# MINIMUM SOLAR ZONE AREA WORKSHEET – NEW CONSTRUCTION



| Project Name: | Date Prepared: |
|---|---|
| | |

Solar Zone Area (requirements in §110.10 (b)1A Exception 3, 4, 5, or 6 and §110.10 (b)1B)
This worksheet applies to:

- Single family residences that wish to show compliance with the Solar Ready requirements (Section 110.10(b) by providing a solar zone on the roof of the residence. Note that Exceptions 1, 2, and 7 to Section 110.10(b)1A exempt a residence from the solar ready requirements and are documented on the Certificate of Compliance Form CF1R-SRA-01-E. Check the exception being used and fill in the relevant details.
- Low-rise multifamily projects that wish to show compliance with the Solar Ready requirements (Section 110.10(b) by providing a solar zone on the roof of the building. Note that Exceptions 1, 2, 4, and 5 to Section 110.10(b)1B exempt a multifamily building from the solar ready requirements and are documented on the Certificate of Compliance Form CF-1R-SRA-01-E. Check the exception being used and fill in the relevant details.

| **A. General Information** | | |
|---|---|---|
| 01 | Building Type: | |

| **B. Minimum Required Solar Zone Area for Single Family Residence** | | |
|---|---|---|
| 01 | Does the residence have three stories or more, and a total floor area less than or equal to 2000 square feet? | |
| 02 | Is the residence located in Climate zones 8-14, in a Wildland-Urban Interface Fire Area as defined in Title 24, Part 2, and have a whole house fan? | |
| 03 | What is the total area of low-sloped roofs where the annual solar access is 70% or greater ($ft^2$)? | |
| 04 | What is the total area of steep-sloped roofs oriented between 110 and 270 degrees relative to true north, where the annual solar access is 70% or greater ($ft^2$)? | |
| 05 | Solar zone area – solar access method ($ft^2$) | |
| 06 | Are all the thermostats Occupant Controlled Smart Thermostats (OCSTs), certified to the Energy Commission and listed on the Commission's appliances database?<br>Alternatively, a networked system of devices may be installed that provides functionality equivalent to an OCST. | |
| 07 | Minimum required solar zone area ($ft^2$): | |

| **C. Minimum Required Solar Zone Area for Multifamily Building** | | |
|---|---|---|
| 01 | What is the total area of the roof of the building? ($ft^2$) | |
| 02 | What is the total area of skylights installed in the roof of the building? ($ft^2$) | |
| 03 | What is the total area of low-sloped roofs where the annual solar access is 70% or greater? ($ft^2$) | |
| 04 | What is the total area of steep-sloped roofs oriented between 110 and 270 degrees relative to true north, where the annual solar access is 70% or greater? ($ft^2$) | |
| 05 | Solar zone area – net roof area method ($ft^2$) | |
| 06 | Solar zone area – solar access method ($ft^2$) | |
| 07 | Minimum required solar zone area? ($ft^2$) | |

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**D. Schedule of Solar Zone Sub-Areas**

| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| Subarea ID | Building Plan Reference | Slope of Roof or Overhang (Note A) | If Steep Slope, roof or overhang is oriented between 110 and 270 degrees relative to true north | Subarea complies with Part 9 of Title 24 (Note B) | Subarea is free of obstructions (Note C) | Subarea is located the appropriate distance from obstructions (Note D) | Smallest dimension is 5 feet or greater | Subarea is at least 80 $ft^2$ (160$ft^2$ for a building with roof area >10,000$ft^2$) | Subarea Qualifies | Area ($ft^2$) |
| | | | | | | | | | | |
| | | | | | | | | | | |

Notes:

A. "A roof is either low-sloped or steep-sloped. Low-sloped" means a rise-to-run of 2:12 or less (9.5 degrees from horizontal). "Steep-sloped" means a rise-to-run greater than 2:12 (9.5 degrees from horizontal)

B. The solar zone shall 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.

C. No obstructions, including but not limited to, vents, chimneys, architectural features, and roof mounted equipment, shall be located in the solar zone.

D. If there are any obstructions located south of the most northerly point of the solar zone, then the nearest point of the solar zone must be located no closer than twice the distance, measured in the horizontal plane, of the height difference between the highest point of the obstruction and the nearest point of the solar zone, measured in the vertical plane.

| | | |
|---|---|---|
| 12 | Total proposed solar zone area ($ft^2$) | |
| 13 | Compliance Statement: | |

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| DOCUMENTATION AUTHOR'S DECLARATION STATEMENT | |
|---|---|
| 1. I certify that this Certificate of Compliance documentation is accurate and complete. | |
| Documentation Author Name: | Documentation Author Signature: |
| Company: | Signature Date: |
| Address: | CEA/HERS Certification Identification (if applicable): |
| City/State/Zip: | Phone: |

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. 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.
5. I will ensure that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

| Responsible Designer Name: | Responsible Designer Signature: |
|---|---|
| Company: | Date Signed: |
| Address: | License: |
| City/State/Zip: | Phone: |

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## CF1R-SRA-02-E User Instructions

A. General Information

01 Building Type: Select a Building Type from the available options

B. Minimum Required Solar Zone Area for Single Family Residence (Complete this section only if 'Single Family' is selected in A01)

01 User chooses whether the building has three or more stories and a total floor area less than or equal to 2000 square feet.

