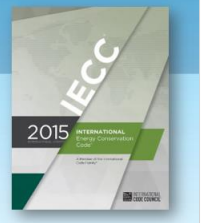
Residential Requirements of the 2015 IECC with County Amendments



Webinar
April 29, 2020

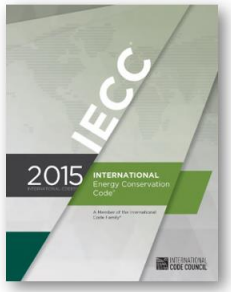
HAWAII STATE Energy Office

Hawai'i Energy

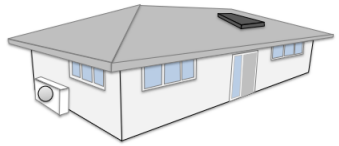
AIA Honolulu

HAWAII

Section 1
Introduction



Section 2
Residential – Overview & Definitions



Section 3
Residential – Tropical Zone

Section 4
Residential Envelope Prescriptive Option

Section 5
Residential – Systems

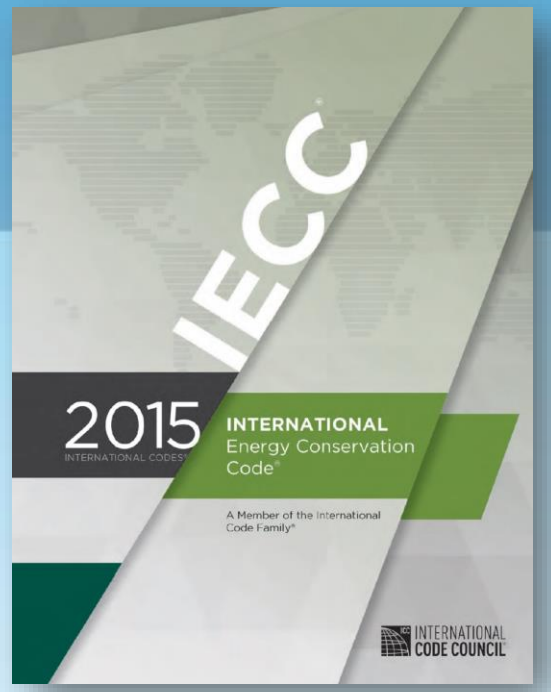
Section 6
Residential – Electrical, Power & Lighting

Section 7
Compliance Documentation

Section 8
Summary

Panel Q&A

Residential Requirements of the 2015 IECC with County Amendments



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

COURSE DESCRIPTION

This webinar for architects and contractors in Hawaii covers the low-rise residential requirements of the 2015 International Energy Conservation Code, including county amendments. Both envelope and systems requirements will be addressed, along with the new Tropical Zone compliance option. A local panel will answer questions and discuss experience with energy code compliance

LEARNING OBJECTIVES

At the end of this course, participants will be able to:

1. Determine applicability and requirements for the Tropical-Zone energy code compliance.
2. Identify complying energy-efficient residential envelope constructions.
3. Determine applicable County energy code amendments.
4. Evaluate energy efficiency design options with the residential points option.

Introductions

Presenters and panelists

- Erik Kolderup, PE, Kolderup Consulting
- Howard Wiig, State Energy Office
- Daniel Sandomire, AIA, Armstrong Builders
- Blake Reid, Terrawatt
- Tony Kawal, Hawaii Energy

Acknowledgments

- Sehun Nakama, Hawaii Energy
- Karen Shishido, Hawaii Energy
- Gail Suzuki-Jones, State Energy Office

Topics

Hawaii Energy

IECC Introduction

Overview & definitions

Tropical Zone option

Prescription option

- Envelope
- System
- Electrical

Panel Q&A

RESIDENTIAL NEW CONSTRUCTION

Hawai‘i Energy is providing the nudge toward energy-efficient new homes

RESIDENTIAL NEW CONSTRUCTION

PRESCRIPTIVE APPROACH

Minimum Requirements

- LED Lighting
- ENERGY STAR® Appliances

Optional Incentives

- High SEER A/C
- Smart Thermostats
- Ventilation Fans

RESIDENTIAL NEW CONSTRUCTION

FUTURE EFFORTS

- Increased involvement in the multifamily sector with potential enhanced incentives for affordable rental housing

- Include a performance based path to single family new construction (i.e. Home Energy Rating System Index)

Mahalo!

Stay Connected

Oahu: 537-5577 (Residential) **839-8880** (Business)

Neighbor Islands: 1-877-231-8222 toll-free

www.hawaiienergy.com

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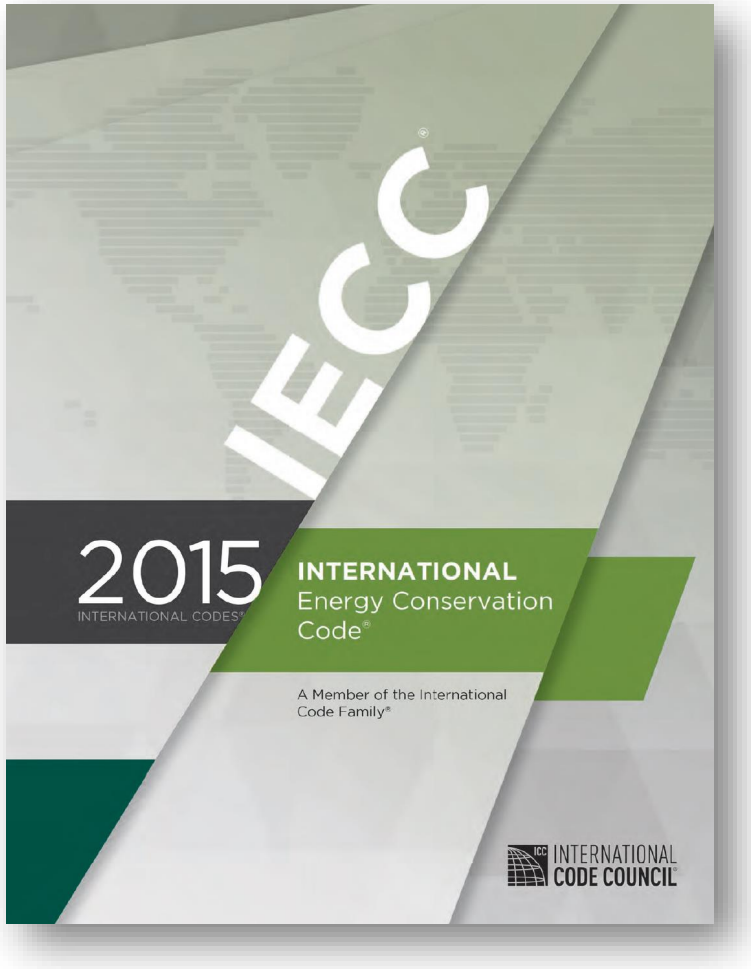
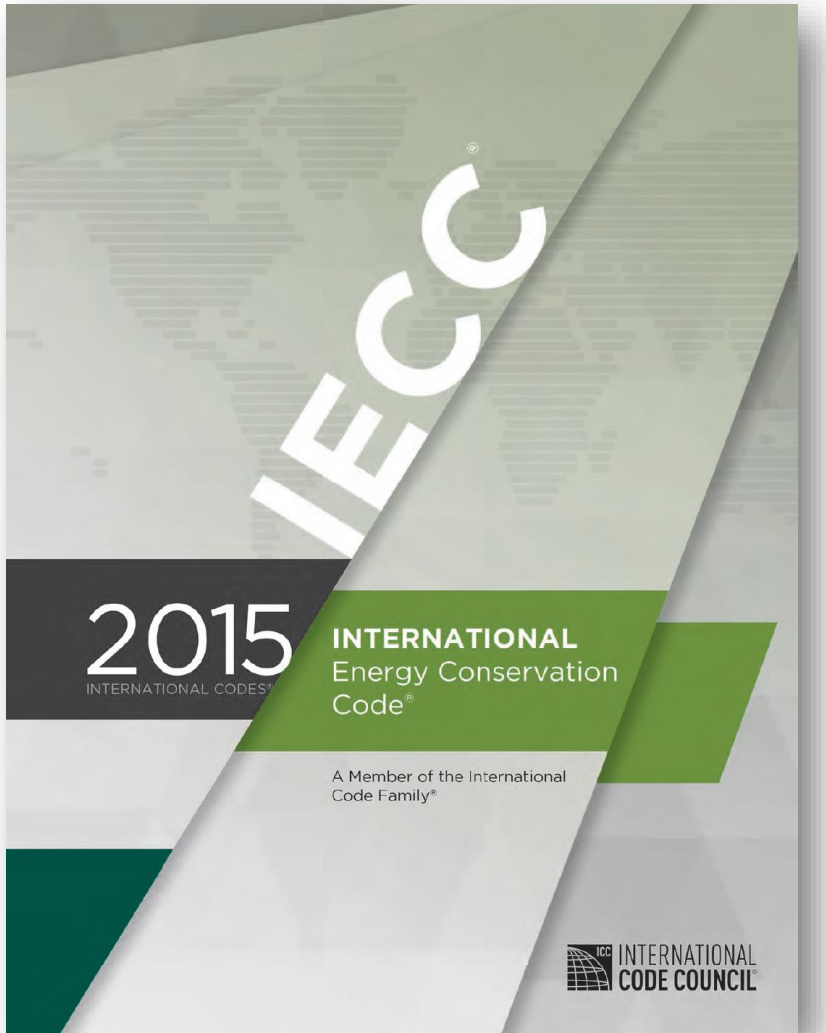
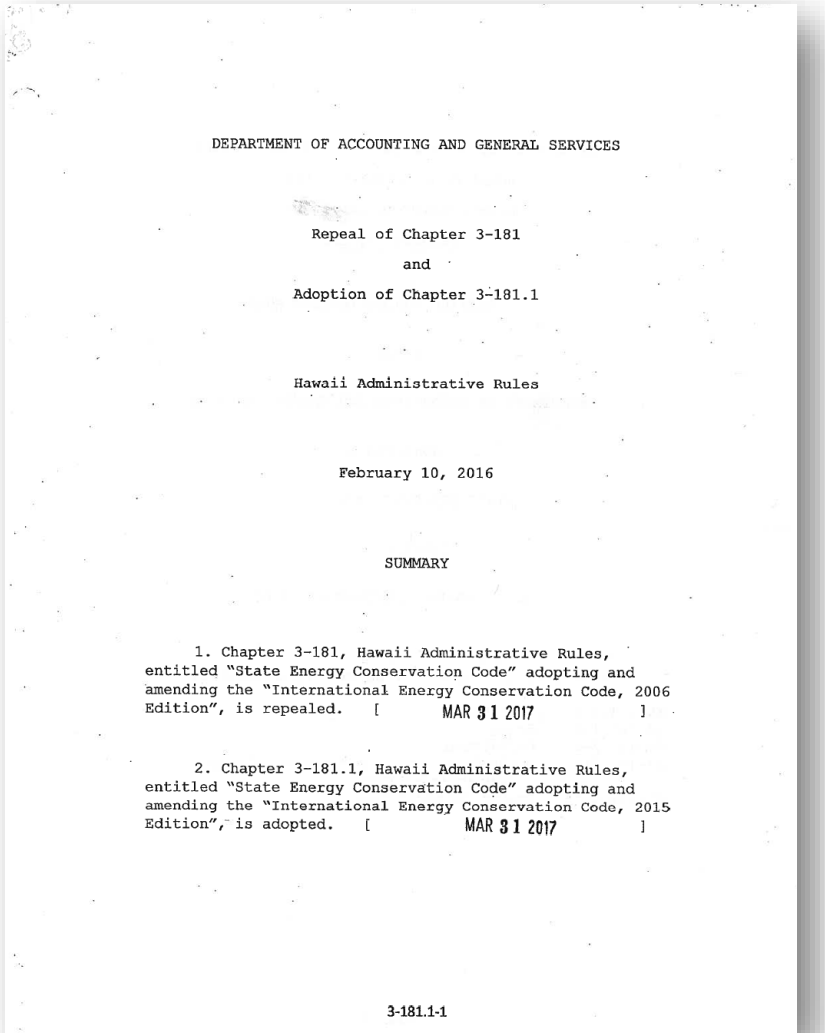
Section 1

Introduction







DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Repeal of Chapter 3-181

and

Adoption of Chapter 3-181.1

Hawaii Administrative Rules

February 10, 2016

SUMMARY

1. Chapter 3-181, Hawaii Administrative Rules, entitled "State Energy Conservation Code" adopting and amending the "International Energy Conservation Code, 2006 Edition", is repealed. [MAR 31 2017]

2. Chapter 3-181.1, Hawaii Administrative Rules, entitled "State Energy Conservation Code" adopting and amending the "International Energy Conservation Code, 2015 Edition", is adopted. [MAR 31 2017]

3-181.1-1

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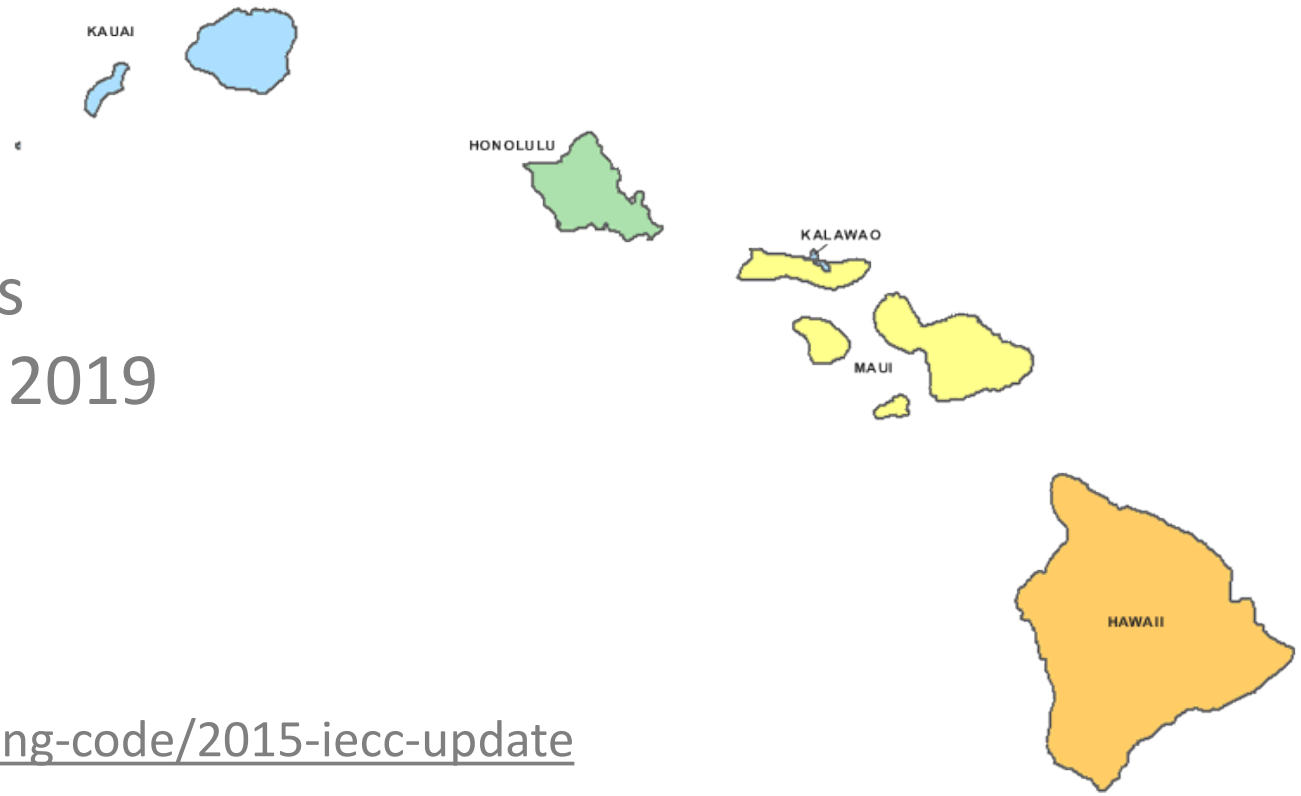
Adoption

Kauai – Nov. 2018
Maui – Mar. 2019
Hawaii – Feb. 2020
Honolulu ➡ State amendments apply as of March 2019



Amendments
http://energy.hawaii.gov/hawaii-energy-building-code/2015-iecc-update

Commercial Provisions

Chapter 1 – Scope and Administration

Chapter 2 – Definitions

Chapter 3 – General Requirements

Chapter 4 – Commercial Energy Efficiency

Chapter 5 – Existing Buildings

Chapter 6 – References Standards

Residential Provisions

Chapter 1 – Scope and Administration

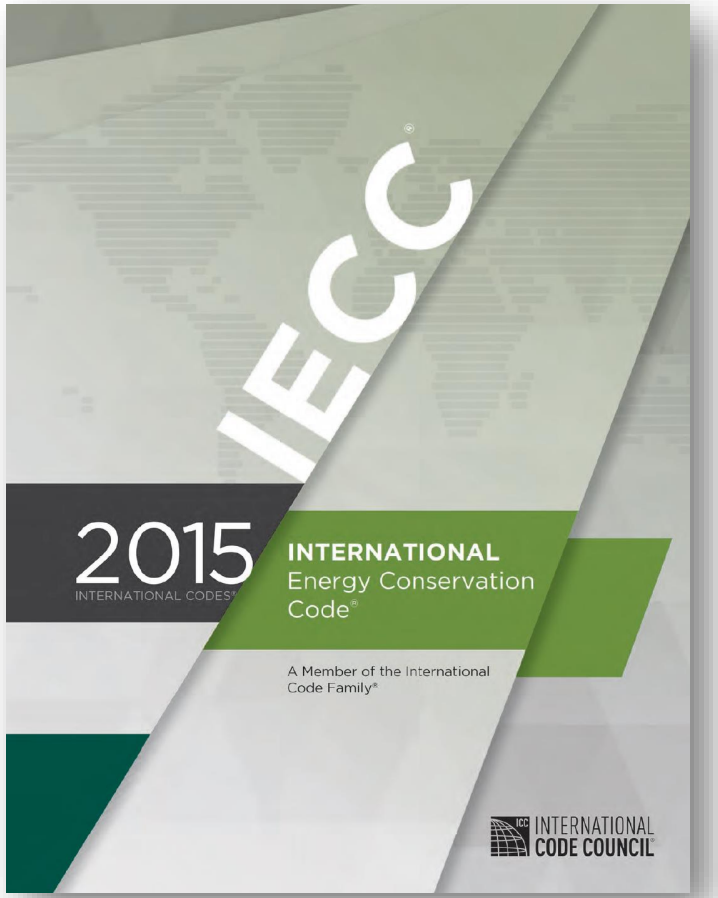
Chapter 2 – Definitions

Chapter 3 – General Requirements

Chapter 4 – Residential Energy Efficiency

Chapter 5 – Existing Buildings

Chapter 6 – References Standards



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Residential

- 1- and 2-family dwellings (R-3)
- Multi-family (R-2 ≤ 3 stories)
- Residential care/assisted living (R-4 ≤ 3 stories)

