MINIMUM SOLAR ZONE AREA WORKSHEET

Project Name:	Date Prepared:

Solar Zone Area (requirements in §110.10(b)1B)

This worksheet applies to hotel/motel occupancies and high-rise multifamily buildings with ten stories or fewer, and all other nonresidential buildings with three stories or fewer that comply with the solar zone requirement through Compliance Path A: Allocated Solar Zone in the NRCC-SRA-01-E Certificate of Compliance Solar Ready Areas.

The worksheet applies to all additions that increase the roof area by more than 2,000 ft^2.

A. General Information

Project Address:

Total Roof Area: □ Less than or equal to 10,000 ft^2 □ Greater than 10,000 ft^2	**Phase of Construction:** □ New Construction □ Addition that increases roof area by more than 2,000 ft^2

Step 1: Determine Minimum Solar Zone Area

Calculate the minimum solar zone area using one of the two options provided below. Use option 2 if your roofs and overhangs are shaded.

Method 1: Minimum Solar Zone Area Based on Total Roof Area (requirements in 110.10(b)1B)

New Construction: Total roof area (ft^2) Additions: Total roof area added to building (ft^2)	A	
New Construction: Area of roof covered with skylights (ft^2) Additions: Area of new roof area covered with skylights (ft^2)	B	
Minimum solar zone area	C = 0.15 x (A – B)	

Note: For additions, if A ≤ 2,000 ft^2 then addition does not need to comply with solar zone requirements

Method 2: Minimum Solar Zone Area Based on Potential Solar Zone (requirements in Exception 3 to 110.10(b)1B)

The enforcement agency may require additional documentation that describes how the reduced solar zone area was determined.

Method/Tool(s) used to quantify annual solar access: (for example, "Software X", "CAD Tool Y"		
Area of low-sloped roof (ratio of rise to run of 2:12 or less) where the annual solar access is 70% or greater.* (ft^2)	D	
Area of steep-sloped roof (ratio of rise to run is greater than 2:12) that is oriented between 110° and 270° and annual solar access is 70% or greater.* (ft^2)	E	
Minimum solar zone area	F = 0.5 x (D + E)	

* For new construction consider total roof area; for additions consider newly added roof area

Minimum solar zone area (either C or F) (ft^2)	**G**	

MINIMUM SOLAR ZONE AREA WORKSHEET

Project Name:	Date Prepared:

Step 2: Allocated Solar Zone Subareas

Subarea ID	Building Plan Reference	Slope of Roof or Overhang	If Steep Slope, roof or overhang oriented between 110° and 270°	Subarea complies with Part 9 of Title 24[A]	Subarea is free of obstructions[B]	Subarea is located the appropriate distance from obstructions[C]	Smallest dimension is greater than 5 feet	Subarea meet minimum area requirement[D]	Subarea Qualifies[E]	Area (ft^2)
H	I	J	K	L	M	N	O	P	Q	R
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
		□ Low □ Steep	□ Yes □ No □ NA	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	□ Yes □ No	
Proposed Solar Zone Area (ft^2) (sum of all qualifying subareas) [S]										

A. 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.

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

C. 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 horizontal projection of the nearest point of the solar zone, measured in the vertical plane.

D. If building roof area ≤ 10,000 ft^2 then minimum area is 80ft^2. If building roof area >10,000 ft^2 then minimum area is 160 ft^2.

E. Check "yes" if answers to questions in columns K through P are "yes".

□ Building Complies with Minimum Solar Zone Area Requirement	Check box if Proposed Solar Zone Area [S] is equal to or greater than the Min. Solar Zone Area [G]

CERTIFICATE OF COMPLIANCE	NRCC-SRA-02-E
Minimum Solar Zone Area Worksheet	(Page 3 of 3)
Project Name:	Date Prepared:

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. 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 completed signed 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 completed signed 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:

NRCC-SRA-02-E User Instructions

A. General Information

01 Enter the project address.

02 Total Roof Area: Select the total area of the roof from the available options.

03 Phase of Construction: Select the phase of construction from the available options.

Step 1. Determine Minimum Solar Zone Area by using either Method 1 or Method 2

Method 1: Minimum Solar Zone Area based on Total Roof Area

01 In Box A, enter the total roof area (ft^2) for new construction, or for an addition enter the total roof area (ft^2) added to the building.

