

# BUILDING ENERGY ANALYSIS REPORT

**REVIEWED FOR  
CODE COMPLIANCE**

7/19/2024

Khosrow Fallah

BLD23-6524

**PERMIT SONOMA**

THESE ATTACHMENTS ARE PART  
OF THE APPROVED PLANS  
**DO NOT REMOVE THEM**

7/19/2024

Khosrow Fallah

**PERMIT SONOMA  
BUILDING PLAN CHECK**

## **PROJECT:**

Guilloux, Enguerrand Remodel  
17132 Bodega Lane  
Bodega, CA 94922

## **Project Designer:**

Gerda Engelbart  
1083 Vine Street #336  
Healdsburg, CA 95448  
707-431-9841

## **Report Prepared by:**

Rick Rocklewitz  
NRG Compliance, LP  
PO Box 3777  
Santa Rosa, California 95402  
707-237-6957



## **Job Number:**

090122304

## **Date:**

9/4/2023

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 2022 Building Energy Efficiency Standards.

This program developed by EnergySoft, LLC – [www.energysoft.com](http://www.energysoft.com).

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**CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD**

**CF1R-PRF-01E**

**Project Name:** Residential Building

**Calculation Date/Time:** 2023-09-04T09:30:31-07:00

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**Calculation Description:** Title 24 Analysis

**Input File Name:** GuillouxEnguerrandRemodel.ribd22x

GENERAL INFORMATION					
01	Project Name	Residential Building			
02	Run Title	Title 24 Analysis			
03	Project Location	17132 Bodega Lane			
04	City	Bodega	05	Standards Version	2022
06	Zip code	94922	07	Software Version	CBECC-Res 2022.3.0
08	Climate Zone	1	09	Front Orientation (deg/ Cardinal)	270
10	Building Type	Single family	11	Number of Dwelling Units	1
12	Project Scope	Addition and/or Alteration	13	Number of Bedrooms	3
14	Addition Cond. Floor Area (ft <sup>2</sup> )	0	15	Number of Stories	2
16	Existing Cond. Floor Area (ft <sup>2</sup> )	2048.5	17	Fenestration Average U-factor	0.35
18	Total Cond. Floor Area (ft <sup>2</sup> )	2048.5	19	Glazing Percentage (%)	18.62%
20	ADU Bedroom Count	n/a	21	ADU Conditioned Floor Area	n/a
22	Fuel Type	Propane	23	Occupancy U:	No

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	Building does not incorporate Special Features

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Registration Date/Time: 09/04/2023 14:27

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CA Building Energy Efficiency Standards - 2022 Residential Compliance

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ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft <sup>2</sup> -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft <sup>2</sup> -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft <sup>2</sup> -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft <sup>2</sup> -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	0	250.61	0	239.15	0	11.46
Space Cooling	0	0	0	0	0	0
IAQ Ventilation	0	0	0	0	0	0
Water Heating	0	40.88	0	40.88	0	0
Self Utilization/Flexibility Credit						
<b>Efficiency Compliance Total</b>	<b>0</b>	<b>291.49</b>	<b>0</b>	<b>280.03</b>	<b>0</b>	<b>11.46</b>
Photovoltaics		0		0		
Battery				0		
Flexibility						
Indoor Lighting	0	7.58	0	7.58		
Appl. & Cooking	0	23.22	0	23.21		
Plug Loads	0	28.62	0	28.62		
Outdoor Lighting	0	1.82	0	1.82		
<b>TOTAL COMPLIANCE</b>	<b>0</b>	<b>352.73</b>	<b>0</b>	<b>341.26</b>		

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ENERGY USE INTENSITY				
	Standard Design (kBtu/ft <sup>2</sup> - yr )	Proposed Design (kBtu/ft <sup>2</sup> - yr )	Compliance Margin (kBtu/ft <sup>2</sup> - yr )	Margin Percentage
Gross EUI <sup>1</sup>	52.5	50.71	1.79	3.41
Net EUI <sup>2</sup>	52.5	50.71	1.79	3.41

Notes  
 1. Gross EUI is Energy Use Total (not including PV) / Total Building Area.  
 2. Net EUI is Energy Use Total (including PV) / Total Building Area.

REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
<ul style="list-style-type: none"> <li>NO SPECIAL FEATURES REQUIRED</li> </ul>

HERS FEATURE SUMMARY
The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the HERS Registry
<ul style="list-style-type: none"> <li>Kitchen range hood</li> <li>Minimum Airflow</li> <li>Fan Efficacy Watts/CFM</li> <li>Duct leakage testing</li> </ul>

BUILDING - FEATURES INFORMATION						
01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (ft <sup>2</sup> )	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
Residential Building	2048.5	1	3	2	0	1

ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft <sup>2</sup> )	Avg. Ceiling Height	Water Heating System 1	Status
First Floor	Conditioned	HVAC System1	1171	8	DHW Sys 1	Existing

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ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft <sup>2</sup> )	Avg. Ceiling Height	Water Heating System 1	Status
Second Floor	Conditioned	HVAC System1	877.5	9.3	DHW Sys 1	Existing

OPAQUE SURFACES										
01	02	03	04	05	06	07	08	09	10	11
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft <sup>2</sup> )	Window and Door Area (ft <sup>2</sup> )	Tilt (deg)	Wall Exceptions	Status	Verified Existing Condition
West Wall	First Floor	Default Wall Prior to 197	270	Front	260	83.9	90	none	Existing	No
North Wall	First Floor	Default Wall Prior to 197	0	Left	289	87.3	90	none	Existing	No
East Wall	First Floor	Default Wall Prior to 197	90	Back	260	54.1	90	none	Existing	No
South Wall	First Floor	Default Wall Prior to 197	180	Right	289	42.5	90	none	Existing	No
West Wall 2	Second Floor	Default Wall Prior to 197	270	Front	225.1	25	90	none	Existing	No
North Wall 2	Second Floor	Default Wall Prior to 197	0	Left	337.6	37.4	90	none	Existing	No
East Wall 2	Second Floor	Default Wall Prior to 197	90	Back	225.1	25	90	none	Existing	No
South Wall 2	Second Floor	Default Wall Prior to 197	180	Right	337.6	37.4	90	none	Existing	No
Roof (Slope 2/12)	First Floor	Default Roof Prior to 197	n/a	n/a	293.5	n/a	n/a		Existing	No
Roof (Slope 7/12) 2	Second Floor	R-30 Roof Attic	n/a	n/a	857.5	n/a	n/a		Altered	No
Raised Floor	First Floor	Default Floor Crawlspace	n/a	n/a	1171	n/a	n/a		Existing	No
Interior Surface Floor	Second Floor	Default Floor No Crawlspace	n/a	n/a	877.5	n/a	n/a		Existing	No

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OPAQUE SURFACES - CATHEDRAL CEILINGS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Zone	Construction	Azimuth	Orientation	Area (ft <sup>2</sup> )	Skylight Area (ft <sup>2</sup> )	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Cool Roof	Status	Verified Existing Condition	Existing Construction
Roof (Slope 7/12)	Second Floor	R-30 Roof Attic1	270	Front	20.1	20	7	0.1	0.85	No	Altered	No	

ATTIC											
01	02			03	04	05	06	07	08	09	10
Name	Construction			Type	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof	Status	Verified Existing Condition
Attic First Floor	Attic RoofFirst Floor			Ventilated	2	0.1	0.85	No	No	Existing	No
Attic Second Floor	Attic RoofSecond Floor			Ventilated	7	0.1	0.85	No	No	Existing	No

FENESTRATION / GLAZING															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft <sup>2</sup> )	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading	Status	Verified Existing Condition
Window (New)	Window	West Wall	Front	270			1	52.7	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 2	Window	North Wall	Left	0			1	87.3	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 3	Window	East Wall	Back	90			1	54.1	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 4	Window	South Wall	Right	180			1	42.5	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 5	Window	West Wall 2	Front	270			1	25	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA

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FENESTRATION / GLAZING															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft <sup>2</sup> )	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading	Status	Verified Existing Condition
Window (New) 6	Window	North Wall 2	Left	0			1	37.4	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 7	Window	East Wall 2	Back	90			1	25	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Window (New) 8	Window	South Wall 2	Right	180			1	37.4	0.34	NFRC	0.34	NFRC	Bug Screen	New	NA
Skylight (New)	Skylight	Roof (Slope 7/12)	Front	270			1	20	0.48	NFRC	0.37	NFRC		New	NA

OPAQUE DOORS					
01	02	03	04	05	06
Name	Side of Building	Area (ft <sup>2</sup> )	U-factor	Status	Verified Existing Condition
Door (New)	West Wall	31.2	0.5	New	n/a

OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
Default Wall Prior to 197	Exterior Walls	Wood Framed Wall	2x4 @ 16 in. O. C.	R-0	None / None	0.302	Inside Finish: Gypsum Board Cavity / Frame: no insul. / 2x4 Exterior Finish: Wood Siding/sheathing/decking