Courtesy Daniel Sandomire, Armstrong Builders

Commercial

- All other buildings
  - Including R-1 (hotels)

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Scope

New construction

Additions (R503)

1. New construction requirements for addition alone, or
2. Simulated Performance Alternative for existing + addition

Alterations (R503)

- New construction requirements for altered components
- Several exceptions (partial list)
  - Wall or roof cavity already filled with insulation
  - Wall or roof cavity is not exposed
  - Roof recover
  - Glazing-only replacement
  - Roof replacement

Change space conditioning (R503.2)

- Kauai and Hawai'i County exceptions

Roof replacement

Kauai. Choose <u>two</u>:

Maui and Hawaii. Choose <u>one</u>:

1. Energy Star compliant roof covering
2. Radiant barrier
3. Attic ventilation via solar attic fans or ridge vent or gable vent

Scope

Portions exempt from envelope requirements

- Peak AC energy demand less than 1.0 watt/ft^2
- Unconditioned space that does not contain habitable space

Maui adds

- Greenhouses, towers, walls, and similar uses

Hawai'i County adds

- Unconditioned dwellings with enclosed habitable areas less than 1,100 square feet
- Dwellings with permitted, off-grid, self supplying photovoltaic with battery back up

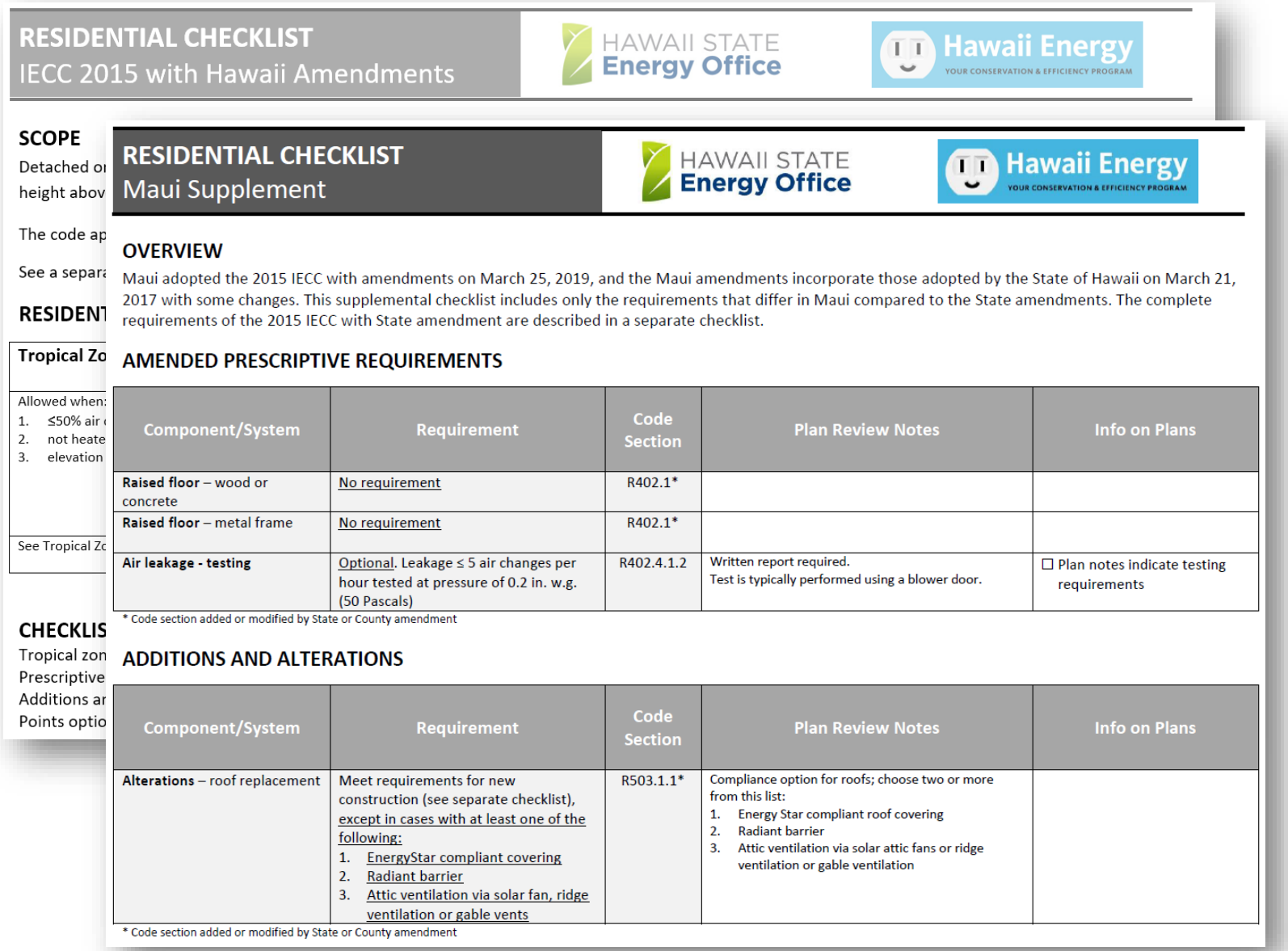
Checklists

Residential

Residential – County supplements

Commercial

Commercial – County supplements



RESIDENTIAL CHECKLIST
IECC 2015 with Hawaii Amendments

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YOUR CONSERVATION & EFFICIENCY PROGRAM

SCOPE

Detached o
height abov

The code ap

See a separa

RESIDENT

Tropical Zo
Allowed when: 1. ≤50% air 2. not heate 3. elevation
See Tropical Zo

CHECKLIS

Tropical zon
Prescriptive
Additions ar
Points optio

RESIDENTIAL CHECKLIST
Maui Supplement

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OVERVIEW

Maui adopted the 2015 IECC with amendments on March 25, 2019, and the Maui amendments incorporate those adopted by the State of Hawaii on March 21, 2017 with some changes. This supplemental checklist includes only the requirements that differ in Maui compared to the State amendments. The complete requirements of the 2015 IECC with State amendment are described in a separate checklist.

AMENDED PRESCRIPTIVE REQUIREMENTS

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Raised floor – wood or concrete	No requirement	R402.1*		
Raised floor – metal frame	No requirement	R402.1*		
Air leakage - testing	Optional. Leakage ≤ 5 air changes per hour tested at pressure of 0.2 in. w.g. (50 Pascals)	R402.4.1.2	Written report required. Test is typically performed using a blower door.	☐ Plan notes indicate testing requirements

* Code section added or modified by State or County amendment

ADDITIONS AND ALTERATIONS

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Alterations – roof replacement	Meet requirements for new construction (see separate checklist), except in cases with at least one of the following: 1. EnergyStar compliant covering 2. Radiant barrier 3. Attic ventilation via solar fan, ridge ventilation or gable vents	R503.1.1*	Compliance option for roofs; choose two or more from this list: 1. Energy Star compliant roof covering 2. Radiant barrier 3. Attic ventilation via solar attic fans or ridge ventilation or gable ventilation	

* Code section added or modified by State or County amendment

http://energy.hawaii.gov/hawaii-energy-building-code

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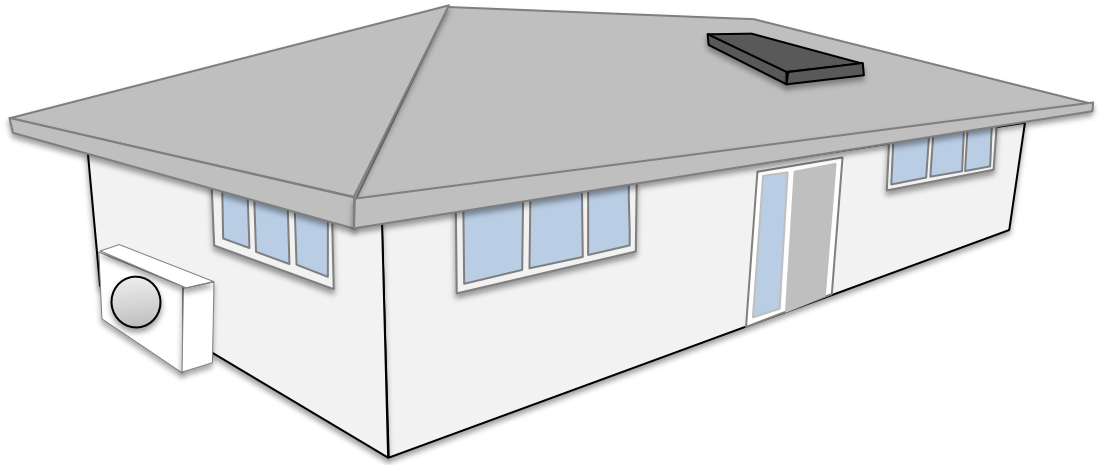
Poll – your role

- Architect
- Contractor
- Engineer
- Developer
- Building owner / owner's representative
- Vendor
- Building official
- Other government
- Energy efficiency specialist
- Other

Section 2

Residential – Overview & Definitions



What's covered

Envelope

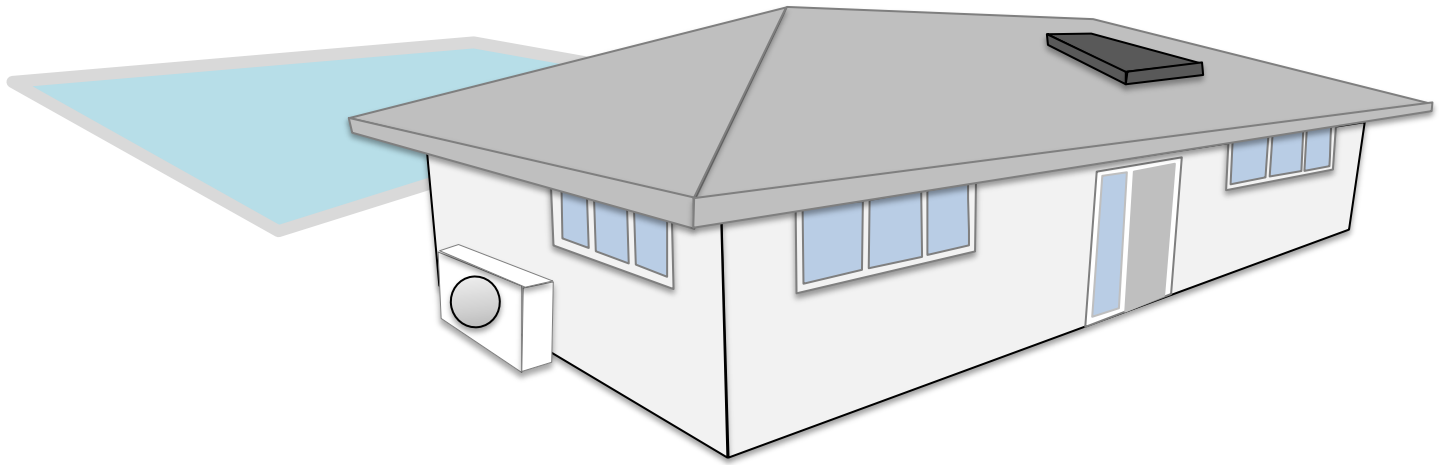
Roof
Walls
Window & skylights
Air leakage

Systems

Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fan
EV charging



Not covered

Plug-in lighting
Appliances
AC efficiency
Water heater efficiency

Highlights of changes

- New Tropical Zone compliance option
- New points option for walls and roof
- Air leakage testing – blower door (optional in some cases)
- Lower window SHGC
- Duct leakage testing
- High efficacy lighting

Definitions

R-value

U-factor

Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance

Thermal emittance

Definitions

R-value ➡

U-factor

Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance

Thermal emittance

Thermal resistance
(Btu/hr-ft^2-F)

Definitions

R-value

U-factor ➡

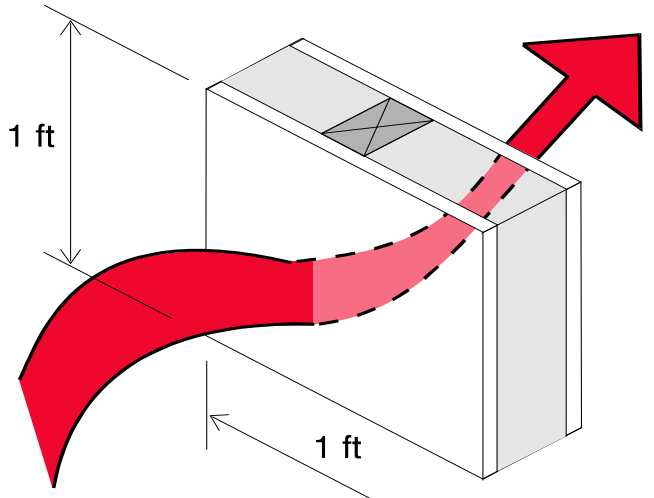
Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance

Thermal emittance

Thermal transmittance
(hr-ft^2-F/Btu)



U-Value is the rate of heat flow in Btu/h through one ft^2 area when one side is 1° F warmer

$$U = 1/R$$

$$Q = U \cdot A \cdot \Delta T$$

Heat flow (Btu/hr) = U-factor * area * (Outdoor temperature – Indoor Temperature)

Definitions

R-value

U-factor

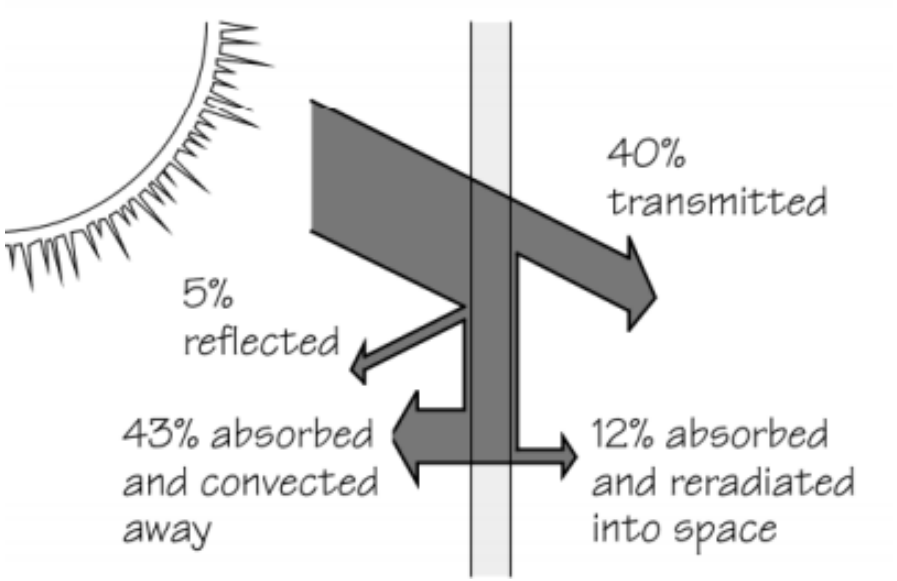
Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance

Thermal emittance

$$\text{SHGC} = \frac{\text{Solar heat gain entering the space}}{\text{Incident solar radiation energy}}$$



http://windows.lbl.gov/software/NFRC/SimMan/NFRCSim6.3-2013-07-Manual.pdf

Definitions

R-value

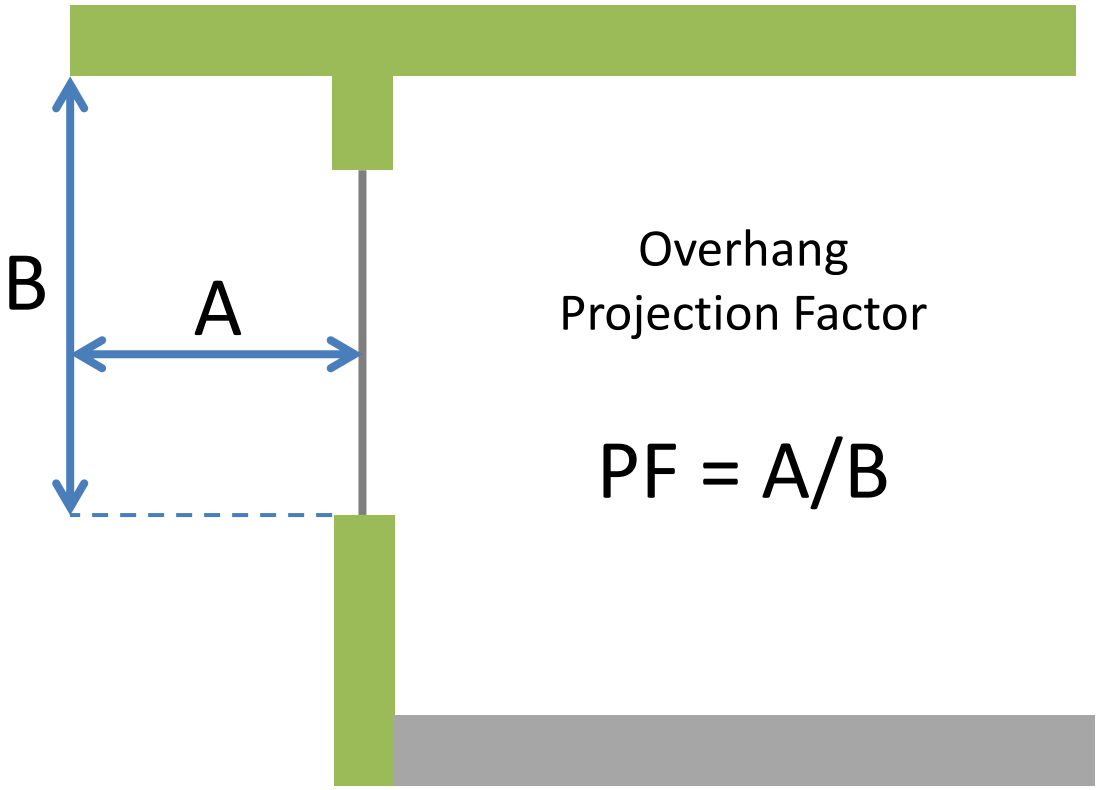
U-factor

Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance

Thermal emittance



Definitions

R-value

U-factor

Solar heat gain coefficient (SHGC)

