

Adding Vertical Fenestration⁴ (New Glazing) and Greenhouse	Weighted average U-factor = or < 0.58 <u>Exemption:</u> Up to 10 ft ² or 0.5% of Conditioned Floor Area, whichever is greater, is exempt from the U-factor requirement §150.0(q)	Must not exceed the 20% Total or 5% West Fenestration Area U-factor = 0.32 (in all CZs); In CZ2, 4 & 6-16: SHGC = 0.25 §150.2(b)1.A.	Added fenestration up to 75 ft ² need not meet total or west-facing fenestration area requirements as per §150.2(b)1A Exception 1 . Added Greenhouse must either meet the maximum U-factor of 0.58 or weighted average U-factor of 0.58 or up to 10ft ² or 0.5% of CFA whichever is greater as per §150.0(q)1.	CF1R-AL
1: Alterations must comply with all applicable mandatory measures in §110.0 and §150.0 of the Standards as explained in Chapters 3, 4, 5 and 6 of this Manual.				
2: Several prescriptive measures are Climate Zone (CZ) specific.				
3: There are no mandatory measures or prescriptive requirements when altering below-grade or exterior mass walls.				
4: Replacement fenestration is new fenestration that is located in the same existing wall or roof in which the same or larger area of existing fenestration is being removed. It labeled as "altered. Any new fenestration area that increases the total net area of fenestration in any existing wall or roof is labeled as "new".				

Greenhouse Windows

Greenhouse or garden windows are special windows that project from the façade of the building and are typically five sided structure. An NFRC-rated U-factor for greenhouse windows is typically quite high and may not meet the mandatory requirements for the fenestration U-factor of 0.58.

The ways to meet this mandatory measure for greenhouse windows are:

Must have a maximum U-factor of 0.58 or better; or

Use the area-weighted average for all new and replacement fenestration with a combined mandatory maximum of 0.58 U-factor as per §150.0(q)2; or

The Exception to §150.0(q)1 for up to 10 ft² or 0.5% of CFA, whichever is greater; or

When using the performance approach Exception 1 as per §150.2(b) - Any dual-glazed greenhouse or garden window installed as part of an alteration complies automatically with the U-factor and meets the requirements as per §150.1(c)3.

9.6.3 Adding Insulation to Existing Roof/Ceilings, Walls and Raised Floors

The prescriptive requirement for alterations is to add the equivalent of the specified level of batt insulation that fits within the cavity of wood framed assemblies:

1. R-38 in attic spaces in climate zones 1 and 11 through 16; and R-30 in attics in climate zones 2 through 10; or
2. R-13 in 2x4 exterior walls, and R-19 in 2x6 or greater exterior walls; or
3. R-19 in raised floors over crawl spaces, over open outdoor areas and over unheated basements and garages.

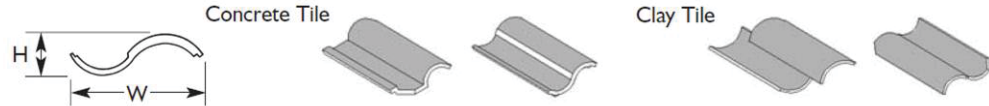
9.6.4 Replacing the Roof Surface or Roof Sheathing

STEEP-SLOPED ROOFS (≥ 2:12)

In climate zones 10 through 15: if 50% or more of the existing building's roof surface is being replaced, the minimum cool roof requirement for the replaced steep-sloped roofing area is aged solar reflectance = 0.20, thermal emittance = 0.75 or a minimum SRI = 16. These apply unless any of the following is present which are considered equivalent to the cool roof requirements in §150.2(b)1Hi:

1. Air space of 1.0" (25mm) between the roof deck and the bottom of the roofing product; or
2. Roofing product profile ratio of rise to width is at least 1:5 for >50% width of roofing product; or

High Profile Tile – Tiles having a rise to width ratio greater than 1:5 (measured in installed condition)



3. Existing ducts in attic insulated and sealed according to §150.1(c)9; or
4. Building has at least R-38 roof/ceiling insulation; or
5. Roof of attic spaces has a radiant barrier according to §150.1(c)2; or
6. There are no ducts in any attic space; or
7. In CZ10 through 15 only: greater than R-4.0 insulation above the roof deck.

LOW-SLOPED ROOFS (< 2:12)

In climate zones 13 and 15: if 50% or more of the existing building's roof surface is being replaced, the minimum cool roof requirements for low-sloped roofs are aged solar reflectance = 0.63, thermal emittance = 0.75 or a minimum SRI = 75 per §150.2(b)1Hii. These apply unless any of the following is present which are considered equivalent to the cool roof requirements in §150.2(b)1Hii:

1. There are no ducts in any attic space; or
2. The aged solar reflectance can be traded off with additional insulation being added at the roof deck as specified in Table 150.2-A

Table 9-6Aged Solar Reflectance Insulation Trade Off Table

Aged Solar Reflectance	Roof Deck Insulation R-value	Aged Solar Reflectance	Roof Deck Insulation R-value
0.62 – 0.60	2	0.44 – 0.40	12
0.59 -0.55	4	0.39 – 0.35	16
0.54 - 0.50	6	0.34 – 0.30	20
0.49 – 0.45	8	0.29 – 0.25	24

ROOF SHEATHING

In climate zones 2 through 15: if roof sheathing over an attic space with a continuous radiant barrier is being replaced, a continuous radiant barrier must be re-installed.