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OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
R-30 Roof Attic1	Cathedral Ceilings	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-30	None / None	0.042	Roofing: Light Roof (Asphalt Shingle) Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: R-30 / 2x4 Inside Finish: Gypsum Board
Attic RoofFirst Floor	Attic Roofs	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-0	None / 0	0.644	Roofing: Light Roof (Asphalt Shingle) Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: no insul. / 2x4
Attic RoofSecond Floor	Attic Roofs	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-0	None / 0	0.644	Roofing: Light Roof (Asphalt Shingle) Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: no insul. / 2x4
Default Floor Crawlspace	Floors Over Crawlspace	Wood Framed Floor	2x12 @ 16 in. O. C.	R-0	None / None	0.216	Floor Surface: Carpeted Floor Deck: Wood Siding/sheathing/decking Cavity / Frame: no insul. / 2x12
Default Roof Prior to 197	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 16 in. O. C.	R-11	None / None	0.083	Over Ceiling Joists: R-1.9 insul. Cavity / Frame: R-9.1 / 2x4 Inside Finish: Gypsum Board
R-30 Roof Attic	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-30	None / None	0.032	Over Ceiling Joists: R-20.9 insul. Cavity / Frame: R-9.1 / 2x4 Inside Finish: Gypsum Board
Default Floor No Crawlspace	Interior Floors	Wood Framed Floor	2x12 @ 16 in. O. C.	R-0	None / None	0.196	Floor Surface: Carpeted Floor Deck: Wood Siding/sheathing/decking Cavity / Frame: no insul. / 2x12 Ceiling Below Finish: Gypsum Board

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BUILDING ENVELOPE - HERS VERIFICATION				
01	02	03	04	05
Quality Insulation Installation (QII)	High R-value Spray Foam Insulation	Building Envelope Air Leakage	CFM50	CFM50
Not Required	Not Required	N/A	n/a	n/a

WATER HEATING SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
Name	System Type	Distribution Type	Water Heater Name	Number of Units	Solar Heating System	Compact Distribution	HERS Verification	Water Heater Name (#)	Status	Verified Existing Condition	Existing Water Heating System
DHW Sys 1	Domestic Hot Water (DHW)	Standard	DHW Heater 1	1	n/a	None	n/a	DHW Heater 1 (1)	New	NA	

WATER HEATERS														
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Name	Heating Element Type	Tank Type	# of Units	Tank Vol. (gal)	Heating Efficiency Type	Efficiency	Rated Input Type	Input Rating or Pilot	Tank Insulation R-value (Int/Ext)	Standby Loss or Recovery Eff	1st Hr. Rating or Flow Rate	Tank Location	Status	Verified Existing Condition
DHW Heater 1	Propane	Consumer Instantaneous	1	0	UEF	0.82	Btu/Hr	200000	0	n/a	n/a		New	n/a

WATER HEATING - HERS VERIFICATION						
01	02	03	04	05	06	07
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Compact Distribution Type	Recirculation Control	Shower Drain Water Heat Recovery
DHW Sys 1 - 1/1	Not Required	Not Required	Not Required	None	Not Required	Not Required

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SPACE CONDITIONING SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
Name	System Type	Heating Unit Name	Heating Equipment Count	Cooling Unit Name	Cooling Equipment Count	Fan Name	Distribution Name	Required Thermostat Type	Status	Verified Existing Condition	Existing HVAC System
HVAC System1	Heating and cooling system other	Heating Component 1	2	Cooling Component 1	2	HVAC Fan 1	Air Distribution System 1	Setback	New	No	

HVAC - HEATING UNIT TYPES				
01	02	03	04	05
Name	System Type	Number of Units	Heating Efficiency	Heating Unit Brand
Heating Component 1	Central gas furnace	2	AFUE - 90	n/a

HVAC - COOLING UNIT TYPES								
01	02	03	04	05	06	07	08	09
Name	System Type	Number of Units	Efficiency Metric	Efficiency EER/EER2/CEER	Efficiency SEER/SEER2	Zonally Controlled	Mult-speed Compressor	HERS Verification
Cooling Component 1	Central split AC	2	EER/SEER	12.2	14	Not Zonal	Single Speed	Cooling Component 1-hers-cool

HVAC COOLING - HERS VERIFICATION					
01	02	03	04	05	06
Name	Verified Airflow	Airflow Target	Verified EER/EER2	Verified SEERSEER2	Verified Refrigerant Charge
Cooling Component 1-hers-cool	Required	350	Not Required	Not Required	Not Required

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HVAC - DISTRIBUTION SYSTEMS															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Name	Type	Design Type	Duct Ins. R-value		Duct Location		Surface Area		Bypass Duct	Duct Leakage	HERS Verification	Status	Verified Existing Condition	Existing Distribution system	New Ducts 25 ft
			Supply	Return	Supply	Return	Supply	Return							
Air Distribution System 1	Unconditioned attic	Non-Verified	R-6	R-6	Attic	Attic	n/a	n/a	No Bypass Duct	Sealed and Tested	Air Distribution System 1-hers-dist	New	n/a		No