Projection factor (PF)

Solar reflectance ➡

Thermal emittance

Percentage of solar energy reflected by a surface

http://coolroofhawaii.com

Definitions

R-value

U-factor

Solar heat gain coefficient (SHGC)

Projection factor (PF)

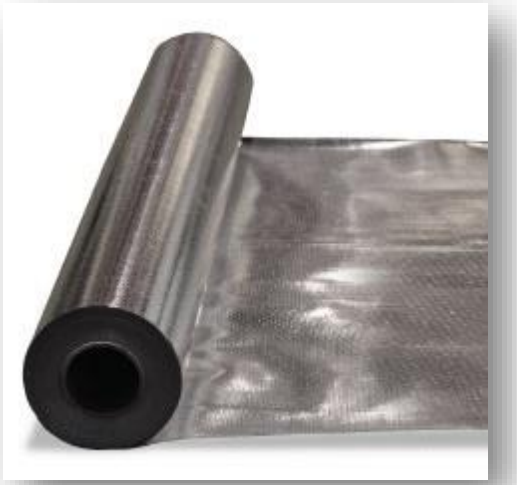
Solar reflectance

Thermal emittance ➡

$$\varepsilon = \frac{\text{Radiation emitted by a given material}}{\text{Radiation emitted by a black body at the same temperature}}$$

ε = 0.8 – 0.9 typical

ε < 0.1 for “low-e” surfaces, polished metal

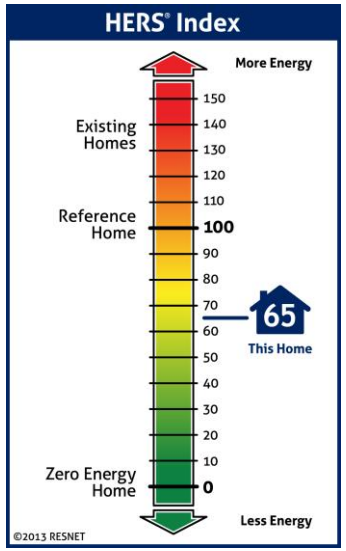


Compliance Options - Residential

1. Tropical Zone
   - ≤50% air conditioned
   - not heated
   - elevation < 2,400 feet
     (5,000 ft Hawaii County)
2. Prescriptive
   - Envelope (+ Points Option)
   - Systems
   - Electrical power and lighting systems
3. Simulated performance alternative

4. Energy rating index (ERI)
   - ERI ≤ 52

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement R-Value	Slab R-Value	Crawl Space Wall R-Value
1	NR	0.75	0.25	30	13	3/4	NA[1]	0	0	0



https://www.hersindex.com/

Section 3

Residential – Tropical Zone

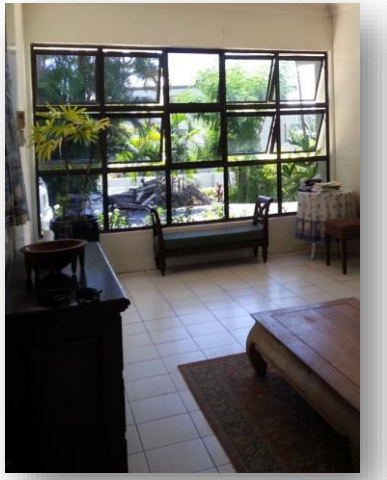
R401.2.1 Tropical Zone

Can use this path if:

- ≤50% air conditioned,
  - And ≤ 1,000 ft^2 air conditioned (Kauai only)
- not heated, and
- elevation < 2,400 feet (5,000 feet Hawaii County)

Requirements cover:

- Roof
- Windows and overhangs
- Skylights
- Natural ventilation
- Jalousie air leakage
- Envelope air leakage for AC areas
- Water heating
- Lighting



R401.2.1 Tropical Zone

Hawaii State Version

R401.2.1 Tropical zone. *Residential buildings* in the tropical zone at elevations below 2,400 feet (731.5 m) above sea level shall be deemed to comply with this chapter where the following conditions are met:

1. Not more than one-half of the *dwelling unit* is air conditioned
2. The *dwelling unit* is not heated.
3. Solar, wind or other renewable energy source supplies not less than 90 percent of the energy for service water heating.
4. 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[b]	SHGC
< .30	.25
.30 - .50	.40
≥ .50	N/A

[b] Exception: 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.

5. Skylights in dwelling units shall have a maximum U-factor as specified in Table R402.1.2.
6. Permanently installed lighting is in accordance with Section R404.
7. The roof/ceiling complies with one of the following options:

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

2. Install R-19 insulation or greater.

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

Exception: The roof/ceiling assembly are permitted to comply with Section R407.

8. Roof surfaces have a minimum slope of ¼ inch per foot of run. The finished roof does not have water accumulation areas.
9. 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.
10. Bedrooms with exterior walls facing two different direction have operable fenestration or exterior walls facing two different directions.
11. Interior doors to bedrooms are capable of being secured in the open position.
12. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as bedroom.
13. Jalousie windows shall have an air infiltration rate of no more than 1.2 cfm per square foot (6.1 L/s/m²).
14. 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. [Eff 5/24/10; am and comp MAR 31 2017] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

R401.2.1 Tropical Zone

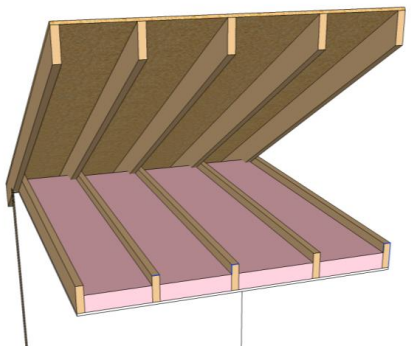
Roof

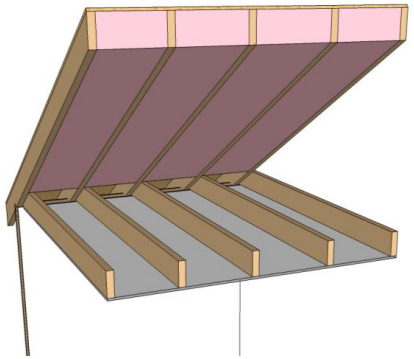
1. R-19 insulation
2. Cool roof + R-13 insulation

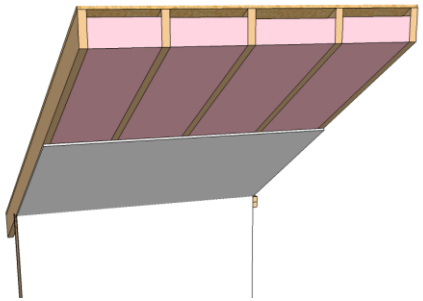
If there is an attic

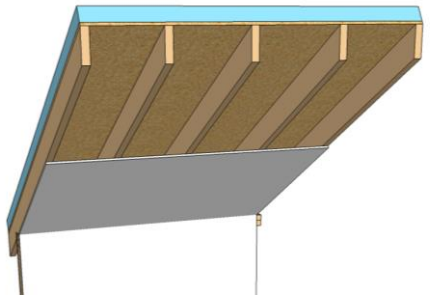
- Vented if insulation on ceiling
- Unvented if insulation at roof

Insulation type & thickness	R-13	R-19
Batt or blown-in	3.5”	6”
Open-cell spray foam	3-4”	5-6”
Closed-cell spray foam	2-3”	3-4”
Polystyrene board	2.75”	4”
Polyisocyanurate board	2”	3”









R401.2.1 Tropical Zone

Roof

1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation

R401.2.1 Tropical Zone

Roof

1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation

Cool roof definitions (C402.3)

1. Solar reflectance ≥ 0.55 & thermal emittance ≥ 0.75
2. Solar reflectance index ≥ 0.64
3. Shaded portions (see C402.3)

R401.2.1 Tropical Zone

Roof

1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation

Cool roof – metal example

Architect: Daniel Sandomire, Armstrong Builders

R401.2.1 Tropical Zone

Roof

1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation

Cool roof – concrete tile example

www.hansonrooftile.com

R401.2.1 Tropical Zone

Roof

1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation

Cool roof - liquid applied example

http://coolroofhawaii.com

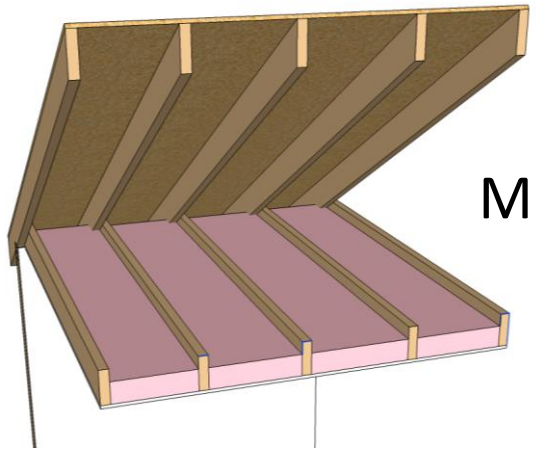
R401.2.1 Tropical Zone

Roof

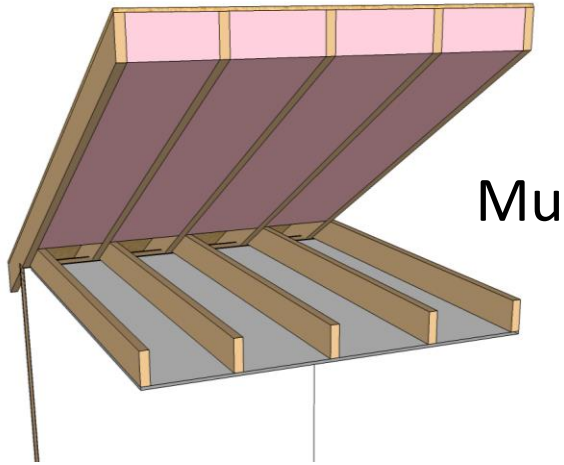
1. R-19 insulation
2. Cool roof + R-13 insulation

If there is an attic

- Vented if attic above insulation
- Unvented if attic below insulation



Must be vented



Must be unvented

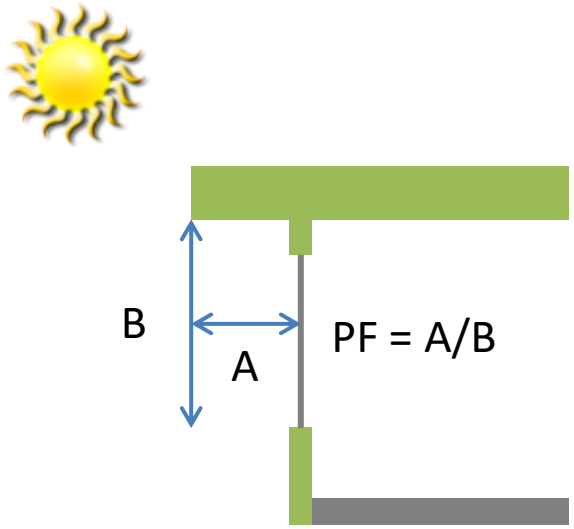
R401.2.1 Tropical Zone

Wall

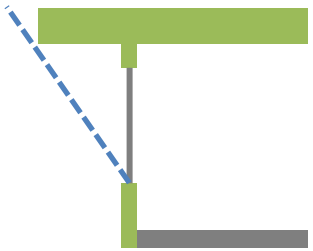
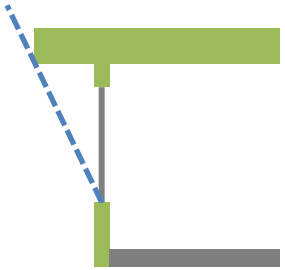
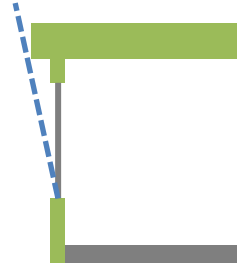
No requirements

R401.2.1 Tropical Zone

Windows



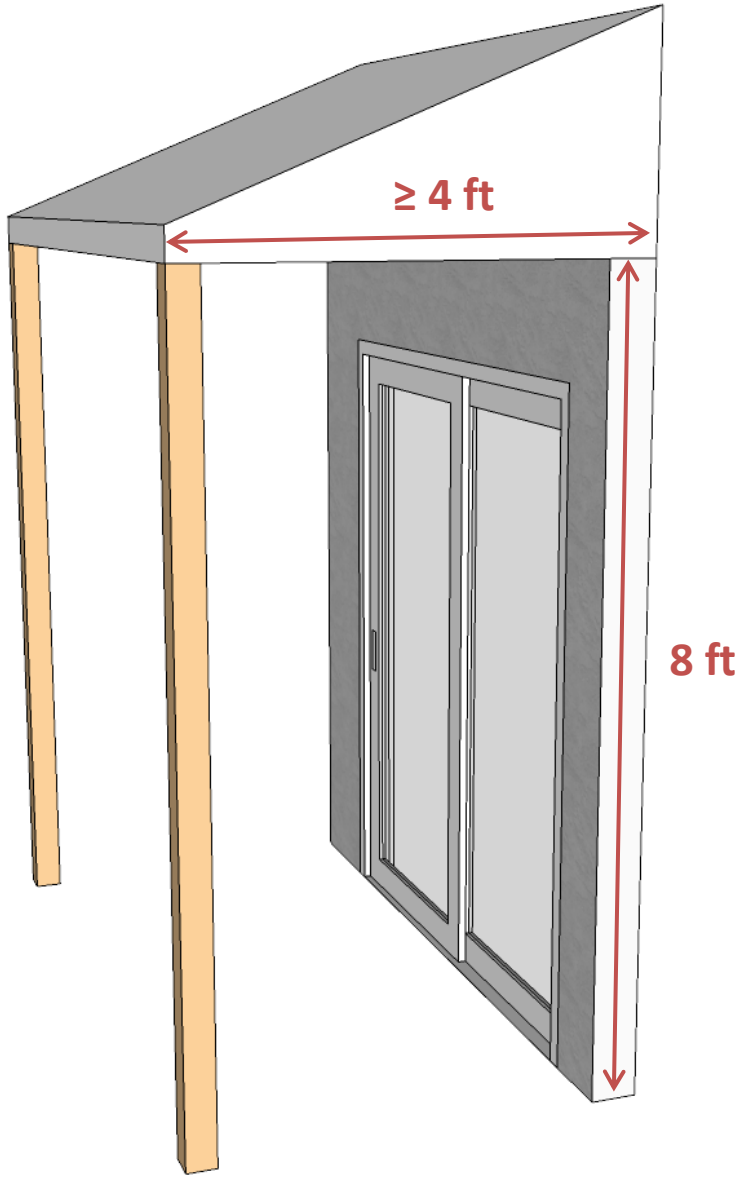
Maximum solar heat gain coefficient (SHGC)

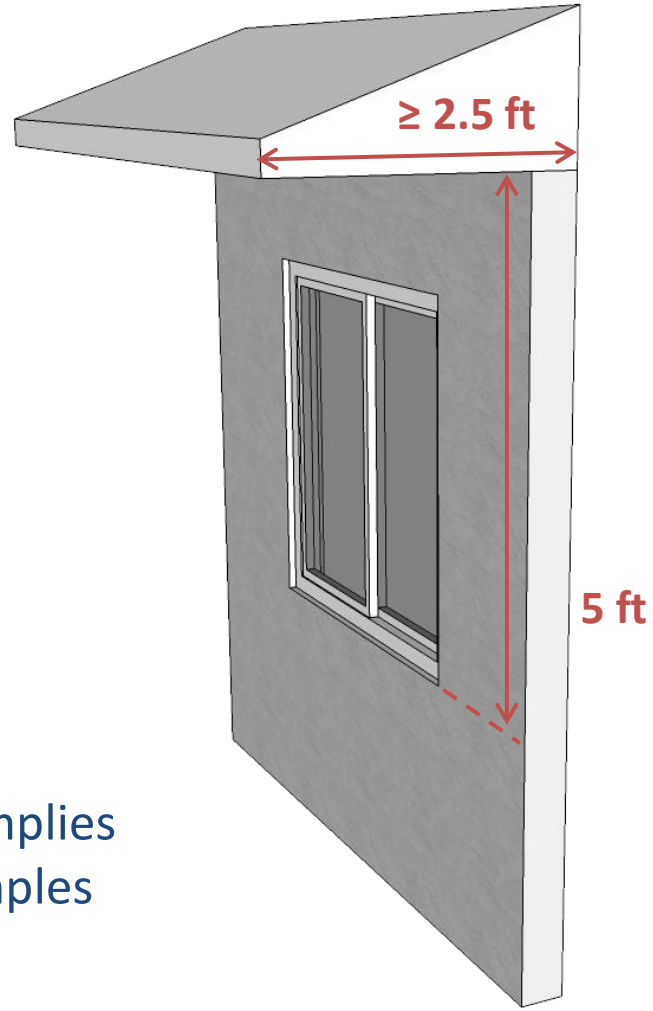
	No requirement	0.40	0.25
	Large overhang 	Medium overhang 	Small overhang 
Overhang Projection Factor	≥ 0.5	0.30 ≤ PF < 0.50	< 0.30

North windows: no requirement if PF > 0.20

Hawaii County: jalousies exempt

Overhang size that allows clear glass to comply?

