

RESIDENTIAL ENERGY EFFICIENCY: HOW TO COMPLY WITH THE TROPICAL ZONE REQUIREMENTS OF THE 2015 HAWAII ENERGY CODE

Residential buildings in the tropical zone at elevations below 2,400 feet above sea level must comply with Section R401.2.1 Tropical Zone of the 2015 International Energy Conservation Code

You can use the Tropical Zone provisions if not more than one-half of the dwelling unit is air-conditioned.

Building Envelope Requirements

- Glazing in *dwelling units* shall have a maximum *solar heat gain coefficient* as specified in Table R402.2.1.

Table R402.2.1. Window SHGC Requirements

Projection Factor of overhang from base of average window sill ^a	SHGC
< .30	.25
.30 - .50	.40
≥.50	N/A

^aException: North-facing windows with pf > .20 are exempt from the SHGC requirement. Overhangs shall extend 2 feet on each side of window or to nearest wall, whichever is less.

- Walls, floors and ceilings separating air conditioned spaces from non-air conditioned spaces shall be constructed to limit air leakage in accordance with the requirements in Table R402.4.1.1, as illustrated in Figure 1.

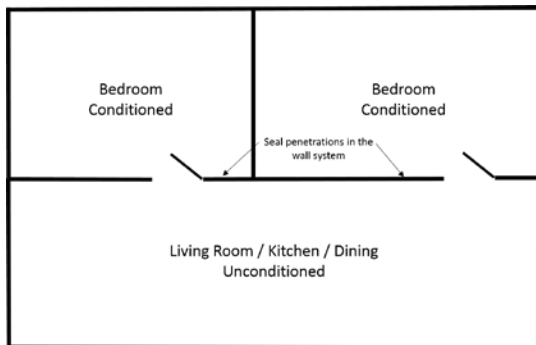


FIGURE 1. AIR SEALING BETWEEN AIR CONDITIONED AND NON-AIR CONDITIONED SPACES

- The roof/ceiling complies with one of the following options:

- Comply with one of the roof surface options in Table C402.3 and install R-13 insulation or greater.
- Install R-19 insulation or greater.

If present, attics above the insulation are vented and attics below the insulation are unvented.

**Table C402.3
Minimum Roof Reflectance and Emittance
Options^a**

Three-year aged solar reflectance ^b of 0.55 and 30 year aged thermal emittance ^c of 0.75
Three-year-aged solar reflectance index ^d of 64.

- The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section C402.2.1.1.1 and a 3-year-aged thermal emittance of 0.90.
- Aged solar reflectance tested in accordance with ASTM C 1549, ASTM E 903 or ASTM E 1918 or CRRC-1.
- Aged thermal emittance tested in accordance with ASTM C 1371 or ASTM E 408 or CRRC-1.
- Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h · ft² · F^o (12W/m² · K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance.

How Cool Roofs Work

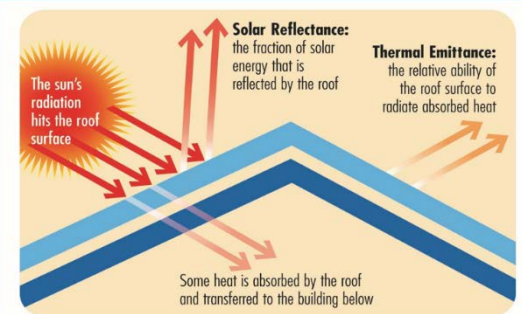


Photo credit: Cool Roof Rating Council

A cool roof is a roof that has been designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a sheet covering or of a highly reflective type of paint, tiles, or shingles. Standard or dark roofs can reach temperatures of 150°F or more in the summer sun; a cool roof under the same conditions could stay more than 50°F cooler. Cool roofs improve indoor air comfort for spaces that are naturally ventilated, cut costs in air conditioned spaces, and extend the life of cooling equipment.

- Roof surfaces have a minimum slope of ¼ inch per foot of run. The finished roof does not have water accumulation areas.
- Skylights in dwelling units shall have a maximum U-factor of 0.75.
- Jalousie windows shall have an air infiltration rate of no more than 1.2 cfm per square foot (6.1 L/s/m²).

How Jalousie Windows Work



Jalousie windows consist of glass louvers that overlap one another and are opened using a crank or turn-screw. Jalousie windows are used to maximize air flow and ventilation, as well as reduce the need for air conditioning.

Photo credit: Sunbeam Window & Door Co.

Renewable Energy Requirements

- Solar water heating systems are required for new single-family residential construction pursuant to section 196-6.5, HRS.
- Solar, wind or other renewable energy source supplies not less than 90 percent of the energy for service water heating.

Lighting Requirements

- Permanently installed lighting must be in accordance with Section R404, which states that not less than 75 percent of the lamps in permanently installed lighting fixtures must be high-efficacy lamps or not less than 75 percent of the permanently installed lighting fixtures must contain only high-efficacy lamps.
Exception: Low-voltage lighting.
- **High-efficacy lamps** are LED's, compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

Lumens per Watt	Watts
60	≥40
50	>15 and < 40
40	≤15

Natural Ventilation Requirements

- A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as bedroom
- Operable fenestration provides ventilation area equal to not less than 14 percent of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
- Bedrooms with exterior walls facing two different directions have operable fenestration or exterior walls facing two different directions (Figure 2).
- Interior doors to bedrooms are capable of being secured in the open position (Figure 3).

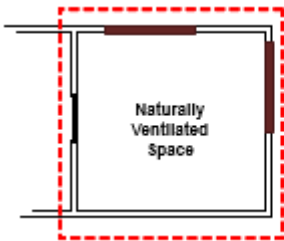


Figure 2

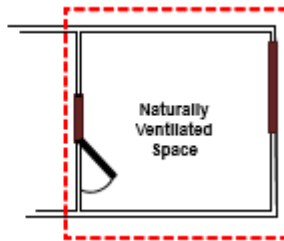


Figure 3