HVAC DISTRIBUTION - HERS VERIFICATION								
01	02	03	04	05	06	07	08	09
Name	Duct Leakage Verification	Duct Leakage Target (%)	Verified Duct Location	Verified Duct Design	Buried Ducts	Deeply Buried Ducts	Low-leakage Air Handler	Low Leakage Ducts Entirely in Conditioned Space
Air Distribution System 1-hers-dist	Yes	5.0	Not Required	Not Required	Not Required	Credit not taken	Not Required	No

HVAC - FAN SYSTEMS			
01	02	03	04
Name	Type	Fan Power (Watts/CFM)	Name
HVAC Fan 1	HVAC Fan	0.45	HVAC Fan 1-hers-fan

HVAC FAN SYSTEMS - HERS VERIFICATION		
01	02	03
Name	Verified Fan Watt Draw	Required Fan Efficacy (Watts/CFM)
HVAC Fan 1-hers-fan	Required	0.45

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CA Building Energy Efficiency Standards - 2022 Residential Compliance

Report Version: 2022.0.000

Report Generated: 2023-09-04 09:30:49

Schema Version: rev 20220901

Project Name: Residential Building

Calculation Date/Time: 2023-09-04T09:30:31-07:00

(Page 11 of 12)

Calculation Description: Title 24 Analysis

Input File Name: GuillouxEnguerrandRemodel.ribd22x

HERS RATER VERIFICATION OF EXISTING CONDITIONS



**CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD**

**CF1R-PRF-01E**

**Project Name:** Residential Building

**Calculation Date/Time:** 2023-09-04T09:30:31-07:00

**(Page 12 of 12)**

**Calculation Description:** Title 24 Analysis

**Input File Name:** GuillouxEnguerrandRemodel.ribd22x

<b>DOCUMENTATION AUTHOR'S DECLARATION STATEMENT</b>	
1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name: Mario Bertacco	Documentation Author Signature: <i>Mario Bertacco</i>
Company: NRG Compliance LP	Signature Date: 09/04/2023
Address: PO Box 3777	CEA/ HERS Certification Identification (If applicable):
City/State/Zip: Santa Rosa, CA 95402	Phone: 707-237-6957
<b>RESPONSIBLE PERSON'S DECLARATION STATEMENT</b>	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> <li>1. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance.</li> <li>2. I certify that the energy features and performance specifications identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.</li> <li>3. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.</li> </ol>	
Responsible Designer Name: Gerda Engelbart	Responsible Designer Signature: <i>Gerda Engelbart</i>
Company: Gerda Engelbart	Date Signed: 09/04/2023
Address: 1083 Vine Street #336	License:
City/State/Zip: Healdsburg, CA 95448	Phone: (707) 431-9841

*Digitally signed by California Home Energy Efficiency Rating Services (CHEERS). This digital signature is provided in order to secure the content of this registered document, and in no way implies Registration Provider responsibility for the accuracy of the information.*

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CA Building Energy Efficiency Standards - 2022 Residential Compliance

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# RESIDENTIAL MEASURES SUMMARY RMS-1

Project Name <i>Guilloux, Enguerrand Remodel</i>	Building Type <input checked="" type="checkbox"/> Single Family <input type="checkbox"/> Addition Alone <input type="checkbox"/> Multi Family <input checked="" type="checkbox"/> Existing+ Addition/Alteration	Date <b>9/4/2023</b>		
Project Address <i>17132 Bodega Lane Bodega</i>	California Energy Climate Zone <i>CA Climate Zone 01</i>	Total Cond. Floor Area <b>2,049</b>	Addition <b>0</b>	# of Units <b>1</b>

INSULATION		Cavity	Area (ft <sup>2</sup> )	Special Features	Status
Floor	<i>Wood Framed w/Crawl Space</i>	<i>- no insulation</i>	<i>1,171</i>		<i>Existing</i>
Wall	<i>Wood Framed</i>	<i>- no insulation</i>	<i>176</i>		<i>Existing</i>
Door	<i>Opaque Door</i>	<i>- no insulation</i>	<i>31</i>		<i>New</i>
Wall	<i>Wood Framed</i>	<i>- no insulation</i>	<i>202</i>		<i>Existing</i>
Wall	<i>Wood Framed</i>	<i>- no insulation</i>	<i>206</i>		<i>Existing</i>
Wall	<i>Wood Framed</i>	<i>- no insulation</i>	<i>247</i>		<i>Existing</i>
Roof	<i>Wood Framed Attic</i>	<i>R 11</i>	<i>294</i>		<i>Existing</i>
Wall	<i>Wood Framed</i>	<i>- no insulation</i>	<i>200</i>		<i>Existing</i>