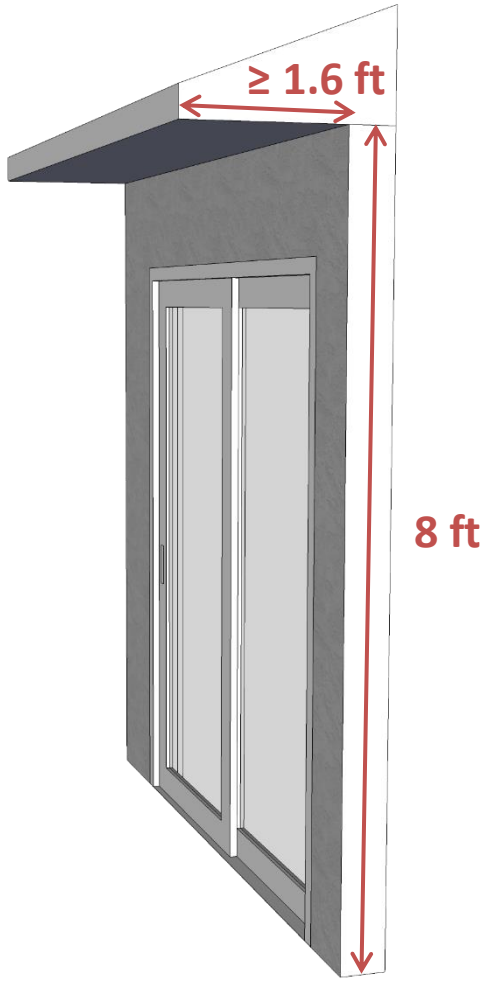




Clear glass complies in these examples

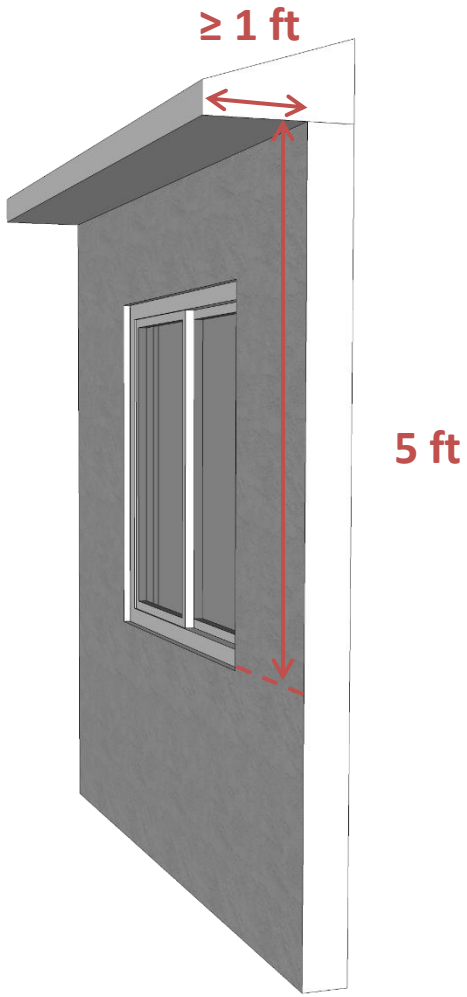
PF ≥ 0.5

How about on the north side?



North-facing windows

Clear glass complies in these examples
PF ≥ 0.2



Window examples

Dual-pane, low-e, solar control

Double Glazed	Visible Light Trans %	Visible Light Reflect Out %	Visible Light Reflect In %	UV Trans %	SHGC	U-Factor 1/2" Gap Argon	U-Factor 1/2" Gap Air
ClimaGuard 80/70 (#3)	81	13	13	41	0.702	0.271	0.315
HiLightR 802 (80/70 + IS-20)	79	14	14	40	0.678	0.222	0.254
ClimaGuard 72/57 (#3)	71	13	14	27	0.575	0.251	0.298
ClimaGuard 72/57	71	14	13	27	0.468	0.251	0.298
ClimaGuard 70/36	70	11	13	25	0.383	0.248	0.294
ClimaGuard 62/27	62	11	12	8	0.278	0.245	0.292
ClimaGuard 55/27	56	17	19	21	0.277	0.246	0.293
ClimaGuard 53/23	53	13	12	11	0.233	0.243	0.290

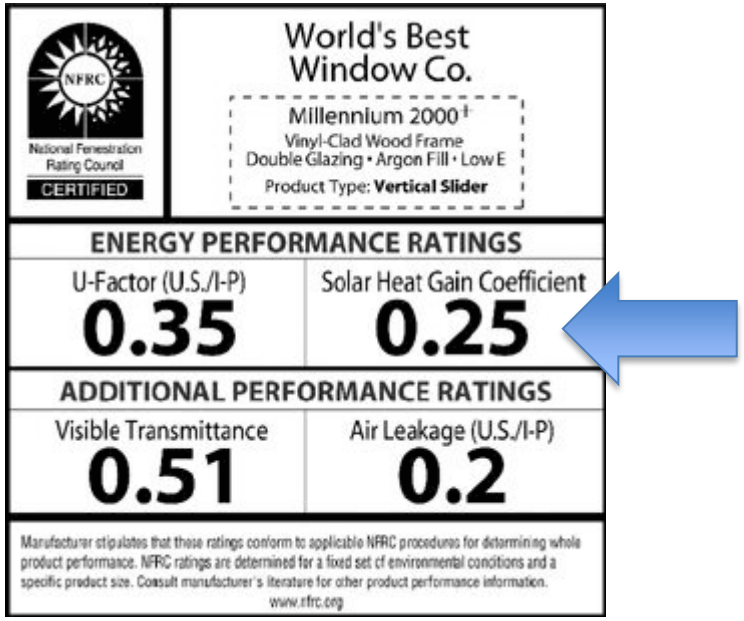
SHGC < 0.40

SHGC < 0.25

Source: www.guardian.com

Low UV transmission is an extra benefit

National Fenestration Rating Council (NFRC) Label

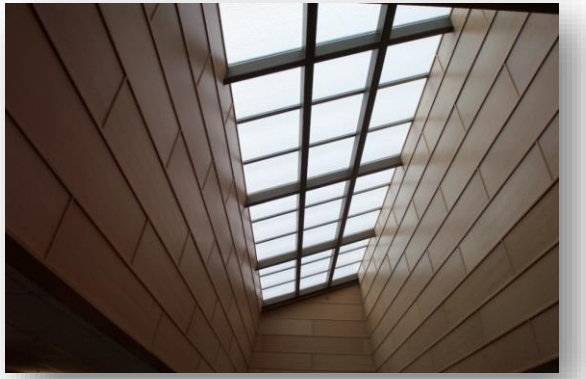


R401.2.1 Tropical Zone

Skylights

U-factor ≤ 0.75

Requires double-pane skylights



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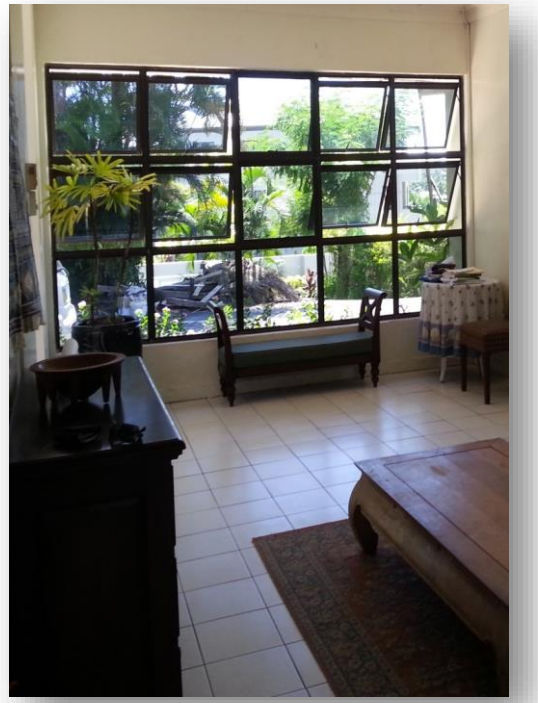
R401.2.1 Tropical Zone

Natural ventilation

- Operable windows
  - Ventilation area ≥ 14% of floor area in each room
  - Or 2ACH mechanical ventilation (Hawaii County)
- Bedrooms
  - Interior doors can be secured open
  - Openings on two different sides if exterior walls face two different directions
- Ceiling fans or whole-house fan (Hawaii)
  - Bedrooms
  - Largest space that is not a bedroom
- Jalousie windows
  - Air infiltration rate ≤ 1.2 cfm/ft2