02 User chooses whether the residence is located in climate zones 8-14, is in a Wildland-Urban Interface Fire Area as defined in Title 24, Part 2 and has a whole house fan.

03 User enters the total area in units of square feet of low-sloped roof where the annual solar access is 70% or greater. Note that a Low Sloped Roof is defined as having a rise to run less than or equal to 2:12 or 9.5 degrees from horizontal. If this value is not known, then the user would enter 'N/A'. To determine the annual solar access during the design phase, designers will first evaluate whether there are any objects external to the building project that will shade the rooftop (or other prospective solar zone areas such as overhangs or parking shade structures). If an existing object is located to the north of all potential solar zones, the object will not shade the solar zone. Similarly, if the horizontal distance ("D") from the object to the solar zone is at least two times the height difference ("H") between the highest point of the object and the horizontal projection of the nearest point of the solar zone then the object will not shade the solar zone (see Figure 9.2). If objects external to the building project could shade the solar zone, annual solar access can be quantitatively determined using several computer-aided design (CAD) software packages which can import a CAD file of the building and perform a shading analysis or several online solar quoting tools which make use of both overhead and orthogonal aerial imagery. Annual solar access can be qualitatively determined using several three-dimensional modeling programs.

04 User enters the total area in units of square feet of steep-sloped roof oriented between 110 and 270 degrees relative to true north, where the annual solar access is 70% or greater. Note that a Steep Sloped Roof is defined as having a rise to run of greater than 2:12 or 9.5 degrees from horizontal. If this value is not known, then the user would enter 'N/A'. To determine the annual solar access during the design phase, designers will first evaluate whether there are any objects external to the building project that will shade the rooftop (or other prospective solar zone areas such as overhangs or parking shade structures). If an existing object is located to the north of all potential solar zones, the object will not shade the solar zone. Similarly, if the horizontal distance ("D") from the object to the solar zone is at least two times the height difference ("H") between the highest point of the object and the horizontal projection of the nearest point of the solar zone then the object will not shade the solar zone (see Figure 9.2). If objects external to the building project could shade the solar zone, annual solar access can be quantitatively determined using several computer-aided design (CAD) software packages which can import a CAD file of the building and perform a shading analysis or several online solar quoting tools which make use of both overhead and orthogonal aerial imagery. Annual solar access can be qualitatively determined using several three-dimensional modeling programs.

05 The Designated Solar Zone Area is auto calculated using the equation (B03+B04)*0.5. Note if either B03 or B04 equals N/A, then this field will be marked N/A.

06 User chooses whether or not all thermostats are Occupant Controlled Smart Thermostats (OCSTs) which have been certified to the Energy Commission.

07 The Minimum Required Solar Zone Area is auto calculated and based on the numbers and answers previously entered in this table.

C. Minimum Required Solar Zone Area for Multifamily Building (Complete this section only if 'Multifamily' is selected in A01)

01 User enters the total area of the roof of the building in units of square feet.

02 User enters the total area of skylights installed on the roof of the building in units of square feet.

03 User enters the total area in units of square feet of low-sloped roof where the annual solar access is 70% or greater. Note that a Low Sloped Roof is defined as having a rise to run less than or equal to 2:12 or 9.5 degrees from horizontal. If this value is not known, then the user would enter 'N/A'. To determine the annual solar access during the design phase, designers will first evaluate whether there are any objects external to the building project that will shade the rooftop (or other prospective solar zone areas such as overhangs or parking shade structures). If an existing object is located to the north of all potential solar zones, the object will not shade the solar zone. Similarly, if the horizontal distance ("D") from the object to the solar zone is at least two times the height difference ("H") between the highest point of the object and the horizontal projection of the nearest point of the solar zone then the object will not shade the solar zone (see Figure 9.2). If objects external to the building project could shade the solar zone, annual solar access can be quantitatively determined using several computer-aided design (CAD) software packages which can import a CAD file of the building and perform a shading analysis or several online solar quoting tools which make use of both overhead and orthogonal aerial imagery. Annual solar access can be qualitatively determined using several three-dimensional modeling programs.