FENESTRATION		Total Area:	Glazing Percentage:	New/Altered Average U-Factor:		Status	
		<i>381</i>	<i>18.6%</i>	<i>0.35</i>			
Orientation	Area(ft <sup>2</sup> )	U-Fac	SHGC	Overhang	Sidefins	Exterior Shades	Status
<i>Front (W)</i>	<i>77.7</i>	<i>0.340</i>	<i>0.34</i>	<i>none</i>	<i>none</i>	<i>N/A</i>	<i>New</i>
<i>Left (N)</i>	<i>124.7</i>	<i>0.340</i>	<i>0.34</i>	<i>none</i>	<i>none</i>	<i>N/A</i>	<i>New</i>
<i>Rear (E)</i>	<i>79.1</i>	<i>0.340</i>	<i>0.34</i>	<i>none</i>	<i>none</i>	<i>N/A</i>	<i>New</i>
<i>Right (S)</i>	<i>79.9</i>	<i>0.340</i>	<i>0.34</i>	<i>none</i>	<i>none</i>	<i>N/A</i>	<i>New</i>
<i>Skylight</i>	<i>20.0</i>	<i>0.480</i>	<i>0.37</i>	<i>none</i>	<i>none</i>	<i>N/A</i>	<i>New</i>

HVAC SYSTEMS						
Qty.	Heating	Min. Eff	Cooling	Min. Eff	Thermostat	Status
<i>2</i>	<i>Gas Central Furnace</i>	<i>90% AFUE</i>	<i>Split Air Conditioner</i>	<i>14.0 SEER</i>	<i>Setback</i>	<i>New</i>

HVAC DISTRIBUTION					Duct R-Value	Status
Location	Heating	Cooling	Duct Location			
<i>HVAC System</i>	<i>Ducted</i>	<i>Ducted</i>	<i>Attic</i>	<i>6.0</i>		<i>New</i>

WATER HEATING					
Qty.	Type	Gallons	Min. Eff	Distribution	Status
<i>1</i>	<i>Small Instantaneous Gas</i>	<i>0</i>	<i>0.82</i>	<i>Standard</i>	<i>New</i>





# 2022 Single-Family Residential Mandatory Requirements Summary

*NOTE: Single-family residential buildings subject to the Energy Codes must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information.*

(04/2022)

## Building Envelope:

§ 110.6(a)1:	<b>Air Leakage.</b> Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E283, or AAMA/WDMA/CSA 101/I.S.2/A440-2011. *
§ 110.6(a)5:	<b>Labeling.</b> Fenestration products and exterior doors must have a label meeting the requirements of § 10-111(a).
§ 110.6(b):	<b>Field fabricated exterior doors and fenestration</b> products must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.6-A, 110.6-B, or JA4.5 for exterior doors. They must be caulked and/or weather-stripped. *
§ 110.7:	<b>Air Leakage.</b> 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):	<b>Insulation Certification by Manufacturers.</b> Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.8(g):	<b>Insulation Requirements for Heated Slab Floors.</b> Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	<b>Roofing Products Solar Reflectance and Thermal Emittance.</b> The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) and be labeled per §10-113 when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	<b>Radiant Barrier.</b> When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	<b>Roof Deck, Ceiling and Rafter Roof Insulation.</b> Roof decks in newly constructed attics in climate zones 4 and 8-16 area-weighted average U-factor not exceeding U-0.184. Ceiling and rafter roofs minimum R-22 insulation in wood-frame ceiling; or area-weighted average U-factor must not exceed 0.043. Rafter roof alterations minimum R-19 or area-weighted average U-factor of 0.054 or less. 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 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):	<b>Loose-fill Insulation.</b> Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	<b>Wall Insulation.</b> Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less, or R-20 in 2x6 inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Tables 150.1-A or B. *
§ 150.0(d):	<b>Raised-floor Insulation.</b> Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor. *
§ 150.0(f):	<b>Slab Edge Insulation.</b> 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 percent; have a water vapor permeance no greater than 2.0 perm per 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:	<b>Vapor Retarder.</b> In climate zones 1 through 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:	<b>Vapor Retarder.</b> 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 0.45; or area-weighted average U-factor of all fenestration must not exceed 0.45. *

## Fireplaces, Decorative Gas Appliances, and Gas Log:

§ 110.5(e)	<b>Pilot Light.</b> Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1:	<b>Closable Doors.</b> Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2:	<b>Combustion Intake.</b> 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)3:	<b>Flue Damper.</b> Masonry or factory-built fireplaces must have a flue damper with a readily accessible control. *

## Space Conditioning, Water Heating, and Plumbing System:

§ 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 California Energy Commission. *
§ 110.2(a):	<b>HVAC Efficiency.</b> Equipment must meet the applicable efficiency requirements in Table 110.2-A through Table 110.2-N. *
§ 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):	<b>Thermostats.</b> All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat. *
§ 110.3(c)3:	<b>Insulation.</b> Unfired service water heater storage tanks and solar water-heating backup tanks must have adequate insulation, or tank surface heat loss rating.
§ 110.3(c)6:	<b>Isolation Valves.</b> Instantaneous water heaters with an input rating greater than 6.8 kBtu per hour (2 kW) must have isolation valves with hose bibbs or other fittings on both cold and hot water lines to allow for flushing the water heater when the valves are closed.



