Energy Code
Low-rise Residential Requirements

May 13, 2025

HAWAI'I STATE ENERGY OFFICE

Presentation Collaborators

Hawai'i Energy · AIA Honolulu · ASHRAE Hawaii Chapter · CREE Hawaii Chapter

Hawaii Energy Incentives

Hawai'i Energy

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Introduction & Scope

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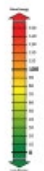

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Energy Code

Low-rise Residential Requirements

May 13, 2025

HAWAIʻI STATE ENERGY OFFICE

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Hawaiʻi Energy

AIA Honolulu

ASHRAE Hawaii Chapter

aee Association of Energy Engineers | Hawaii Chapter

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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

The State and Counties continue to follow the 2018 International Energy Conservation Code with amendments. The first of two webinars covers low-rise residential requirements including townhomes and three-story multifamily buildings.

LEARNING OBJECTIVES

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

1. Identify applicable requirements in the 2018 IECC
2. Determine applicability and requirements for the Tropical-Zone energy code compliance option
3. Determine compliance with the prescriptive requirements for envelope and systems
4. Use energy code checklists to review designs for compliance

Introductions

Presenters

- Howard Wiig, Hawaii State Energy Office
- Erik Kolderup, PE, Kolderup Consulting
- Justin Bizer, Hawaii Energy

Acknowledgments

- Gail Suzuki-Jones, Hawaii State Energy Office
- Ron Chatterjee, Hawaii State Energy Office
- Karen Shishido, Hawaii Energy

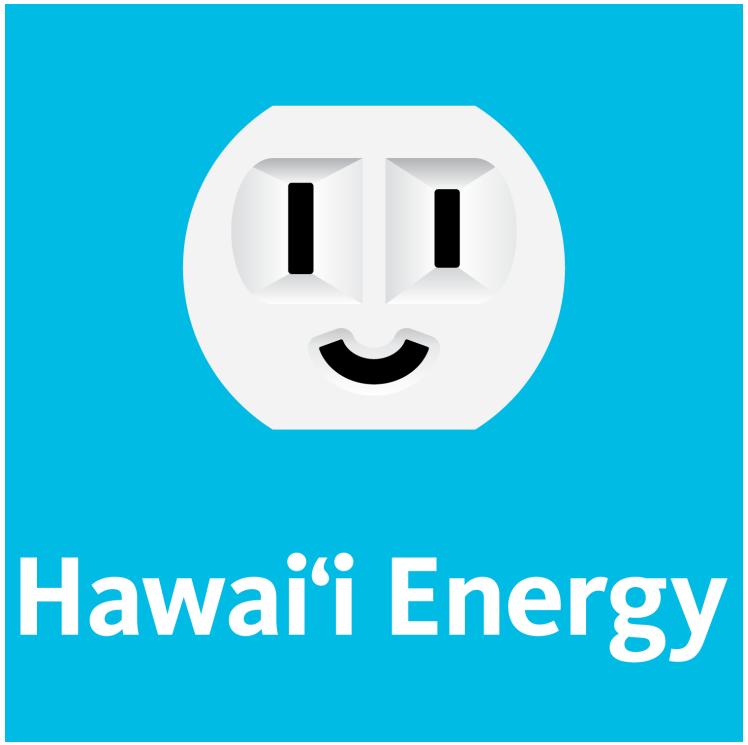
Topics

Hawaii Energy Programs
Introduction & Scope
Compliance
Tropical Zone Option
Prescriptive Option
- Envelope
- Systems
- Electrical & Lighting

EV and Solar Readiness
Performance Compliance Options
Large Homes
Existing Building Compliance
- Additions
- Alterations

Q&A

Hawaii Energy Incentives



Hawaii Energy

YOUR CONSERVATION & EFFICIENCY PROGRAM

THE FUTURE OF ENERGY EFFICIENCY AND CONSERVATION IN HAWAI‘I

1.57 Billion kilowatt hours and $462 Million in First Year Savings

Hawaii Energy Incentives for Residential New Construction Projects

Justin Bizer

Affordability & Accessibility Program Support Specialist

Residential Programs Lead

justin.v.bizer@leidos.com | 808-848-8534

Who Can Apply?