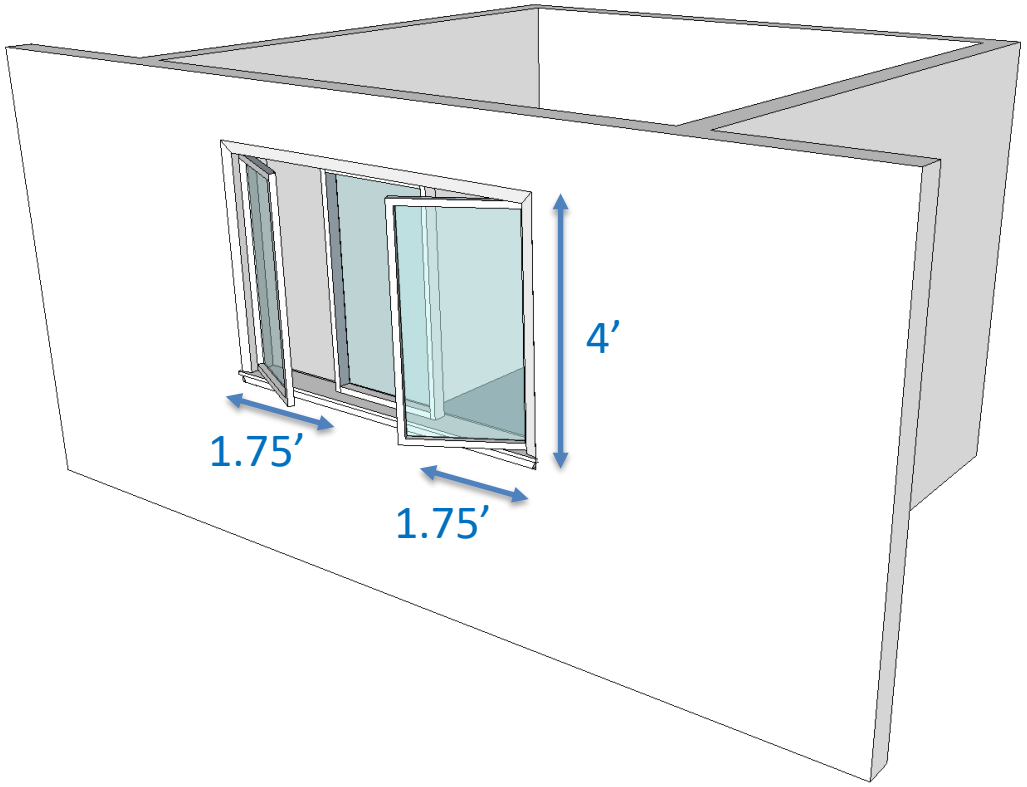


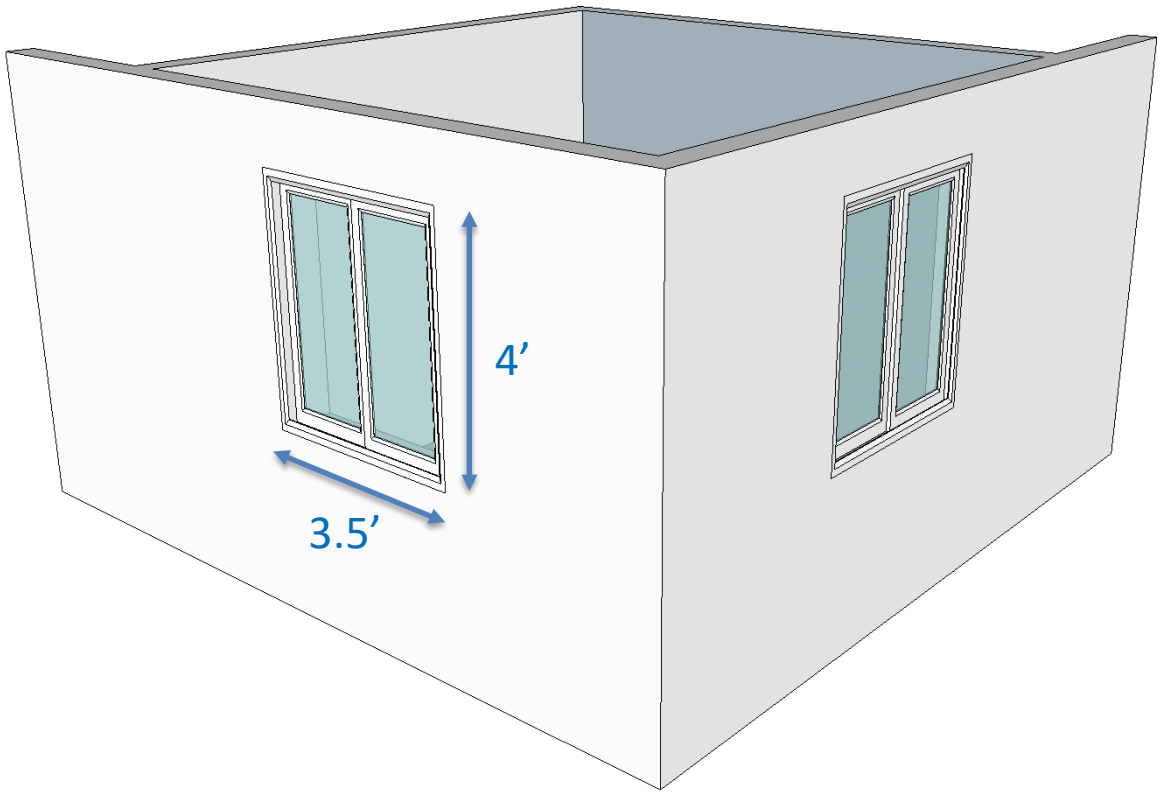
R401.2.1 Tropical Zone

Natural ventilation

Ventilation area ≥ 14% of floor area

Example: 10’x10’ bedroom needs 14 ft^2 vent area



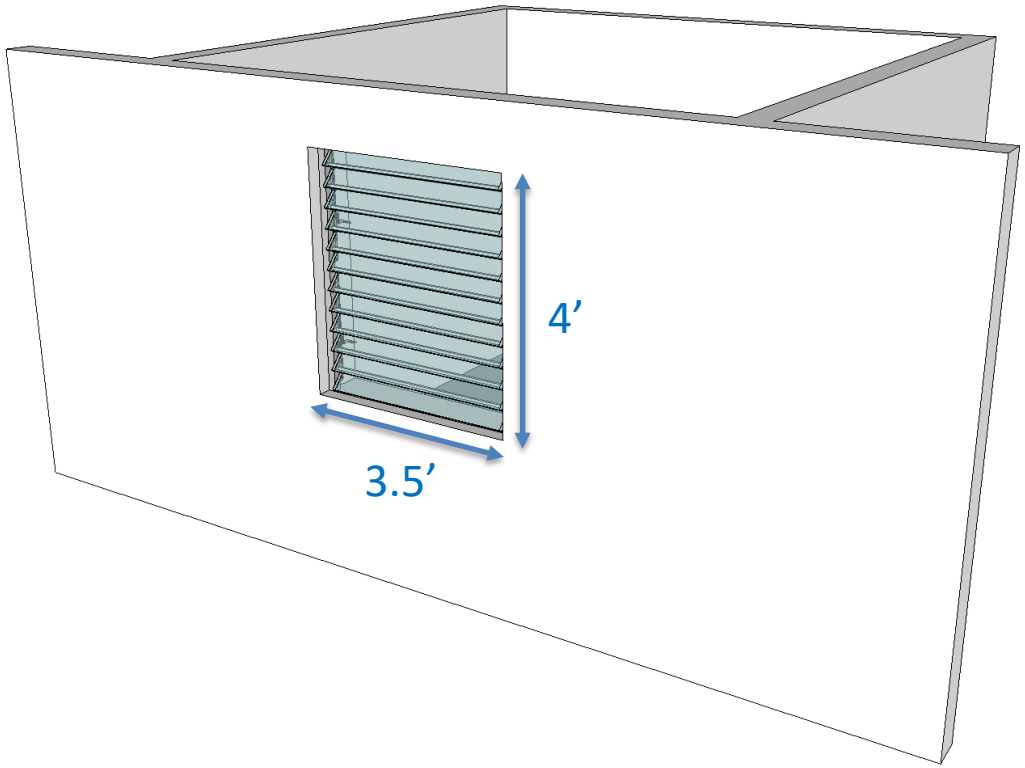


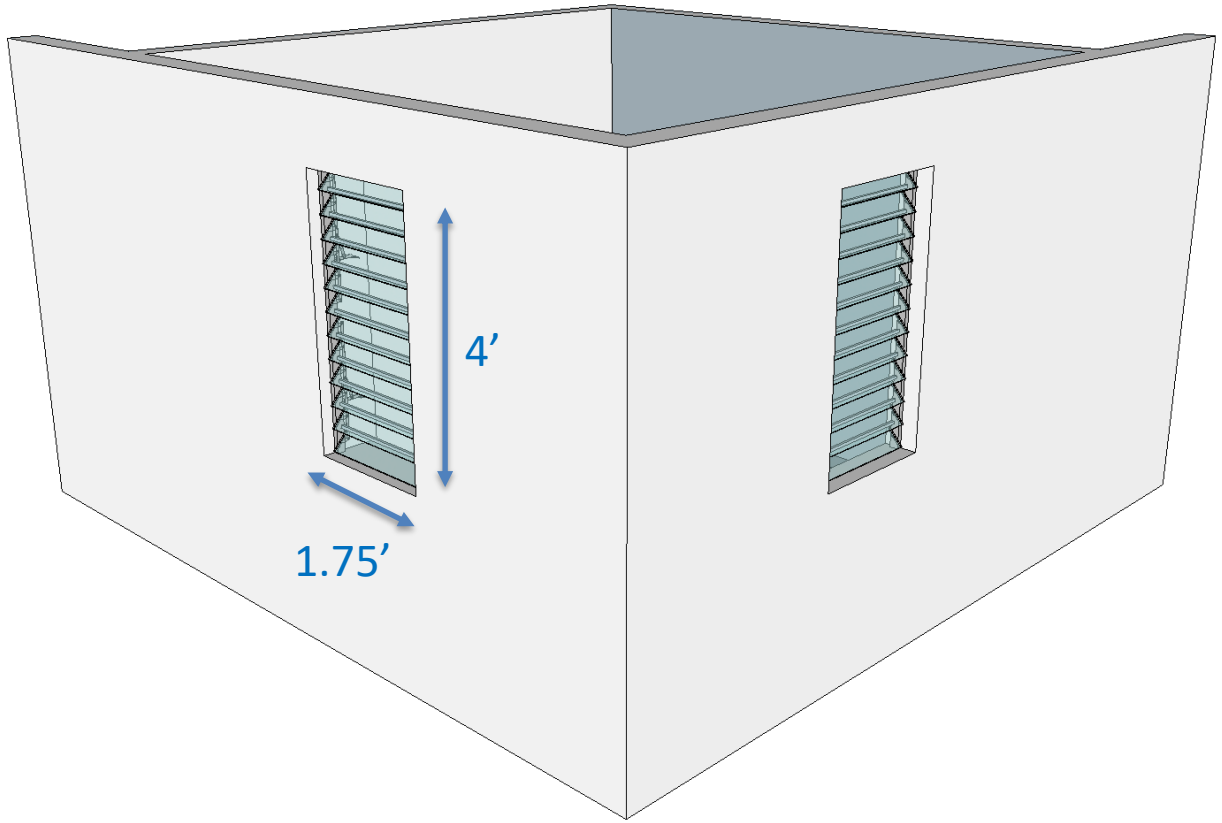
R401.2.1 Tropical Zone

Natural ventilation

Ventilation area ≥ 14% of floor area

Example: 10’x10’ bedroom needs 14 ft^2 vent area





R401.2.1 Tropical Zone

Water heating

Solar, wind or other renewable > 90%

Hawaii County: or State Energy Office waiver

R401.2.1 Tropical Zone

Lighting

High efficacy
≥ 75% of permanently installed lamps

Lamp Wattage	Efficacy (lumens/watt)
> 40 watts	60
15-40 watts	50
< 15 watts	40

High efficacy examples

Compact fluorescent

Source: DOE/NREL PIX17458

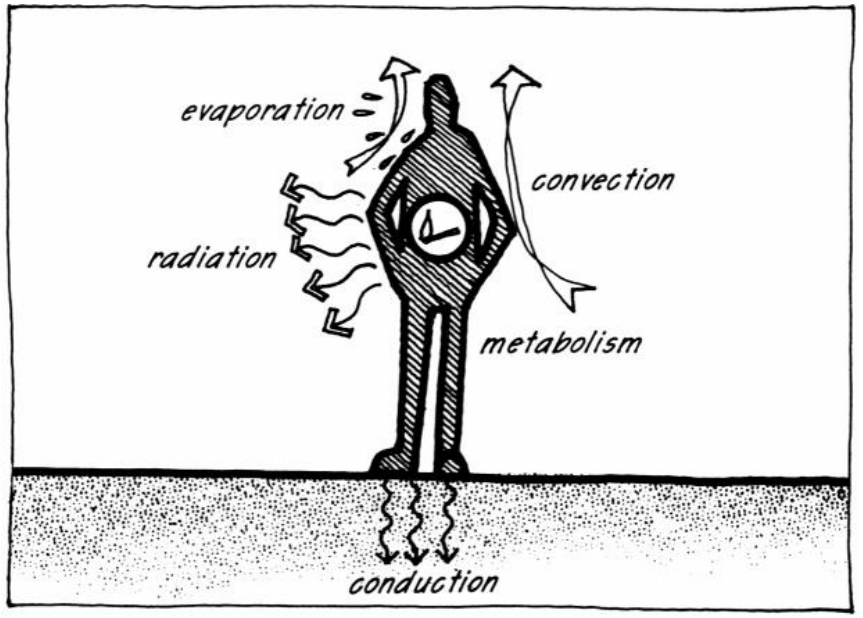
Full-size fluorescent

Source: DOE/NREL PIX20307

LED

R401.2.1 Tropical Zone

- Efficiency
  - Little or no AC
  - Solar water heating
  - High efficacy lighting
- Comfort (keep the sun out, let the breeze in)
  - Window & roof heat gain
  - Natural ventilation openings
  - Ceiling fans



Heat generated within body ≈ Heat loss from body

↓ Air temperature
↓ Ceiling temperature
↑ Air movement

R401.2.1 Tropical Zone

TROPICAL ZONE REQUIREMENTS CHECKLIST

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Tropical zone qualification	▪ ≤ 50% of occupied space has AC ▪ No heating installed ▪ Elevation < 2,400 ft^2	R401.2.1*†	Dwellings that do not meet all these criteria must use another compliance option.	☐ AC space clearly indicated (if applicable)
Certification	Responsible design professional certification on plans	R103.1*		☐ Signed statement on plans
Construction documents	Include: ▪ Insulation R-values ▪ Fenestration U-factors and solar heat gain coefficients (SHGCs)	R103.2		
Water heating - solar	Solar, wind or other renewable source supplies ≥ 90% of energy for water heating	R401.2.1*	Waiver for instant-on water heater permitted.	☐ Solar water heating system specs on plans
Windows – solar heat gain coefficient (SHGC)	≤ **0.25** if projection factor < 0.30 ≤ **0.40** if projection factor 0.30-0.50 N/A: projection factor ≥ 0.5. N/A: north windows if PF > 0.20	R401.2.1*	SHGC = solar heat gain factor. Low SHGC typically requires dual-pane glazing with a low-emittance coating that is designed to reduce solar heat gain. Projection factor = horizontal projection of overhang ÷ vertical distance from overhang to bottom of window. Overhang must extend at least 2 ft on each side of the window or to the nearest wall, whichever is less.	☐ SHGC indicated on plans ☐ Overhang dimensions on plans, if applicable
Skylights – U-factor	≤ **0.75**	R401.2.1*	Skylights must have dual-pane glazing.	☐ Skylight U-factor on plans
Lighting	≥ 75% of lamps or fixtures are high efficacy	R404.1	High efficacy lamps are defined as: ▪ T-8 or smaller diameter fluorescent ▪ Compact fluorescent ▪ 60 lumens/watt if >40W ▪ 50 lumens/watt if >15W and ≤40W ▪ 40 lumens/watt if ≤15W Most, but not all, LED lamps will qualify. Applies to permanently-installed fixtures. Low-voltage lighting is exempt.	☐ Lighting fixture locations on plans ☐ Lighting fixture schedule includes input power and lumen output

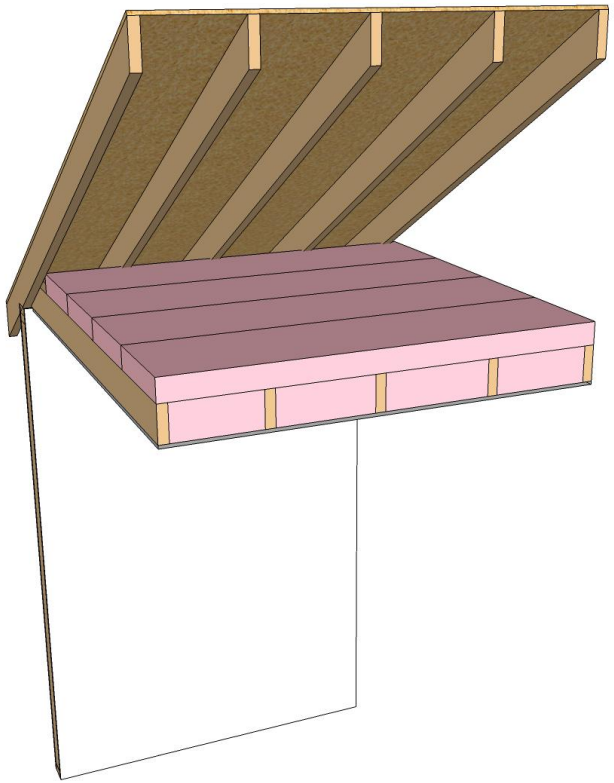
R401.2.1 Tropical Zone

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Roof – insulation and membrane	☐ **R-13** + cool roof, ☐ **R-19**, or ☐ *Points option (section R407)*	R401.2.1*	Qualifying cool roof membranes must meet one of the following (per Table C402.3): 1. Aged reflectance ≥ 0.55 & aged thermal emittance ≥ 0.75 2. Aged solar reflectance index (SRI) ≥ 0.64 Qualifying cool roofs will typically be white in color. Typical options include white painted metal, white tile, white liquid applied coating, and white single-ply membranes. If present, attics above insulation must be vented and attics below insulation must be unvented.	☐ Insulation location on plans ☐ Insulation R-value on plans ☐ Membrane specs on plans (if applicable
Roof – slope	≥ ¼ in. per foot	R401.2.1*	No water accumulation areas allowed.	☐ Roof slope indicated on plans
Walls and floor	No requirement			
Natural ventilation	▪ Opening area ≥ 14% of floor area in each room. ▪ Bedrooms with exterior walls facing two different directions have operable fenestration facing two directions ▪ Interior doors to bedrooms capable of being secured open	R401.2.1*	Operable windows and/or skylights are required for natural ventilation. Ventilation fans can be provided as an alternative.	☐ Operable openings on plans
Ceiling fans	Ceiling fans or rough-ins required for: ▪ Each bedroom ▪ Largest space not used as a bedroom	R401.2.1*		☐ Ceiling fan locations on plans
Jalousie windows	Infiltration rate ≤ 1.2 cfm/sf	R401.2.1*	Manufacturer test data specs required for jalousies	☐ Jalousie specs on plans
Air leakage	Walls, floor and ceilings that separate AC spaces and non-AC spaces use air-tight construction	R401.2.1*	For air conditioned spaces, see section R402.4: ▪ Continuous air barrier ▪ Breaks or joints are sealed ▪ Recessed lighting ▪ Fenestration air leakage	☐ Plan notes indicate installation requirements

* Code section added or modified by Hawaii amendment

Section 4

Residential Envelope Prescriptive Option



Envelope

- Windows
  - SHGC (Table R402.1.2)
- Skylights
  - SHGC & U-factor (Table R402.1.2)
  - Total UA (R402.1.5)
- Wall and roof – four options
  - Insulation R-value (Table R402.1.2)
  - Assembly U-factor (Table R402.1.4)
  - Total UA (R402.1.5)
  - Points option (R407)
- Air leakage
  - Air barrier, sealing
  - Testing (optional Kauai, Maui, Hawaii County)

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Windows

1. U-factor – no requirement
2. Solar heat gain coefficient (SHGC) ≤ 0.25

Exceptions

1. Up to 15 ft^2
2. Area-weighted average allowed

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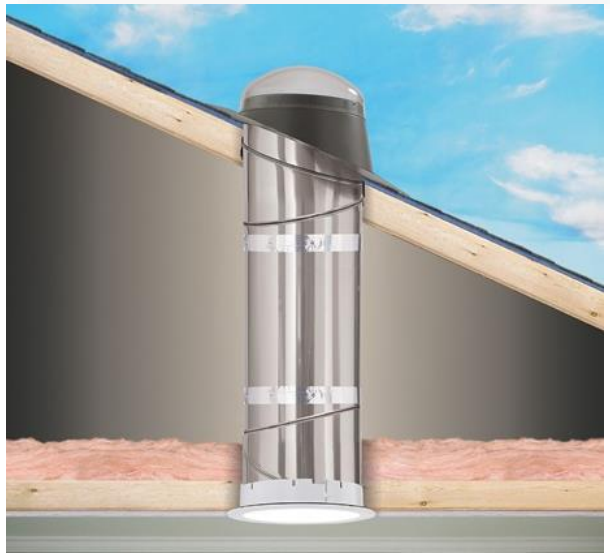
Envelope - Prescriptive

Skylights

1. U-factor ≤ 0.75
2. Solar heat gain coefficient (SHGC) ≤ 0.30

Exceptions

1. Up to 15 ft^2 (total for window + skylight)
2. Area-weighted average allowed



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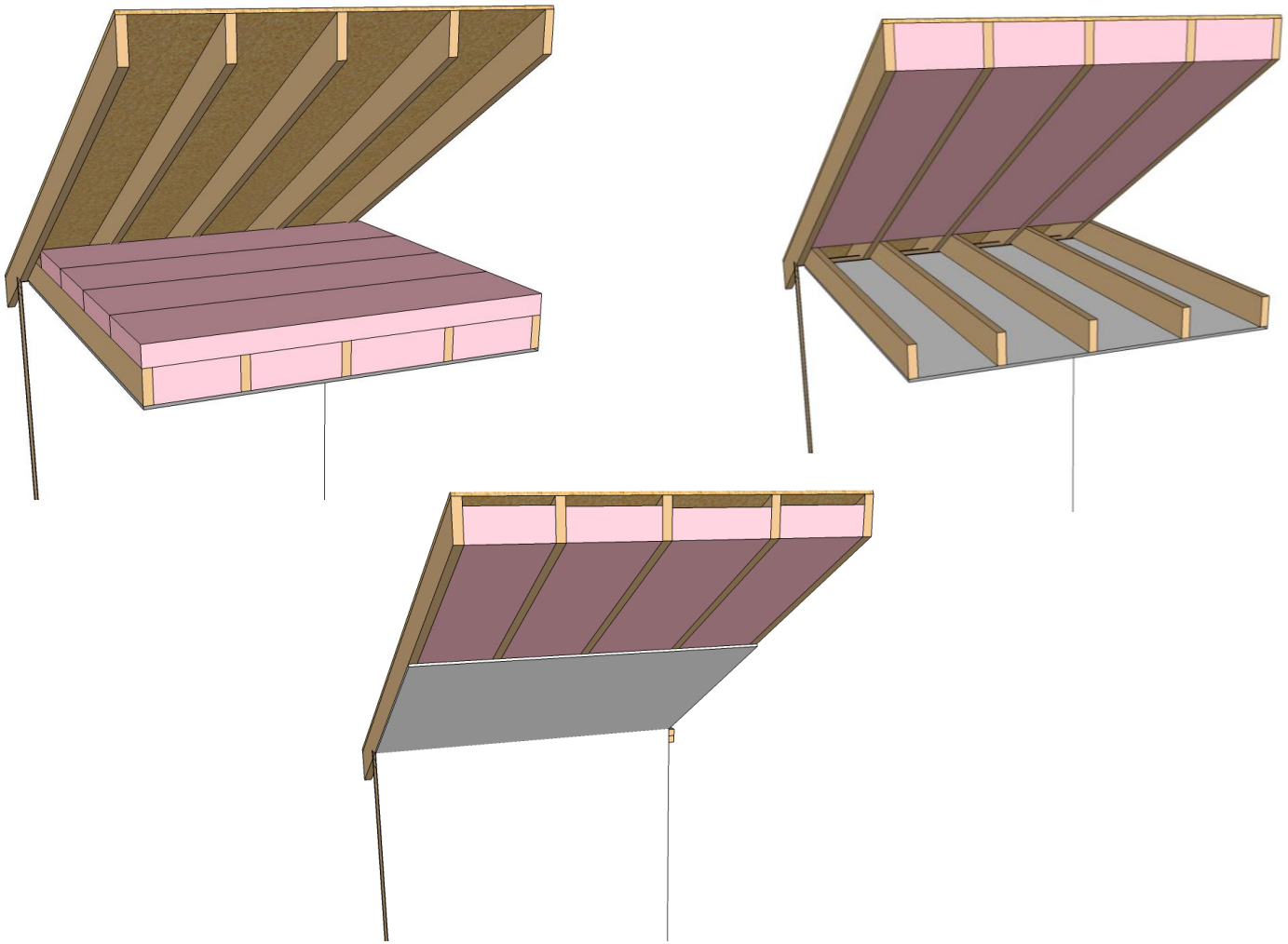
Ceiling – wood framed

1. R-30 insulation (Table R402.1.2)
2. U-0.035 (Table R402.1.4)

Insulation type & thickness	R-30
Batt	8-10”
Blown-in	12”
Open-cell spray foam	~8”
Closed-cell spray foam	~5”
Polystyrene board	6”
Polyisocyanurate board	5”

Or use the points option (R407)



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Ceiling – steel truss

1. R-38 insulation
2. R-30 + 3
3. R-26 + 5

Ceiling – steel joist

1. R-38 insulation
2. R-49 in any framing >2x8

(Table R402.2.6)

Insulation type & thickness	R-38	R-49
Batt	10-12”	15”
Blown-in	15”	19”
Open-cell spray foam	~10”	
Closed-cell spray foam	~6”	

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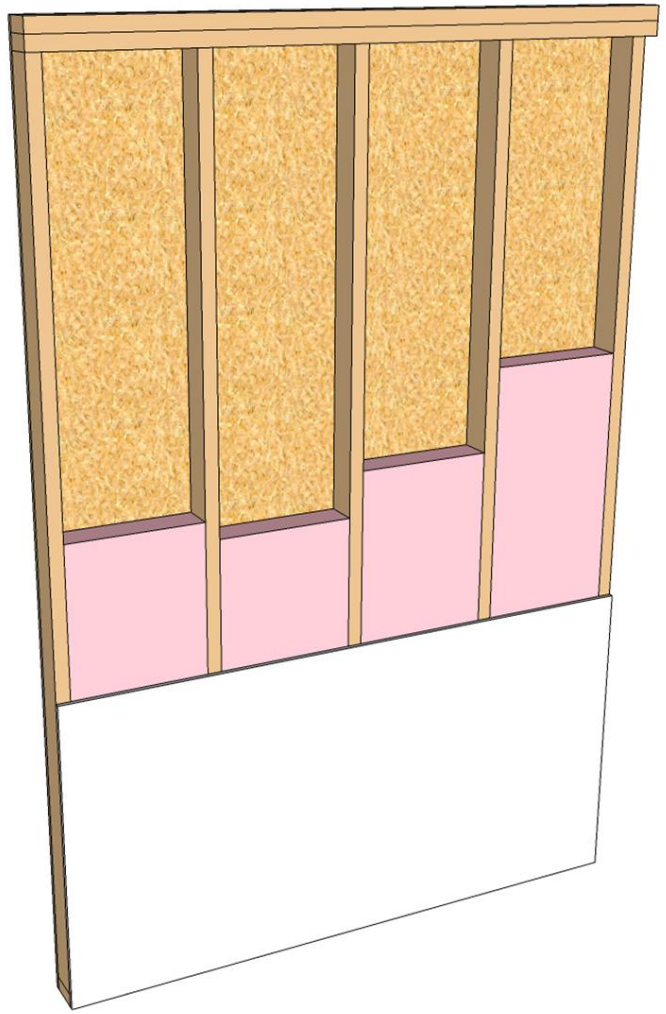
Walls – wood frame

1. R-13 insulation (Table R402.1.2)
2. U-0.084 (Table R402.1.4)

Insulation type & thickness	R-13
Batt or blown-in	3.5”
Open-cell spray foam	3-4”
Closed-cell spray foam	2-3”
Polystyrene board	2.75”
Polyisocyanurate board	2”



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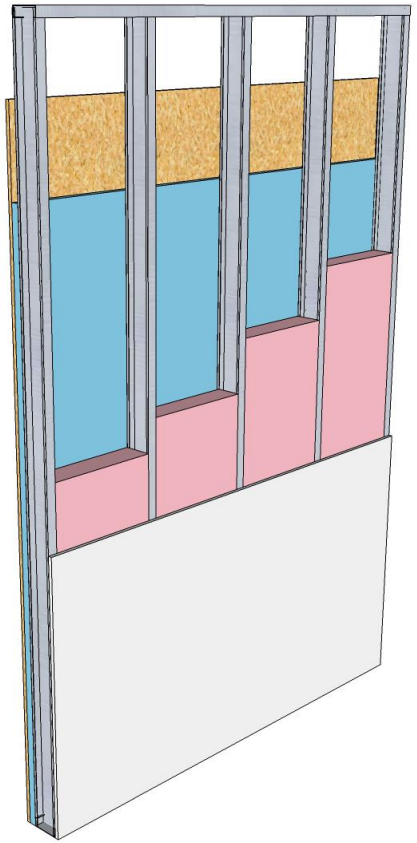
Walls – metal frame

1. Table R402.2.6
2. U-0.084 (Table R402.1.4)



Rigid foam board thickness

Frame spacing	Cavity insulation R-value	Continuous insulation R-value	Extruded Polystyrene (R-5/in.)	Poly-isocyanurate (R-6/in.)
16 in. o.c.	R-0	R-9.3	≥ 1.86 in.	≥ 1.55 in.
	R-13	R-4.2	≥ 0.84 in.	≥ 0.70 in.
	R-15	R-3.8	≥ 0.76 in.	≥ 0.63 in.
24 in. o.c.	R-0	R-9.3	≥ 1.86 in.	≥ 1.55 in.
	R-13	R-3.0	≥ 0.60 in.	≥ 0.50 in.
	R-15	R-2.4	≥ 0.48 in.	≥ 0.40 in.