02 In Box B, enter the total area of the roof (ft^2) covered by skylights for new construction, or for an addition enter the area of the new roof (ft^2) added to the building that is covered by skylights.

03 In Box C calculate the minimum required solar zone area by using the following formula: C = 0.15 x (A - B)

Method 2: Minimum Solar Zone Area based on Potential Solar Zone

01 Enter the tools and methods used to quantify the annual solar access of the building.

02 In Box D, enter the area of the low-sloped roof (ratio of rise to run of 2:12 or less) where the annual solar access is greater than 70% in units of square feet (ft^2).

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. Note that for new construction, consider the entire roof, but for additions consider only the newly added roof area.

03 In Box E, enter the area of steep-sloped roof (ratio of rise to run is greater than 2:12) that is oriented between 110° and 270° and annual solar access is 70% or greater. Note that for new construction, consider the entire roof, but for additions consider only the newly added roof area.

04 In Box F calculate the minimum required solar zone area (ft^2) by using the following formula: F = 0.5 (D + E)

Step 2. Allocated Solar Zone Subareas

01 In Box H, enter an identification number for the solar zone subarea.

02 In Box I, enter the building plan reference number which includes a drawing of the solar zone subarea.

03 In Box J, selects whether the solar zone subarea is located on a low-sloped or steep-sloped section of the roof or overhang.

04 If 'steep' was selected in Box J, then in Box K select whether the roof or overhang is oriented between 110° and 270° relative to true north; otherwise NA.

05 In Box L, select whether the subarea complies with all requirements of Title 24, Part 9.

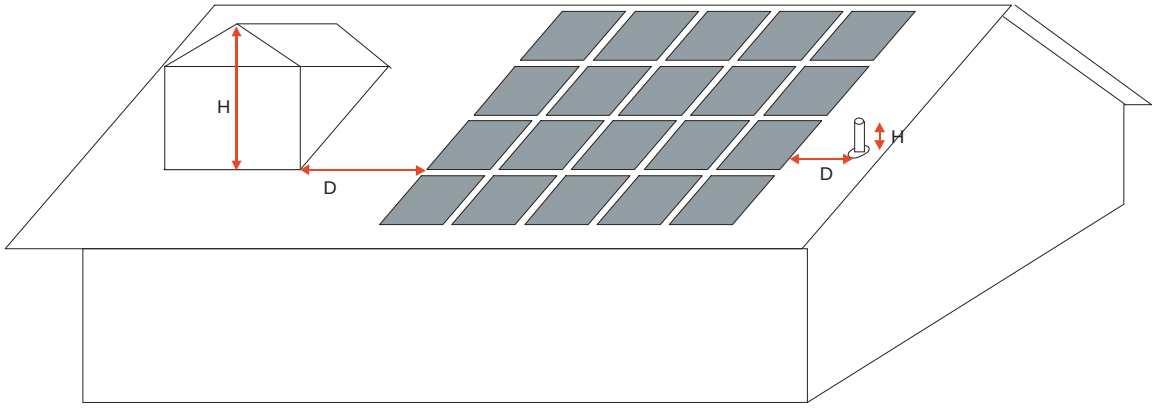
06 In Box M select whether the solar zone subarea is free from obstructions such as vents or chimneys. No obstructions are allowed to be located within a solar zone.

07 In Box N, select whether the solar zone subarea is located an appropriate distance from any on-roof obstructions.

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.

$$D \geq 2 \times H$$

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



Source: California Energy Commission

08 In Box O, select whether the smallest dimension of the solar zone subarea is 5 feet or greater.
09 In Box P, select whether the solar zone subarea covers at least 80 ft^2 of roof space for a roof with a roof area of 10,000 ft^2 or less. If the roof area is greater than 10,000 ft^2, the solar zone subarea must be no smaller than 160 ft^2.
10 In Box Q, determine if the subarea qualifies to be included in the total solar zone area. The subarea qualifies if the questions in Box K through Box P are all answered 'yes.'
11 In Box R, enter the square footage (ft^2) of the solar zone subarea.
12 In Box S, enter total solar zone area (ft^2) by summing the areas of all qualifying solar zone subareas.
13 The building complies if the solar zone area (ft^2) in Box S is greater than the minimum required solar zone area (ft^2) found in Box C or Box F.