New Construction

Brand new residential single-family residential, commercial buildings and multifamily residences qualify for energy efficiency incentives.

Major Renovations

Substantial updates to existing commercial or multifamily buildings can earn rebates.

Occupancy Changes

Projects involving significant changes in how a building is used may qualify.

Building Additions

New sections added to existing structures can receive incentives when built efficiently and ADU's.

Residential New Construction Incentives: Single Family Homes (Up to $700)

Base Rebate: $250

50% of all installed appliances are ENERGY STAR rated

90% of all lighting is LED / High-efficiency

Public awareness campaigns encouraging sustainable practices.

Cooling Incentive (HVAC): Up to $400

SEER 16+ Central Air Conditioning Models = $250

SEER 18+ VRF Mini-Split Models = $400

OR $50 for ENERGY STAR rated Window A/C units

Smart Thermostat: $50

ENERGY STAR rated thermostats receive additional incentive

Multifamily and Commercial Projects: Energy Model Approach

Design Phase Implementation

Begin early in project planning to maximize benefits.

Computer Simulation

Use DOE2, EnergyPlus or similar software to model energy performance.

Exceed Code by 10%+

Demonstrate your design surpasses baseline energy code requirements.

Receive Dual Rebates

Get modeling cost coverage plus $0.12 per kWh saved.

Multifamily and Commercial Projects: Systems Approach

Construction Phase

Perfect for projects already in building stage.

Documentation Submission

Provide as-built plans and equipment specifications.

System-by-System Evaluation

Each component (lighting, HVAC) assessed individually.

Verification

Energy advisor inspects and confirms installations.

Rebate Calculation

$0.12

Per kWh Saved

Base rate for calculating all energy efficiency rebates.

$0.82-1.24

Per Square Foot

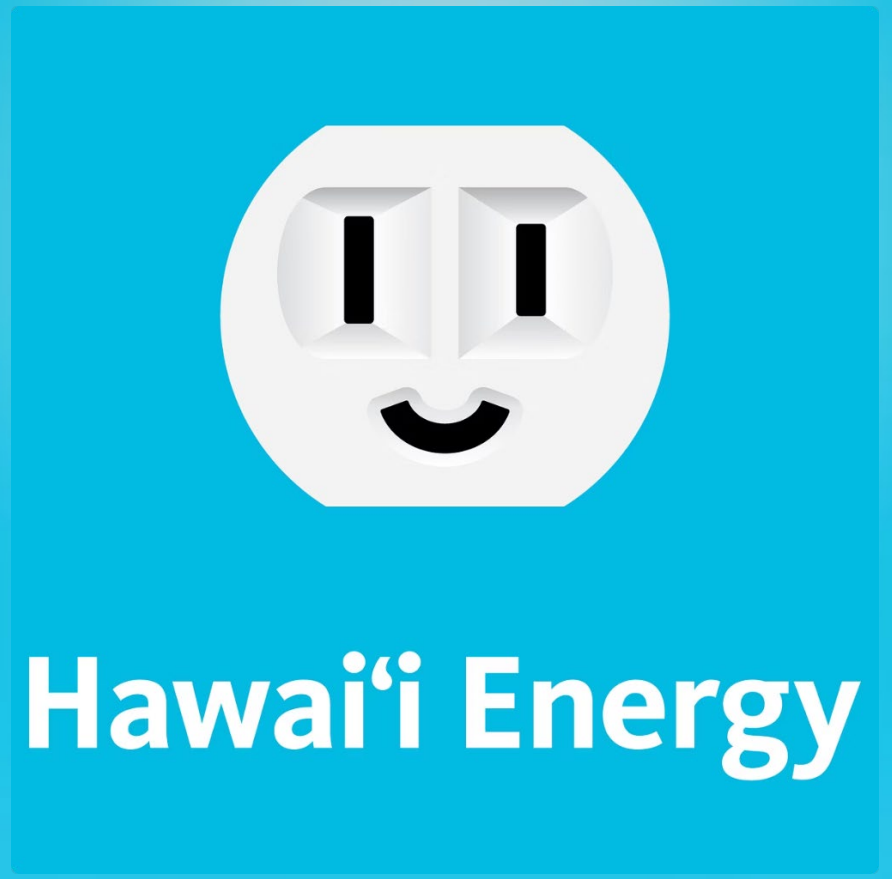
Typical rebate range for multifamily EMA projects.