Or use the points option (R407)

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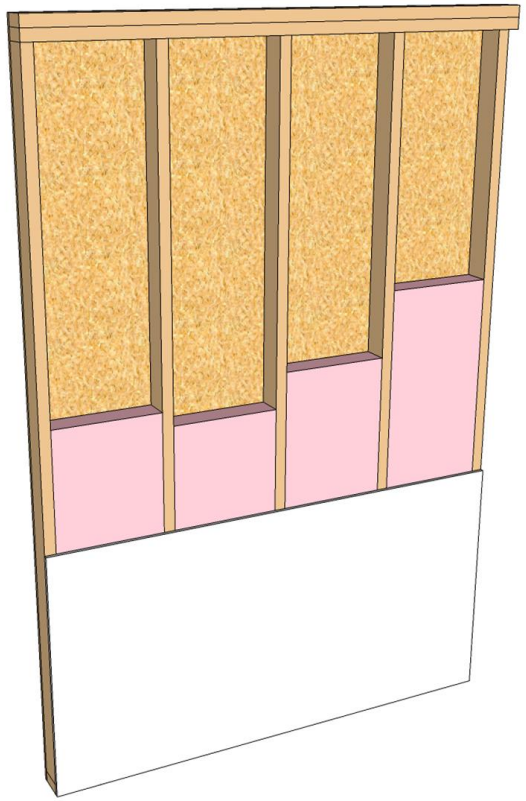
Why extra insulation is required with metal framing

R-13 in wood frame

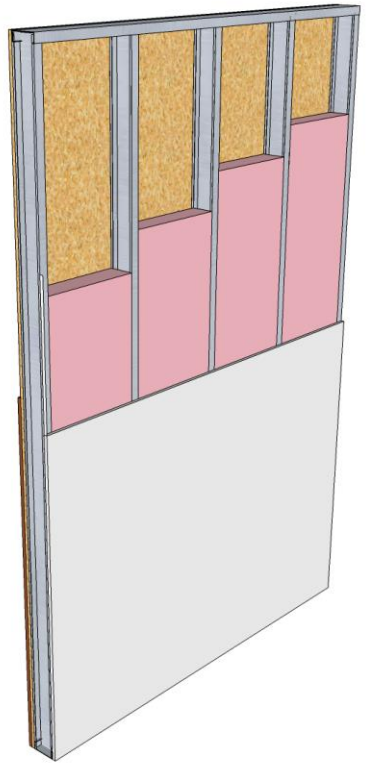


U-factor
0.089

39% higher heat transfer

U-factor
0.124

R-13 in steel frame (effective R-6)



U-factor source: ASHRAE Standard 90.1-2019, Table A3.3.3.1 and Table A3.4.3.1

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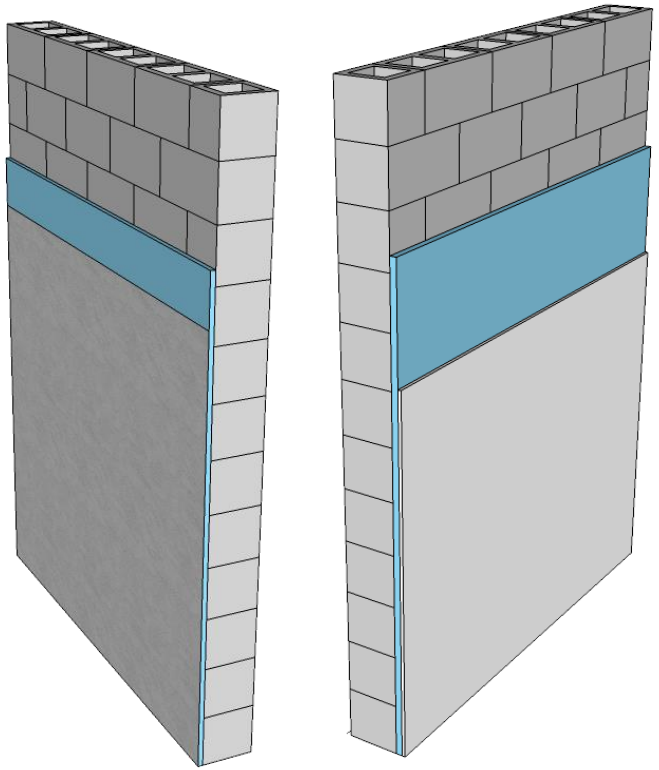
Walls – mass

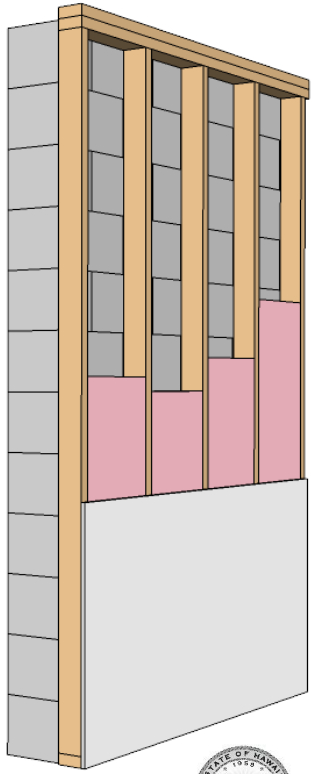
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Kauai & Hawai'i Amendments on following slides

R-3 exterior
≥ 0.50 in. polyisocyanurate
≥ 0.60 in. polystyrene



R-4 interior
≥ 0.67 in. polyisocyanurate
≥ 0.80 in. polystyrene



U-factor ≤ 0.197
≥ R-4 in wood furring
≥ R-11 in metal furring

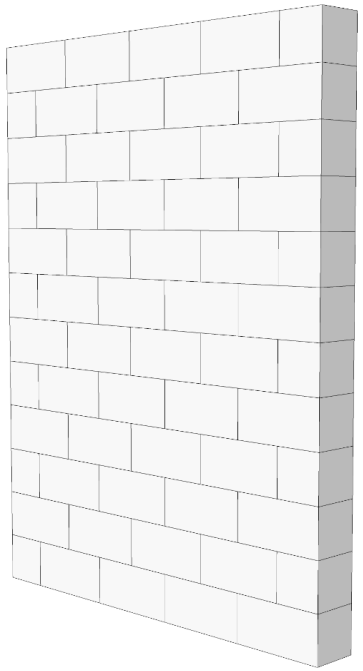
Envelope - Prescriptive

Walls – mass

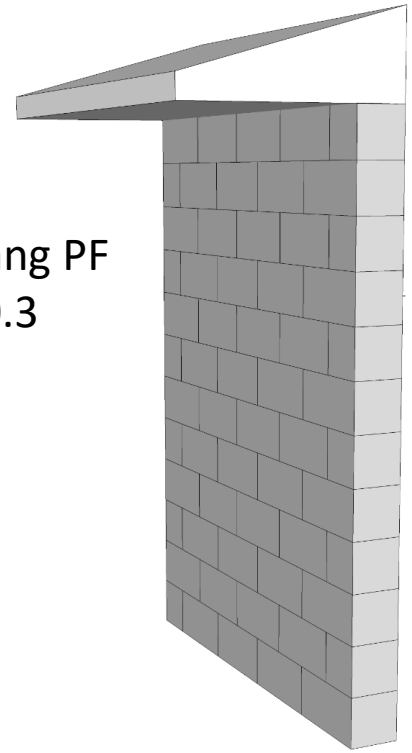
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Kauai Amendment

Exterior reflectance ≥ 0.64



Overhang PF ≥ 0.3



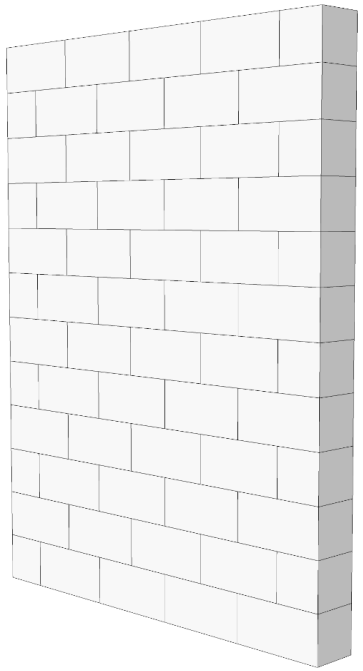
Envelope - Prescriptive

Walls – mass

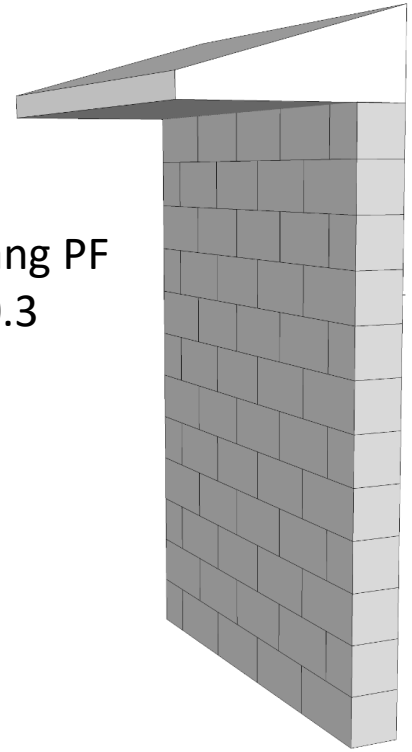
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Hawaii County Amendment

Exterior reflectance ≥ 0.64

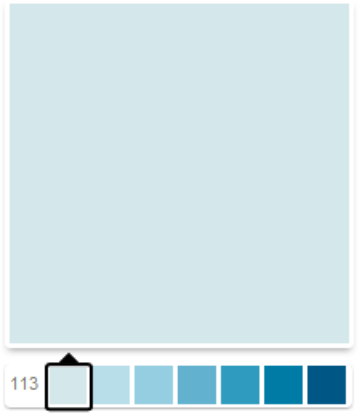


Overhang PF ≥ 0.3



Thickness ≥ 6 inches

Light Reflectance Value (LRV) for exemption ≥ 64%



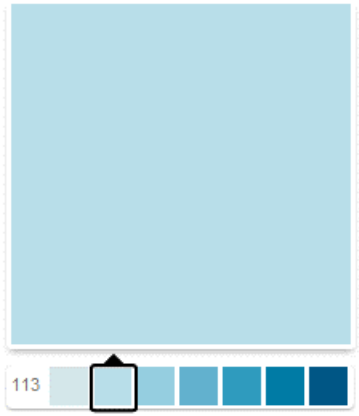
SW 6784 Bravo Blue
Interior/Exterior

Color Collection	SW Color
Color Family	Blues
Color Strip	113
RGB Value	R-212 | G-231 | B-234
Hexadecimal Value	#D4E7EA
LRV	78

78

OK

80



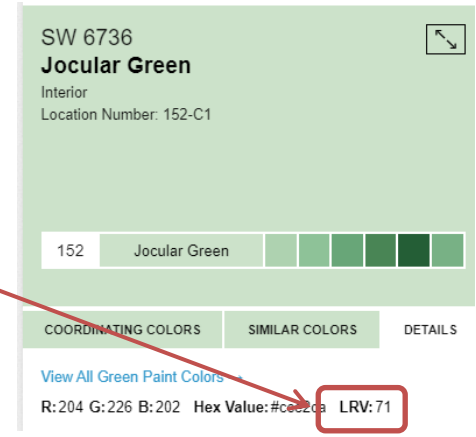
SW 6785 Quench Blue
Interior/Exterior

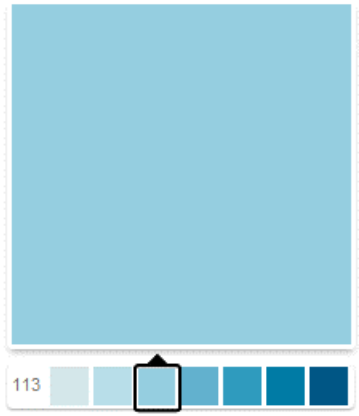
Color Collection	SW Color
Color Family	Blues
Color Strip	113
RGB Value	R-184 | G-222 | B-233
Hexadecimal Value	#B8DEE9
LRV	69

69

OK

71





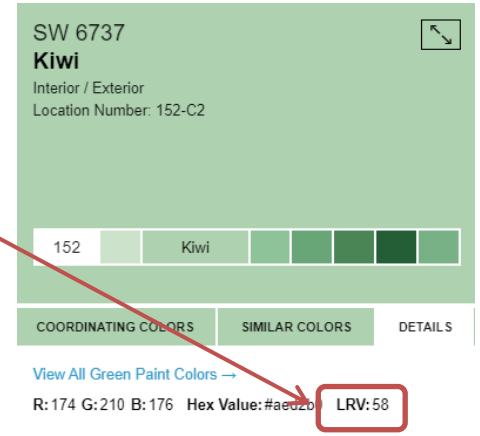
SW 6786 Cloudless
Interior/Exterior

Color Collections	SW Color , Teen Space
Color Family	Blues
Color Strip	113
RGB Value	R-149 | G-206 | B-224
Hexadecimal Value	#95CEE0
LRV	57

57

Not complying

58



Source: www.sherwin-williams.com

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Floors

1. R-13 (Table R402.1.2)

No insulation required

Kauai, Maui & Hawaii County amendment

Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Reasons to use it

1. Want <R-30 roof insulation
2. Have metal-framed walls and don't want to add foam board insulation

Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Attic venting
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Wood Framed Walls

Measure	Standard Home Points	Tropical Zone Points
R-13 cavity wall insulation	0	1
R-19 roof insulation	-1	0
R-19 roof insulation + cool roof membrane[1] or radiant barrier[3]	0	1
R-19 roof insulation + attic venting[2]	0	1
R-30 roof Insulation	0	1
R-13 wall Insulation + high reflectance walls[4]	1	2
R-13 wall + 90% high efficacy lighting and Energy Star appliances[5]	1	2
R-13 wall Insulation + exterior shading wpf=0.3[6]	1	2
Ductless air conditioner[7]	1	1
1.071 X Federal minimum SEER for air conditioner	1	1
1.142 X Federal minimum SEER for air conditioner	2	2
No air conditioning installed	NA	2
House floor area ≤ 1,000 ft^2	1	1
House floor area ≥ 2,500 ft^2	-1	-1
Energy Star fans[8]	1	1
Install 1 kW or greater of solar electric	1	1
Reduce fenestration from 14% to 10% (Hawaii County only)	NA	-1

See also checklist

Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Attic venting
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Metal Framed Walls

Measure	Standard Home Points	Tropical Zone Points
R-13 + R-3 wall insulation	0	1
R-13 cavity wall insulation + R-0	-1	0
R-13 wall Insulation + high reflectance walls[4]	0	1
R-13 wall + 90% high efficacy lighting and Energy Star Appliances[5]	1	2
R-13 wall insulation + exterior shading wpf=0.3[6]	0	1
R-30 roof Insulation	0	1
R-19 roof Insulation	-1	0
R-19 + cool roof membrane[1] or radiant barrier[3]	0	1
R-19 roof Insulation + attic venting[2]	0	1
Ductless air conditioner[7]	1	1
1.071 X Federal minimum SEER for air conditioner	1	1
1.142 X Federal minimum SEER for air conditioner	2	2
No air conditioning installed	NA	2
House floor area ≤ 1,000 ft^2	1	1
House floor area ≥ 2,500 ft^2	-1	-1
Energy Star Fans[8]	1	1
Install 1 kW or greater of solar electric	1	1
Reduce fenestration from 14% to 10% (Hawaii County only)	NA	-1

See also checklist

Envelope – Points Option (R407)