## 2022 Single-Family Residential Mandatory Requirements Summary

§ 110.5:	<b>Pilot Lights.</b> Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour); and pool and spa heaters. *
§ 150.0(h)1:	<b>Building Cooling and Heating Loads.</b> Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume; the SMACNA Residential Comfort System Installation Standards Manual; or the ACCA Manual J using design conditions specified in § 150.0(h)2.
§ 150.0(h)3A:	<b>Clearances.</b> Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B:	<b>Liquid Line Drier.</b> Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(j)1:	<b>Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation.</b> All domestic hot water piping must be insulated as specified in § 609.11 of the California Plumbing Code. *
§ 150.0(j)2:	<b>Insulation Protection.</b> Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind as required by §120.3(b). Insulation exposed to weather must be water retardant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve.
§ 150.0(n)1:	<b>Gas or Propane Water Heating Systems.</b> Systems using gas or propane water heaters to serve individual dwelling units must designate a space at least 2.5' x 2.5' x 7' suitable for the future installation of a heat pump water heater, and meet electrical and plumbing requirements, based on the distance between this designated space and the water heater location; and a condensate drain no more than 2" higher than the base of the water heater
§ 150.0(n)3:	<b>Solar Water-heating Systems.</b> Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the executive director.

### Ducts and Fans:

§ 110.8(d)3:	<b>Ducts.</b> 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 meet CMC §§ 601.0-605.0 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 R-6.0 or higher; ducts located entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8) do not require insulation. 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 UL requirements, or aerosol sealant that meets UL 723. The combination of mastic and either mesh or tape must be used to seal openings greater than ¼". If mastic or tape is used. Building cavities, air handler support platforms, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used to convey conditioned air. Building cavities and support platforms may contain ducts; ducts installed in these spaces must not be compressed. *
§ 150.0(m)2:	<b>Factory-Fabricated Duct Systems.</b> 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:	<b>Field-Fabricated Duct Systems.</b> 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:	<b>Backdraft Damper.</b> Fan systems that exchange air between the conditioned space and outdoors must have backdraft or automatic dampers.
§ 150.0(m)8:	<b>Gravity Ventilation Dampers.</b> Gravity ventilating systems serving conditioned space must have either automatic or readily accessible, manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.
§ 150.0(m)9:	<b>Protection of Insulation.</b> Insulation must be protected from damage due to sunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service (e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover). Cellular foam insulation must be protected as above or painted with a water retardant and solar radiation-resistant coating.
§ 150.0(m)10:	<b>Porous Inner Core Flex Duct.</b> Porous inner cores of flex ducts must have a non-porous layer or air barrier between the inner core and outer vapor barrier.
§ 150.0(m)11:	<b>Duct System Sealing and Leakage Test.</b> 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 Reference Residential Appendix RA3.1.
§ 150.0(m)12:	<b>Air Filtration.</b> Space conditioning systems with ducts exceeding 10 feet and the supply side of ventilation systems must have MERV 13 or equivalent filters. Filters for space conditioning systems must have a two inch depth or can be one inch if sized per Equation 150.0-A. Clean-filter pressure drop and labeling must meet the requirements in §150.0(m)12. Filters must be accessible for regular service. Filter racks or grilles must use gaskets, sealing, or other means to close gaps around the inserted filters to and prevents air from bypassing the filter. *



# 2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(m)13:	<b>Space Conditioning System Airflow Rate and Fan Efficacy.</b> Space conditioning systems that use ducts to supply cooling must have a hole for the placement of a static pressure probe, or a permanently installed static pressure probe in the supply plenum. Airflow must be $\geq 350$ CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy $\leq 0.45$ watts per CFM for gas furnace air handlers and $\leq 0.58$ watts per CFM for all others. Small duct high velocity systems must provide an airflow $\geq 250$ CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy $\leq 0.62$ watts per CFM. Field verification testing is required in accordance with Reference Residential Appendix RA3.3. *
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## Ventilation and Indoor Air Quality:

§ 150.0(o)1:	<b>Requirements for Ventilation and Indoor Air Quality.</b> All dwelling units must meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings subject to the amendments specified in § 150.0(o)1. *
§ 150.0(o)1B:	<b>Central Fan Integrated (CFI) Ventilation Systems.</b> Continuous operation of CFI air handlers is not allowed to provide the whole-dwelling unit ventilation airflow required per §150.0(o)1C. A motorized damper(s) must be installed on the ventilation duct(s) that prevents all airflow through the space conditioning duct system when the damper(s) is closed and controlled per §150.0(o)1Biii&iv. CFI ventilation systems must have controls that track outdoor air ventilation run time, and either open or close the motorized damper(s) for compliance with §150.0(o)1C.
§ 150.0(o)1C:	<b>Whole-Dwelling Unit Mechanical Ventilation for Single-Family Detached and townhouses .</b> Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces must have mechanical ventilation airflow specified in § 150.0(o)1Ci-iii.
§ 150.0(o)1G:	<b>Local Mechanical Exhaust.</b> Kitchens and bathrooms must have local mechanical exhaust; nonenclosed kitchens must have demand-controlled exhaust system meeting requirements of §150.0(o)1Giii, enclosed kitchens and bathrooms can use demand-controlled or continuous exhaust meeting §150.0(o)1Giii-iv. Airflow must be measured by the installer per §150.0(o)1Gv, and rated for sound per §150.0(o)1Gvi. *
§ 150.0(o)1H&I:	<b>Airflow Measurement and Sound Ratings of Whole-Dwelling Unit Ventilation Systems.</b> The airflow required per § 150.0(o)1C must be measured by using a flow hood, flow grid, or other airflow measuring device at the fan's inlet or outlet terminals/grilles per Reference Residential Appendix RA3.7. Whole-Dwelling unit ventilation systems must be rated for sound per ASHRAE 62.2 §7.2 at no less than the minimum airflow rate required by §150.0(o)1C.
§ 150.0(o)2:	<b>Field Verification and Diagnostic Testing.</b> Whole-Dwelling Unit ventilation airflow, vented range hood airflow and sound rating, and HRV and ERV fan efficacy must be verified in accordance with Reference Residential Appendix RA3.7. Vented range hoods must be verified per Reference Residential Appendix RA3.7.4.3 to confirm if it is rated by HVI or AHAM to comply with the airflow rates and sound requirements per §150.0(o)1G

## Pool and Spa Systems and Equipment:

§ 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: compliance with the Appliance Efficiency Regulations and listing in MAEDbS; 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:	<b>Piping.</b> Any pool or spa heating system or 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:	<b>Covers.</b> Outdoor pools or spas that have a heat pump or gas heater must have a cover.
§ 110.4(b)3:	<b>Directional Inlets and Time Switches for Pools.</b> 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:	<b>Pilot Light.</b> Natural gas pool and spa heaters must not have a continuously burning pilot light.
§ 150.0(p):	<b>Pool Systems and Equipment Installation.</b> Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves.

## Lighting:

§ 110.9:	<b>Lighting Controls and Components.</b> All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9. *
§ 150.0(k)1A:	<b>Luminaire Efficacy.</b> All installed luminaires must meet the requirements in Table 150.0-A, except lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers; navigation lighting less than 5 watts; and lighting internal to drawers, cabinets, and linen closets with an efficacy of at least 45 lumens per watt.
§ 150.0(k)1B:	<b>Screw based luminaires.</b> Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1C:	<b>Recessed Downlight Luminaires in Ceilings.</b> Luminaires recessed into ceilings must not contain screw based sockets, must be airtight, and must be sealed with a gasket or caulk. California Electrical Code § 410.116 must also be met.
§ 150.0(k)1D:	<b>Light Sources in Enclosed or Recessed Luminaires.</b> Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1E:	<b>Blank Electrical Boxes.</b> The number of electrical boxes that are more than five feet above the finished floor and do not contain a luminaire or other device shall be no more than the number of bedrooms. These boxes must be served by a dimmer, vacancy sensor control, low voltage wiring, or fan speed control.
§ 150.0(k)1F:	<b>Lighting Integral to Exhaust Fans.</b> Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods) must meet the applicable requirements of § 150.0(k). *