04 User enters the total area in units of square feet of steep-sloped roof oriented between 110 and 270 degrees relative to true north, where the annual solar access is 70% or greater. Note that a Steep Sloped Roof is defined as having a rise to run of greater than 2:12 or 9.5 degrees from horizontal. If this value is not known, then the user would enter 'N/A'. To determine the annual solar access during the design phase, designers will first evaluate whether there are any objects external to the building project that will shade the rooftop (or other prospective solar zone areas such as overhangs or parking shade structures). If an existing object is located to the north of all potential solar zones, the object will not shade the solar zone. Similarly, if the horizontal distance ("D") from the object to the solar zone is at least two times the height difference ("H") between the highest point of the object and the horizontal projection of the nearest point of the solar zone then the object will not shade the solar zone (see Figure 9.2). If objects external to the building project could shade the solar zone, annual solar access can be

quantitatively determined using several computer-aided design (CAD) software packages which can import a CAD file of the building and perform a shading analysis or several online solar quoting tools which make use of both overhead and orthogonal aerial imagery. Annual solar access can be qualitatively determined using several three-dimensional modeling programs.

05 The Solar Zone Area – Net Roof Area Method is auto calculated using the equation (C01-C02) x 0.15.

06 The Solar Zone Area – Solar Access Method is auto calculated using the equation (C03+C04) x 0.5. Note if either C03 or C04 equals N/A, then this field will be marked N/A.

07 The Minimum Required Solar Zone Area is auto calculated and based on the numbers entered in this table.

D. Schedule of Solar Zone Sub-Areas (for both SF and low-rise MF)

01 User enters Solar Zone Area identification information which matches the callouts shown on the building plans e.g., solar-1.

02 User enters the building plan reference number which includes a drawing of the solar zone subarea.

03 User selects whether the solar zone subarea is located on a low-sloped or steep-sloped section of the roof.

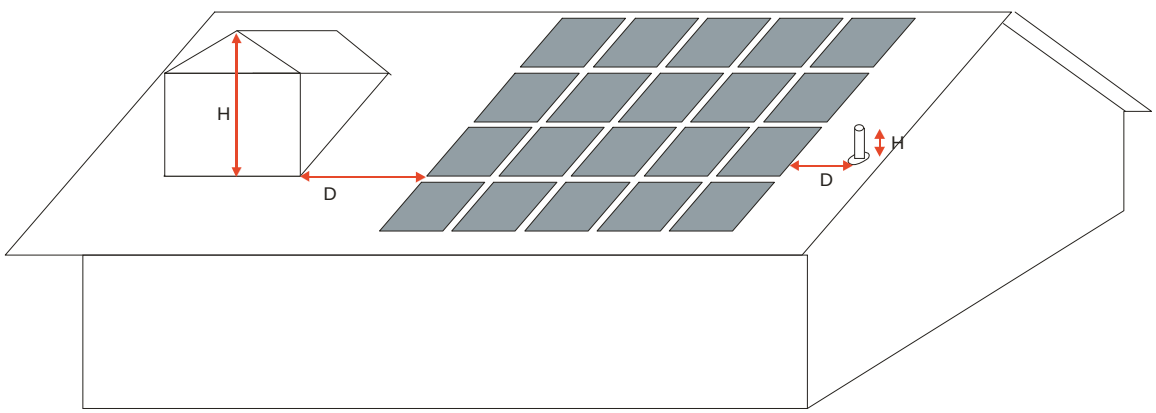
04 If user selects steep slope in D03, then the user must select whether the roof or overhang is oriented between 110 and 270 degrees relative to true north. If user selects low slope in D03, then this question will be answered with N/A.

05 User selects whether the subarea complies with all requirements of Title 24, Part 9.

06 User selects whether the solar zone subarea is free from obstructions such as vents or chimneys. No obstructions are allowed to be located within a solar zone.

07 User selects whether the solar zone subarea is located an appropriate distance from any on-roof obstructions. If user selects yes in D06, then this question will be answered with N/A. For both single family residences and low-rise multi-family buildings, any obstruction, located on the roof or any other part of the building that projects above the solar zone shall be located at a sufficient horizontal distance away from the solar zone, in order to reduce the resulting shading of the solar zone. For each obstruction, the horizontal distance ("D") from the obstruction to the solar zone shall be at least two times the height difference ("H") between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone (D ≥ 2 x H).

**Figure 7.1 Artistic Depiction of "H" and "D"**




Source: California Energy Commission

08 User selects whether the smallest dimension of the solar zone subarea is five feet or greater.

09 User selects whether the solar zone subarea covers at least 80 square feet of roof space for a roof with a roof area of 10,000 square feet or less. If the roof area is greater than 10,000 square feet, the solar zone subarea must be no smaller than 160 square feet.

10 The Sub-area qualification is auto calculated and is based on the information entered in this table.

11 User enters the square footage of the solar zone subarea.

12 The total solar zone area ($ft^2$) is calculated by summing the areas of all qualifying solar zone subareas.

13 The building complies if the solar zone area ($ft^2$) is greater than the minimum required solar zone area ($ft^2$) found in B07 or C08.