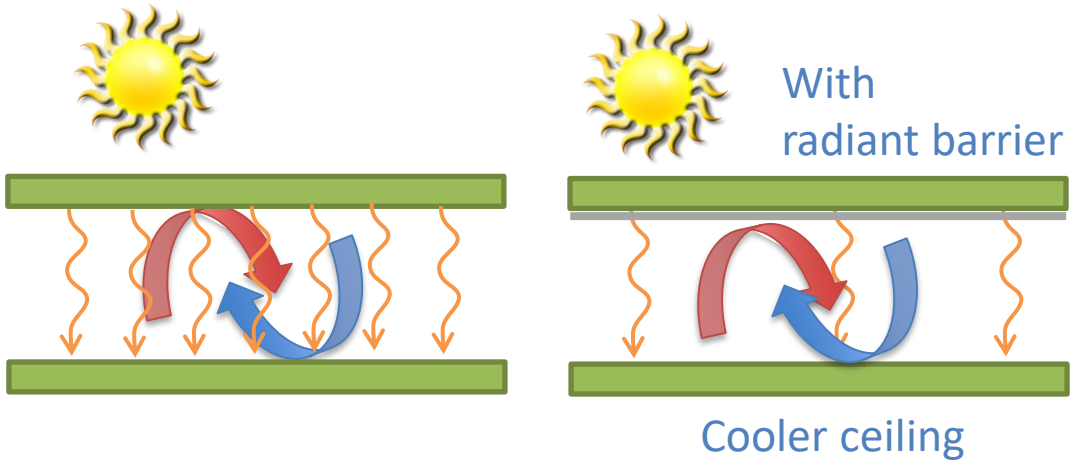
Total points ≥ 0

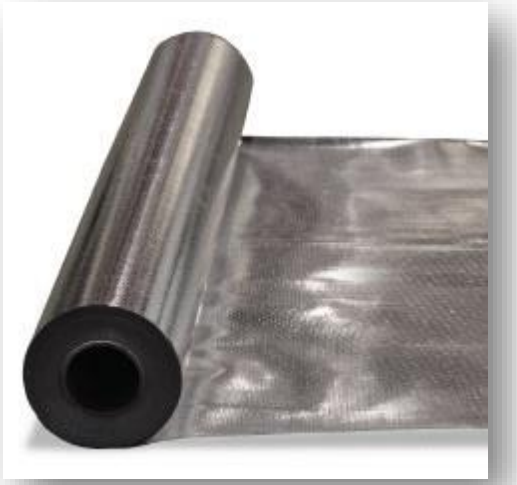
- Roof and walls, or
- Roof alone and wall alone

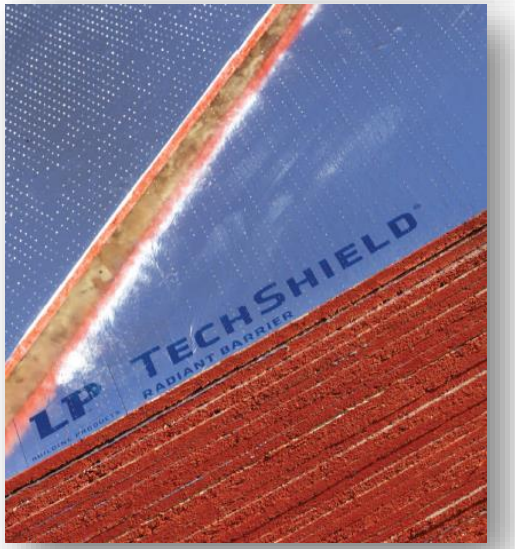
Options for credit

- Insulation
- Cool roof
- **Radiant barrier**
- Attic venting
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

- Thermal emittance < 0.05 (“low-e”)
- Low-e (shiny) surface facing air gap
- Cuts radiant heat transfer







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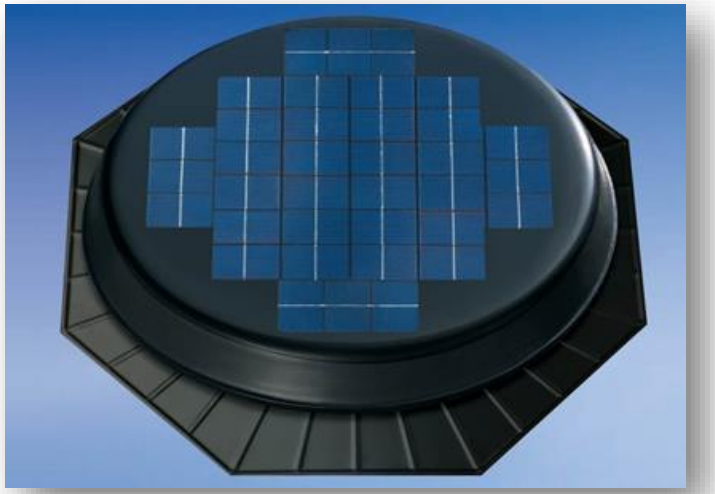
Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- **Attic venting** → ≥1 cfm/ft^2
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric



Source: www.solatube.com

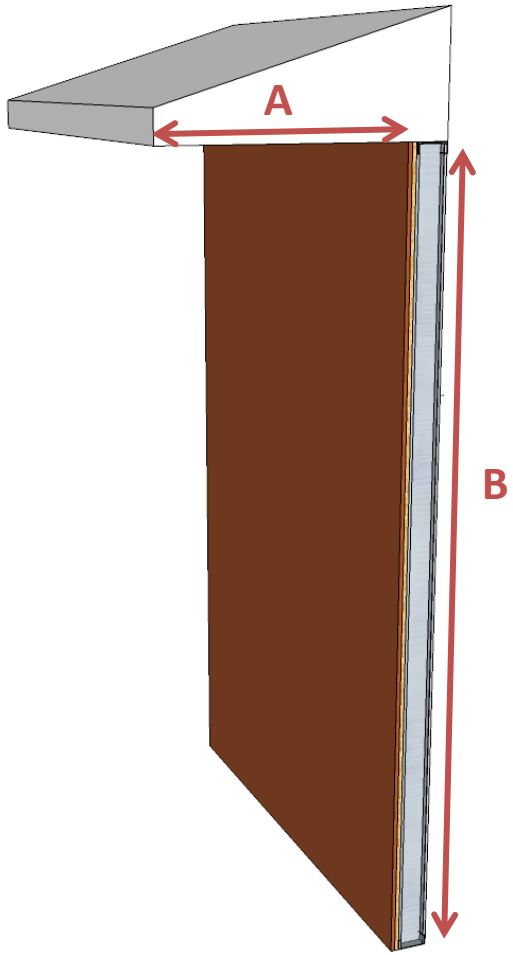
Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Attic venting
- Wall reflectance
- More efficient lighting
- Efficient appliances
- **Wall shading**
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric



Wall Projection Factor (WPF) ≥ 0.30

$$WPF = \frac{A}{B}$$

Envelope – Points Option (R407)

Total points ≥ 0

- Roof and walls, or
- Roof alone and wall alone

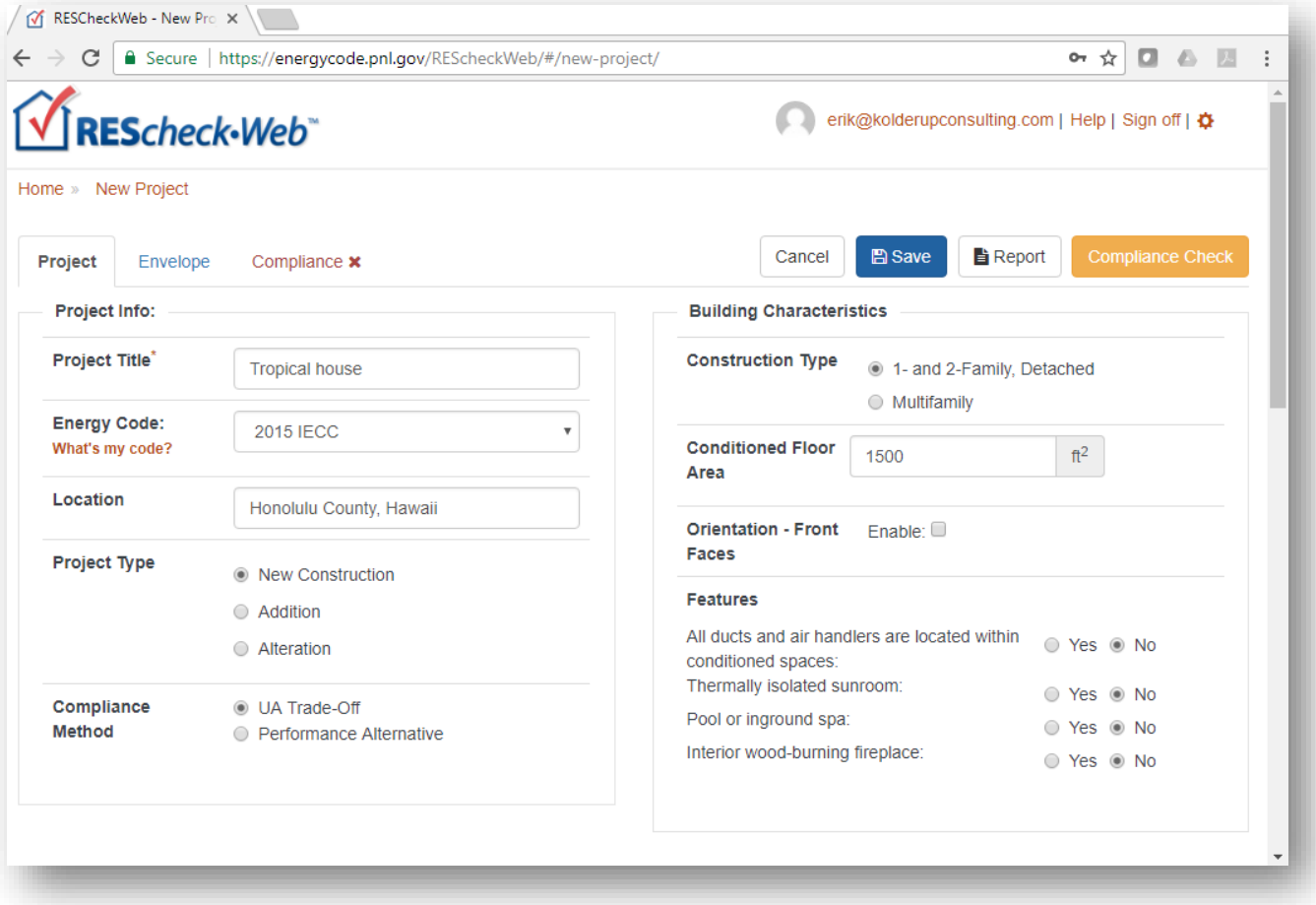
Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Attic venting
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- **High efficiency AC**
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

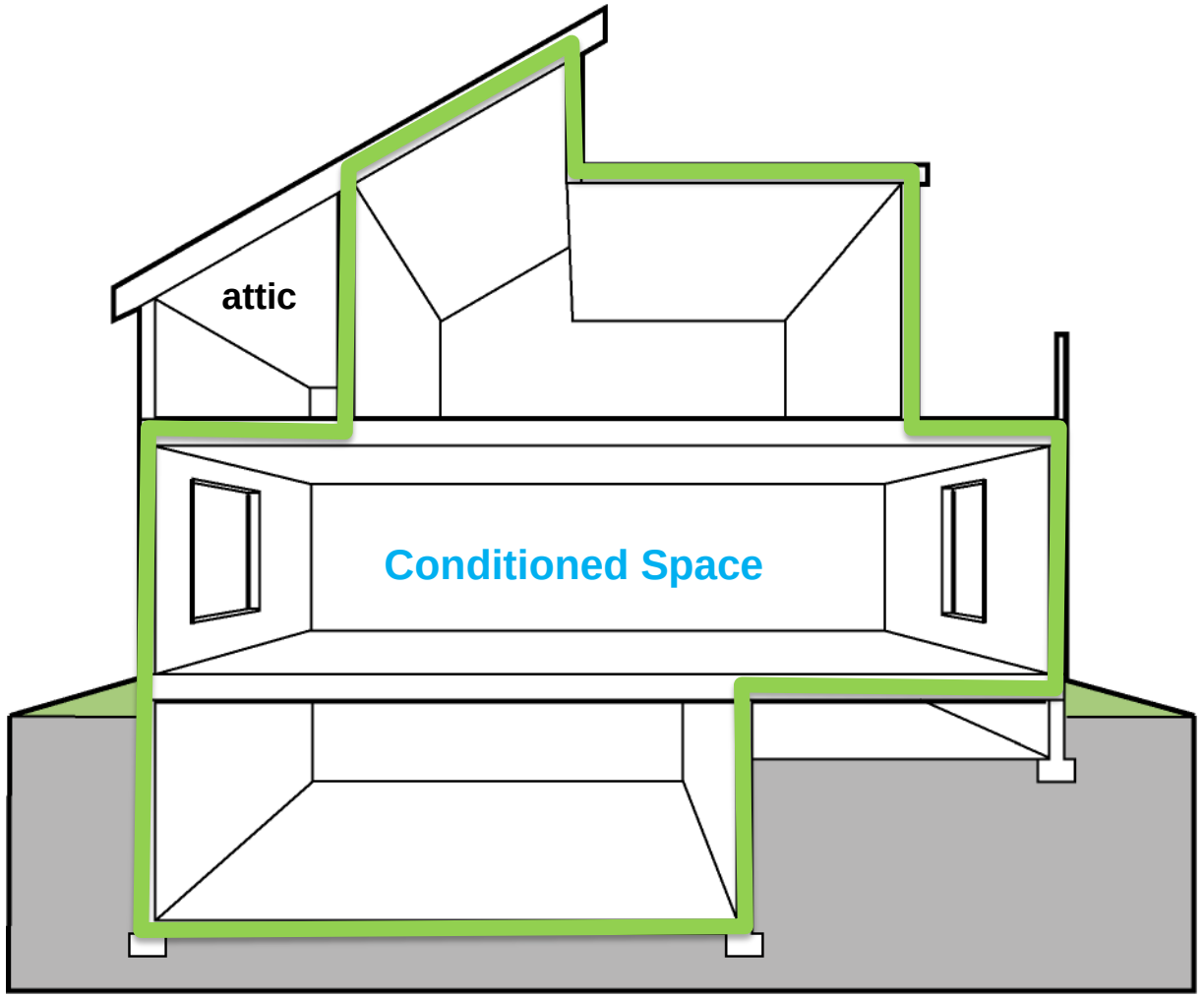
AC System Type	Federal Standard	1 point	2 points
Split system	13.0 SEER	13.9 SEER	14.8 SEER
Packaged system	14.0 SEER	15.0 SEER	16.0 SEER

Envelope – Total UA (R402.1.4)

- Calculate total (U-factor x Area) for walls, roof and fenestration
- Typically use REScheck software
  - Desktop or Web version
  - Does not include Hawaii amendments
  - https://energycode.pnl.gov/REScheckWeb



Envelope – Air Leakage (R402.4)



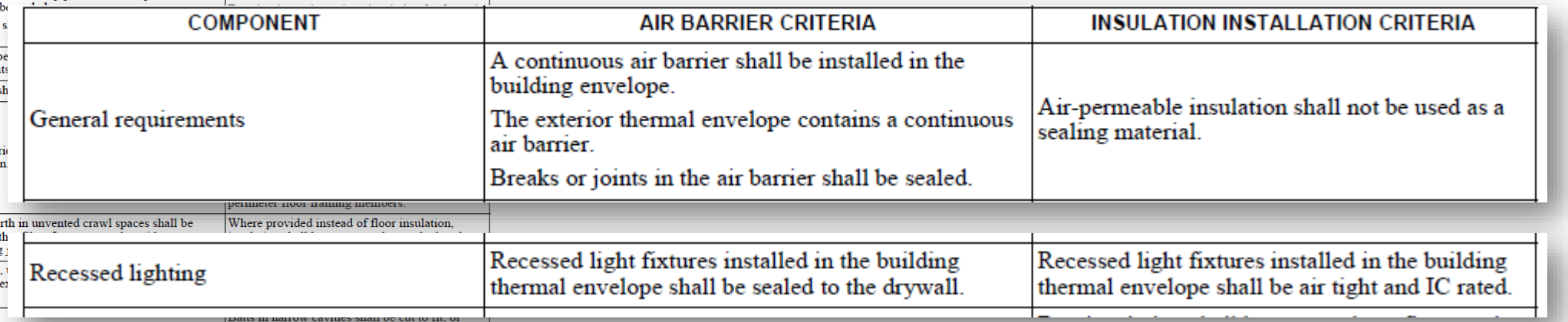
Installation details in Table R402.4.1.1

- Continuous air barrier
- Breaks or joints are sealed
- Recessed lighting
- Fenestration air leakage

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall b Knee walls s	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum.
Windows, skylights and doors	The space be and skylights	
Rim joists	Rim joists sh	
Floors (including above garage and cantilevered floors)	The air barri of insulation.	perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with overlapping	Where provided instead of floor insulation,
Shafts, penetrations	Duct shafts, opening to e sealed.	
Narrow cavities		narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air-sealed boxes shall be installed.	
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

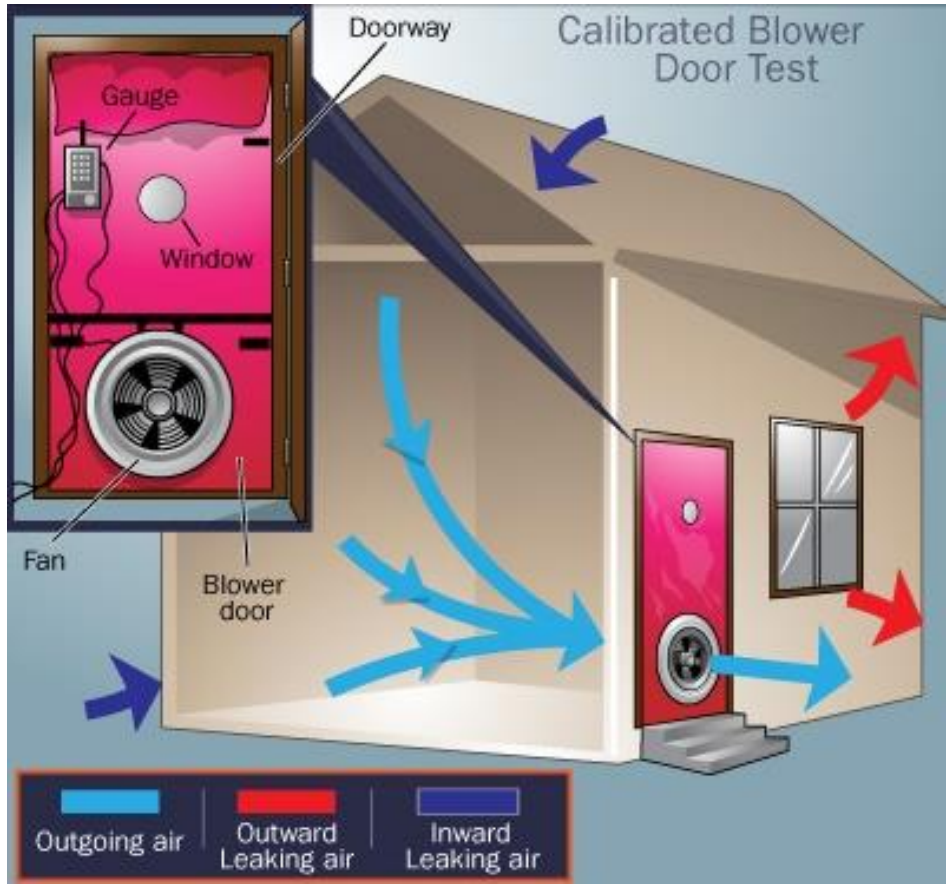


COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.