## 2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(k)1G:	<b>Screw based luminaires.</b> Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1H:	<b>Light Sources in Enclosed or Recessed Luminaires.</b> Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1I:	<b>Light Sources in Drawers, Cabinets, and Linen Closets.</b> Light sources internal to drawers, cabinetry or linen closets are not required to comply with Table 150.0-A or be controlled by vacancy sensors provided that they are rated to consume no more than 5 watts of power, emit no more than 150 lumens, and are equipped with controls that automatically turn the lighting off when the drawer, cabinet or linen closet is closed.
§ 150.0(k)2A:	<b>Interior Switches and Controls.</b> All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.
§ 150.0(k)2B:	<b>Interior Switches and Controls.</b> Exhaust fans must be controlled separately from lighting systems. *
§ 150.0(k)2A:	<b>Accessible Controls.</b> Lighting must have readily accessible wall-mounted controls that allow the lighting to be manually turned on and off. *
§ 150.0(k)2B:	<b>Multiple Controls.</b> Controls must not bypass a dimmer, occupant sensor, or vacancy sensor function if the dimmer or sensor is installed to comply with § 150.0(k).
§ 150.0(k)2C:	<b>Mandatory Requirements.</b> Lighting controls must comply with the applicable requirements of § 110.9.
§ 150.0(k)2D:	<b>Energy Management Control Systems.</b> An energy management control system (EMCS) may be used to comply with dimming, occupancy, and control requirements if it provides the functionality of the specified control per § 110.9 and the physical controls specified in § 150.0(k)2A.
§ 150.0(k)2E:	<b>Automatic Shutoff Controls.</b> In bathrooms, garages, laundry rooms, utility rooms and walk-in closets, at least one installed luminaire must be controlled by an occupancy or vacancy sensor providing automatic-off functionality. Lighting inside drawers and cabinets with opaque fronts or doors must have controls that turn the light off when the drawer or door is closed.
§ 150.0(k)2F:	<b>Dimmers.</b> Lighting in habitable spaces (e.g., living rooms, dining rooms, kitchens, and bedrooms) must have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down. Forward phase cut dimmers controlling LED light sources in these spaces must comply with NEMA SSL 7A.
§ 150.0(k)2K:	<b>Independent controls.</b> Integrated lighting of exhaust fans shall be controlled independently from the fans. Lighting under cabinets or shelves, lighting in display cabinets, and switched outlets must be controlled separately from ceiling-installed lighting.
§ 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 have a manual on/off switch and either a photocell and motion sensor or automatic time switch control) or an astronomical time clock. An energy management control system that provides the specified control functionality and meets all applicable requirements may be used to meet these requirements.
§ 150.0(k)4:	<b>Internally illuminated address signs.</b> Internally illuminated address signs must either comply with § 140.8 or consume no more than 5 watts of power.
§ 150.0(k)5:	<b>Residential Garages for Eight or More Vehicles.</b> 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.

### Solar Readiness:

§ 110.10(a)1:	<b>Single-family Residences.</b> Single-family residences located in subdivisions with 10 or more single-family residences and where the application for a tentative subdivision map for the residences has been deemed complete and approved by the enforcement agency, which do not have a photovoltaic system installed, must comply with the requirements of § 110.10(b)-(e).
§ 110.10(b)1A:	<b>Minimum Solar Zone Area.</b> 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 greater than 10,000 square feet. For single-family residences, the solar zone must be located on the roof or overhang of the building and have a total area no less than 250 square feet. *
§ 110.10(b)2:	<b>Azimuth.</b> All sections of the solar zone located on steep-sloped roofs must have an azimuth between 90-300° of true north.
§ 110.10(b)3A:	<b>Shading.</b> 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:	<b>Shading.</b> 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 horizontal distance 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:	<b>Structural Design Loads on Construction Documents.</b> For areas of the roof designated as a 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):	<b>Interconnection Pathways.</b> The construction documents must indicate: a location reserved for inverters and metering equipment and a pathway reserved for routing of conduit from the solar zone to the point of interconnection with the electrical service; and for single-family residences and central water-heating systems, a pathway reserved for routing 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)-(c) must be provided to the occupant.
§ 110.10(e)1:	<b>Main Electrical Service Panel.</b> The main electrical service panel must have a minimum busbar rating of 200 amps.
§ 110.10(e)2:	<b>Main Electrical Service Panel.</b> 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 permanently marked as "For Future Solar Electric."

### Electric and Energy Storage Ready:



## 2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(s)	<b>Energy Storage System (ESS) Ready.</b> All single-family residences must meet all of the following: Either ESS-ready interconnection equipment with backed up capacity of 60 amps or more and four or more ESS supplied branch circuits, <u>or</u> a dedicated raceway from the main service to a subpanel that supplies the branch circuits in § 150.0(s); at least four branch circuits must be identified and have their source collocated at a single panelboard suitable to be supplied by the ESS, with one circuit supplying the refrigerator, one lighting circuit near the primary exit, and one circuit supplying a sleeping room receptacle outlet; main panelboard must have a minimum busbar rating of 225 amps; sufficient space must be reserved to allow future installation of a system isolation equipment/transfer switch within 3' of the main panelboard, with raceways installed between the panelboard and the switch location to allow the connection of backup power source.
§ 150.0(t)	<b>Heat Pump Space Heater Ready.</b> Systems using gas or propane furnaces to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the furnace with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(u)	<b>Electric Cooktop Ready.</b> Systems using gas or propane cooktop to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the cooktop with circuit conductors rated at least 50 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(v)	<b>Electric Clothes Dryer Ready.</b> Clothes dryer locations with gas or propane plumbing to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the dryer location with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."

\*Exceptions may apply.

