performanceandprescriptivecomplianceapproachesforlowr.htm#table1501acomponentpackagesinglefamilystandardbuildingdesign.htm
- Title 24, Part 6 **Reference Joint Appendix JA8 (JA8):** Qualification Requirements for **High-Efficacy Light Sources** energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixja8qualificationrequirementsforhighefficacylightsources.htm

To Interpret the Energy Code

- Energy Code Ace **Fact Sheets:** **Residential Opaque Envelope Alterations; Residential Indoor and Outdoor Lighting** energycodeace.com/download/35126/file_path/fieldList/FactSheet.Res-OpaqueEnvelope.2019
energycodeace.com/download/35157/file_path/fieldList/FactSheet.Res-Lighting.2019
- Energy Code Ace **Application Guides:** **Residential Envelope, Solar Ready & Solar PV** (see Chapter 5); **Residential Lighting** (see Ch. 4 & 5) energycodeace.com/download/40887/file_path/fieldList/AppGuide.Res.Envelope.SolarReady.PV.2019
energycodeace.com/download/35931/file_path/fieldList/AppGuide.Res.Lighting.2019
- Energy Code Ace **Quick Reference Sheet:** Compliance Baseline Low-Rise Residential **Climate Zones 7, 10, 14, & 15** (see Climate Zone 10) energycodeace.com/download/35123/file_path/fieldList/Quick%20Ref.ComplianceBaseline.LR-Res%20Zn%207.10.14.15%202019
- Energy Code Ace **Quick Reference:** Decoding Recovery: **Insulation Guide** energycodeace.com/download/24325/file_path/ResRebuild%20F5-Insulation-051118.pdf
- Title 24, Part 6 **Reference Joint Appendix JA4 (JA4):** U-factor, C-factor and Thermal Mass Data (see **JA4.2, JA4.3 and JA4.4**) energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixja4ufactorcfactorandthermalmassdata.htm
- Energy Standards **Residential Compliance Manual** (see **Chapter 3**, sections 3.4 and 3.5; **Chapter 6**, sections 6.2 and 6.3) energycodeace.com/site/custom/public/reference-ace-2019/Documents/3buildingenvelopequirements.htm
energycodeace.com/site/custom/public/reference-ace-2019/Documents/6residentiallighting.htm
- California Energy Commission's **Appliance Efficiency Database** (MAEDbS™) cacertappliances.energy.ca.gov/Login.aspx

Forms for Simple Remodel Projects (Prescriptive Approach)

- **CF1R-ALT-05-E: Certificate of Compliance** for Prescriptive Residential Alterations (Non-HERS) energycodeace.com/download/39471/file_path/fieldList/2019-CF1R-ALT-05-E-PrescriptiveAlterations-SimpleNonHERS-PaperVersion.pdf
- **CF2R-ALT-05-E: Certificate of Installation** for Prescriptive Residential Alterations (Non-HERS) energycodeace.com/download/39478/file_path/fieldList/2019-CF2R-ALT-05-E-PrescriptiveAlterations-SimpleNonHERS-PaperVersion.pdf
- **CF1R-ENV-02-E: Area Weighted Average Calculation** Worksheet (Non-HERS) (used when averaged U-factors given for insulation installation) energycodeace.com/download/39472/file_path/fieldList/2019-CF1R-ENV-02-E-AreaWeightedAverageWorkSheet.pdf
- **CF2R-ENV-03-E: Certificate of Installation** for Insulation energycodeace.com/download/39480/file_path/fieldList/2019-CF2R-ENV-03-InsulationInstallation.pdf
- **CF2R-LTG-01-E: Certificate of Installation** for Lighting – Single-Family Dwellings (Non-HERS) energycodeace.com/download/39482/file_path/fieldList/2019-CF2R-LTG-01-E-Lighting-SingleFamilyDwellings.pdf
- **CF2R-MCH-27a-H: Certificate of Installation** for Indoor Air Quality and Mechanical Ventilation efiling.energy.ca.gov/GetDocument.aspx?tn=232778-15&DocumentContentId=65031
- **CF3R-MCH-27a-H: Certificate of Verification** for Indoor Air Quality and Mechanical Ventilation (used when kitchen hood is local exhaust) efiling.energy.ca.gov/GetDocument.aspx?tn=232779-4&DocumentContentId=65087



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