Envelope – Air Leakage (R402.4)

Hawaii, Kauai and Maui Counties
Optional

Testing
Leakage ≤ 5 air changes per hour at 0.2 in. w.c. pressure (50 Pa)



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Prescriptive Envelope Summary

- Windows
  - SHGC (Table R402.1.2)
- Skylights
  - SHGC & U-factor (Table R402.1.2)
  - Total UA (R402.1.5)
- Wall and roof – four options
  - Insulation R-value (Table R402.1.2)
  - Assembly U-factor (Table R402.1.4)
  - Total UA (R402.1.5)
  - Points option (R407)
- Air leakage
  - Air barrier, sealing
  - Testing (optional Kauai, Maui, Hawaii County)

Or Tropical Zone option

Section 5

Residential – Systems

Systems – AC Requirements

Programmable thermostat

Duct sealing & fastening

Source: www.energycodes.gov

Duct insulation

Duct testing

Source: DOE/NREL PIX04869

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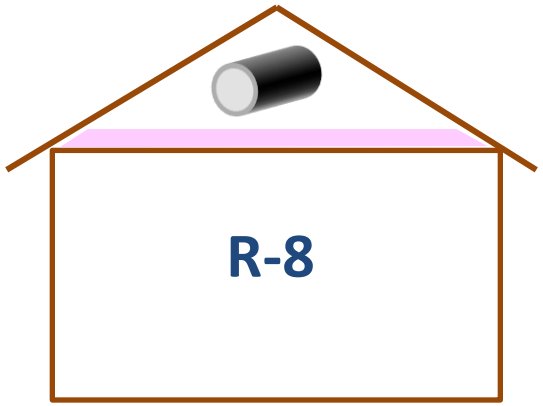
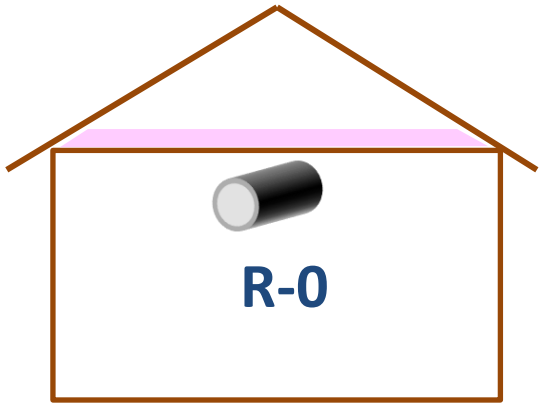
Systems – Duct Insulation

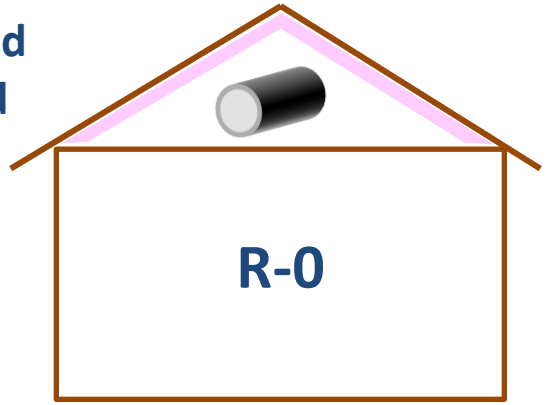
In attic



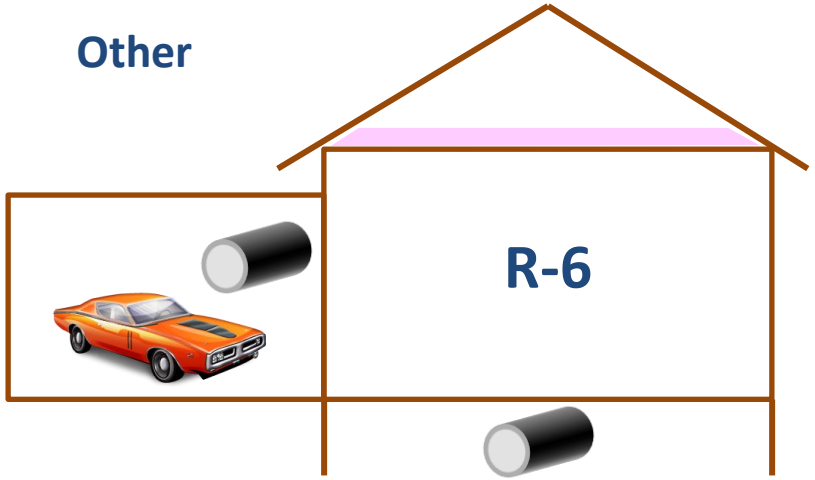
Within thermal envelope



In insulated and sealed attic



Other



Systems – Duct Insulation

Examples

R-6 (~1.75” thick)

R-8 (~2.5” thick)

Systems – Duct Insulation

DUCTS WITHIN THERMAL ENVELOPE EXAMPLES

Source: DOE/NREL PIX03067

Source: DOE/NREL PIX10076

Systems – Duct Sealing (R403.3.2)

IRC M1601.4.1 Joints, seams and connections

Ducts **mechanically fastened** and **sealed**

Sealing options

Tape with UL mark “181 B-FX”

Mastic with UL mark “181 B-M”

Source: DOE/NREL PIX04869

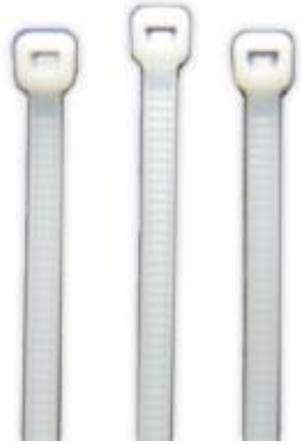
SYSTEMS – DUCT SEALING (R403.3.2)

IRC M1601.4.1 Joints, seams and connections

Ducts **mechanically fastened** and **sealed**

Fastening options

Flex duct
Mechanical fasteners
with UL mark “181 B-C”



Metallic duct

- At least 1 inch overlap
- At least three screws/rivets

Systems – Duct Testing (R403.3.3 & R403.3.4)

Rough-in test

Leakage ≤ 4 cfm/100 ft^2

Leakage ≤ 3 cfm/100 ft^2
(without air handler)

or

Postconstruction test

Leakage ≤ 4 cfm/100 ft^2

Test **not** required if air handler and all ducts are within the thermal envelope

Systems – Solar Water Heating (R403.5.4)

Solar water heating systems are required for new single-family residential construction pursuant to HRS 196-6.5

Systems – Service Hot Water

- Circulation systems (R403.5.1.1)
  - Pump required
  - Automatic temperature and demand controls required
- Demand recirculation systems (R403.5.2)
  - Control based on signal from user action
  - Limit on hot water temperature entering cold water piping
- Pipe insulation (R403.5.3)
  - R-3 insulation (typically ½”) required for pipes
    - ≥ ¾”
    - Serving more than one dwelling
    - Outside conditioned space
    - In recirculating systems

Systems – Pools and Spas (R403.10)

- On/off switch
- Time switch
- Cover for heated pool
  - Unless 70% solar or site recovered heat

Courtesy Daniel Sandomire, Armstrong Builders

Section 6

Residential – Electrical, Power & Lighting

Lighting (R404.1)

High efficacy
≥ 75% of lamps

Lamp Wattage	Efficacy (lumens/watt)
> 40 watts	60
15-40 watts	50
< 15 watts	40

High efficacy examples

Compact fluorescent

Source: DOE/NREL PIX17458

Full-size fluorescent

Source: DOE/NREL PIX20307

LED

Ceiling Fans (R404.2)

R404.2 Ceiling Fans (Mandatory). A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as bedroom.

Kauai and Hawaii County

Section is optional.

Allows whole-house fan instead of ceiling fan.

Whole-House Fan (FYI)

Electric Vehicle Charger Power

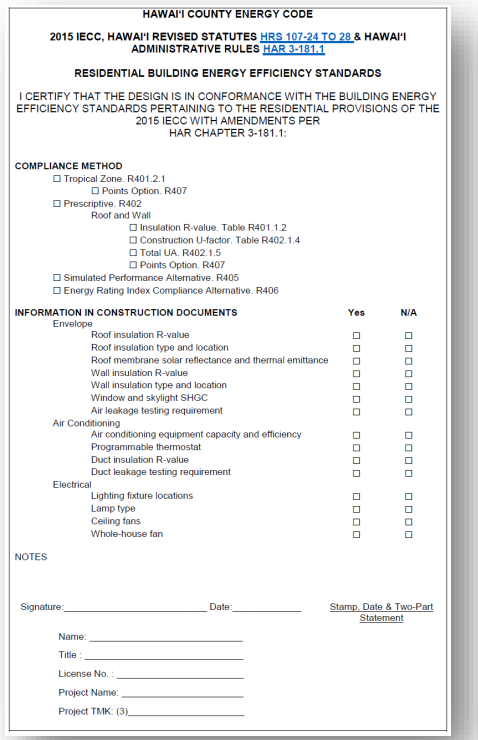
An electrical rough-in of a 30 amp circuit for future electrical vehicle charger may be installed in garage/ carport area.

Kauai, Maui and Hawaii Counties
Optional

https://www.clippercreek.com/

Section 7

Compliance Documentation



HAWAI'I COUNTY ENERGY CODE

2015 IECC, HAWAI'I REVISED STATUTES HRS 107-24 TO 28 & HAWAI'I ADMINISTRATIVE RULES HAR 3-181.1

RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

I CERTIFY THAT THE DESIGN IS IN CONFORMANCE WITH THE BUILDING ENERGY EFFICIENCY STANDARDS PERTAINING TO THE RESIDENTIAL PROVISIONS OF THE 2015 IECC WITH AMENDMENTS PER HAR CHAPTER 3-181.1:

COMPLIANCE METHOD

- ☐ Tropical Zone. R401.2.1
  - ☐ Points Option. R407
- ☐ Prescriptive. R402
  - Roof and Wall
    - ☐ Insulation R-value. Table R401.1.2
    - ☐ Construction U-factor. Table R402.1.4
    - ☐ Total UA. R402.1.5
    - ☐ Points Option. R407
- ☐ Simulated Performance Alternative. R405
- ☐ Energy Rating Index Compliance Alternative. R406

INFORMATION IN CONSTRUCTION DOCUMENTS	**Yes**	**N/A**
Envelope		
Roof insulation R-value	☐	☐
Roof insulation type and location	☐	☐
Roof membrane solar reflectance and thermal emittance	☐	☐
Wall insulation R-value	☐	☐
Wall insulation type and location	☐	☐
Window and skylight SHGC	☐	☐
Air leakage testing requirement	☐	☐
Air Conditioning		
Air conditioning equipment capacity and efficiency	☐	☐
Programmable thermostat	☐	☐
Duct insulation R-value	☐	☐
Duct leakage testing requirement	☐	☐
Electrical		
Lighting fixture locations	☐	☐
Lamp type	☐	☐
Ceiling fans	☐	☐
Whole-house fan	☐	☐

NOTES

Signature:_____ Date:_____ Stamp, Date & Two-Part Statement

Name: _____

Title : _____

License No. : _____

Project Name: _____

Project TMK: (3)_____

Compliance

Information required on construction documents
(See checklist)

Commercial (Section C103.2)

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of *daylight* zones on floor plans.
12. Air sealing details.

Residential (Section R103.2)

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGC).
3. Area-weighted *U*-factor and solar heat gain coefficients (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water-heating system and equipment types, sizes and efficiencies.
6. Equipment and system controls.
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.

Compliance

Certification

Kauai

COUNTY OF KAUA'I
CHAPTER 12, KAUA'I COUNTY BUILDING CODE
KAUA'I COUNTY CODE 1987, AS AMENDED

ARTICLE 6 – ENERGY CONSERVATION CODE

To the best of my knowledge, this project's design substantially conforms to the **Residential Provisions** of:

Section 12-6.3 Adoption of the International Energy Conservation Code (IECC)
Section 12-6.4 Local Amendments to the IECC

COMPLIANCE METHOD

- ☐ Tropical Zone, R401.2.1
- ☐ Prescriptive, R402
  - Roof and Wall
    - ☐ Insulation R-value. Table R401.1.2
    - ☐ Construction U-factor, Table R402.1.4
    - ☐ Total UA, R402.1.5
    - ☐ Points Option, R407
- ☐ Simulated Performance Alternative, R405
- ☐ Energy Rating Index Compliance Alternative, R406

INFORMATION IN CONSTRUCTION DOCUMENTS	**YES**	**N/A**
Envelope		
Roof insulation R-value	☐	☐
Roof insulation type and location	☐	☐
Roof membrane solar reflectance and thermal emittance	☐	☐
Wall insulation R-value	☐	☐
Wall insulation type and location	☐	☐
Window and skylight SHGC	☐	☐
Air leakage testing requirement	☐	☐
Air Conditioning		
Air conditioning equipment capacity and efficiency	☐	☐
Programmable thermostat	☐	☐
Insulation R-value	☐	☐
Duct leakage testing equipment	☐	☐
Electrical		
Lighting fixture locations	☐	☐
Lamp type	☐	☐
Ceiling fans	☐	☐
Whole-house fan	☐	☐

NOTES

SIGNATURE:

DATE:

NAME:

TITLE:

LICENSE NO.:

Compliance

Certification

Maui

COUNTY OF MAUI
MAUI COUNTY CODE, CHAPTER 16.16B ENERGY CODE
RESIDENTIAL PROVISIONS

COMPLIANCE METHOD
Check applicable method

☐	R401.2(1) R401.3 through R404 (Prescriptive)
☐	R401.2(2) R405, R401 through R404 labeled Mandatory (Simulated Performance Alternative)
☐	R401.2(3) R406 (Energy Rating Index Compliance Alternative)
☐	R401.2(4) R401.2.1 (Tropical Zone)
☐	R102.1 (Alternative)

To the best of my knowledge, this project's design substantially conforms to the Energy Code.

Signature: _____ Date: _____

Name: _____

Title: _____

License No.: _____

Compliance

Certification

Hawai’i County

HAWAI‘I COUNTY ENERGY CODE

2015 IECC, HAWAI‘I REVISED STATUTES HRS 107-24 TO 28 & HAWAI‘I ADMINISTRATIVE RULES HAR 3-181.1

RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

I CERTIFY THAT THE DESIGN IS IN CONFORMANCE WITH THE BUILDING ENERGY EFFICIENCY STANDARDS PERTAINING TO THE RESIDENTIAL PROVISIONS OF THE 2015 IECC WITH AMENDMENTS PER HAR CHAPTER 3-181.1:

COMPLIANCE METHOD

- ☐ Tropical Zone. R401.2.1
  - ☐ Points Option. R407
- ☐ Prescriptive. R402
  - Roof and Wall
    - ☐ Insulation R-value. Table R401.1.2
    - ☐ Construction U-factor. Table R402.1.4
    - ☐ Total UA. R402.1.5
    - ☐ Points Option. R407
- ☐ Simulated Performance Alternative. R405
- ☐ Energy Rating Index Compliance Alternative. R406

INFORMATION IN CONSTRUCTION DOCUMENTS	**Yes**	**N/A**
Envelope		
Roof insulation R-value	☐	☐
Roof insulation type and location	☐	☐
Roof membrane solar reflectance and thermal emittance	☐	☐
Wall insulation R-value	☐	☐
Wall insulation type and location	☐	☐
Window and skylight SHGC	☐	☐
Air leakage testing requirement	☐	☐
Air Conditioning		
Air conditioning equipment capacity and efficiency	☐	☐
Programmable thermostat	☐	☐
Duct insulation R-value	☐	☐
Duct leakage testing requirement	☐	☐
Electrical		
Lighting fixture locations	☐	☐
Lamp type	☐	☐
Ceiling fans	☐	☐
Whole-house fan	☐	☐

NOTES

Signature:_____ Date:_____ Stamp, Date & Two-Part Statement

Name: _____

Title : _____

License No. : _____

Project Name: _____

Project TMK: (3)_____

Section 8

Summary

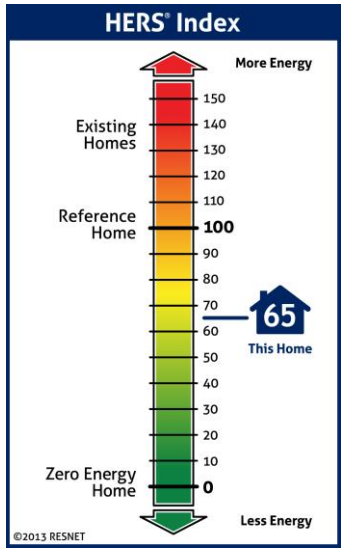
Panel Q&A

Summary

- Tropical Zone
  - ≤50% air conditioned
  - not heated
  - elevation < 2,400 feet
    (5,000 ft Hawaii County)
- Prescriptive
  - Envelope (+ Points Option)
  - Systems
  - Electrical power and lighting systems
- Simulated performance alternative

- Energy rating index (ERI)
  - ERI ≤ 52

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement R-Value	Slab R-Value	Crawl Space Wall R-Value
1	NR	0.75	0.25	30	13	3/4	NA[1]	0	0	0



https://www.hersindex.com/

Panel Q&A

- Erik Kolderup, PE, LEED AP, Kolderup Consulting
- Howard Wiig, State Energy Office
- Daniel Sandomire, Armstrong Builders
- Blake Reid, Terrawatt

For more energy code information

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2015 IECC available:

- http://iccsafe.org/publications

State Energy Code Website:

- http://energy.hawaii.gov/hawaii-energy-building-code/2015-iecc-update