10%+

Code Improvement

Minimum efficiency increase to qualify for incentives.

Both standard prescriptive rebates and custom calculations are available. Your energy advisor will help determine the best option.



Application Process

Submit Initial Application

Complete the Hawaii Energy Commercial Incentive Application and IRS Form W-9.

Provide Project Documentation

Submit drawings, specifications, and cost estimates appropriate for your approach.

Complete Verification

Work with an Energy Advisor to schedule inspections and finalize paperwork.

Regional Support

Honolulu County

Eileen Stewart: (808) 848-8519

Justin Bizer: (808) 848-8534

Maui County

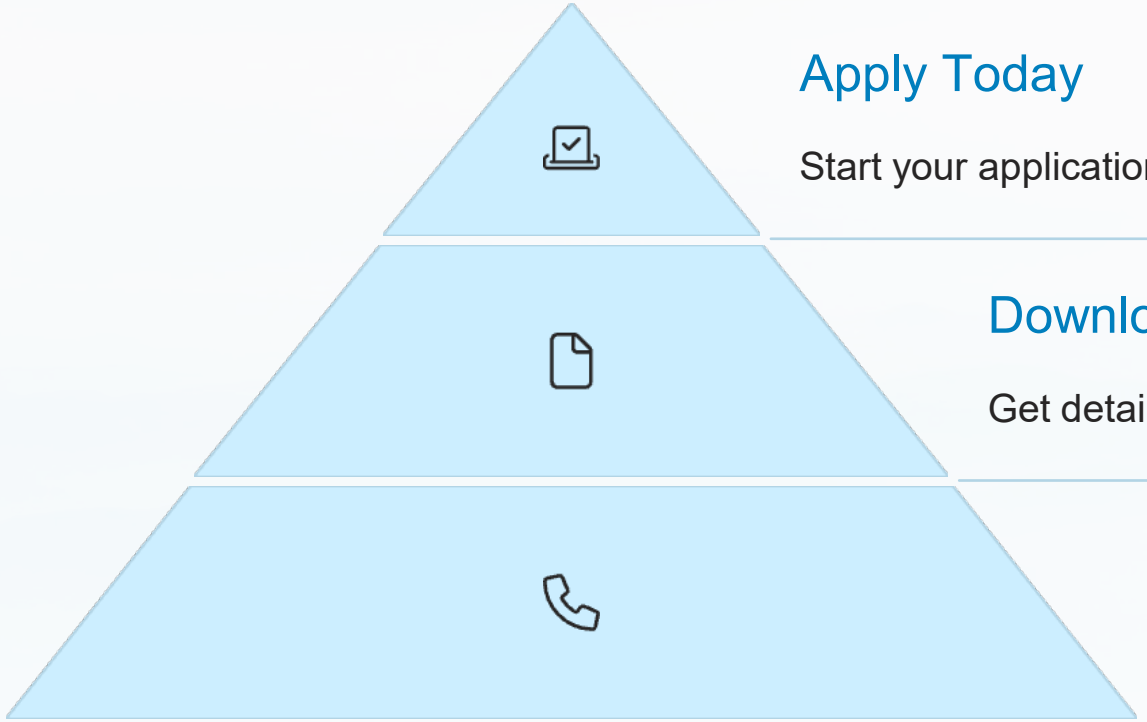
Walter Enomoto: (808) 298-4269

Hawaii County

Graceson Ghen: (808) 895-6713

Local energy advisors provide personalized guidance through every step of the process.

Resources & Next Steps



Apply Today

Start your application process now

Download Guidelines

Get detailed program rules and requirements

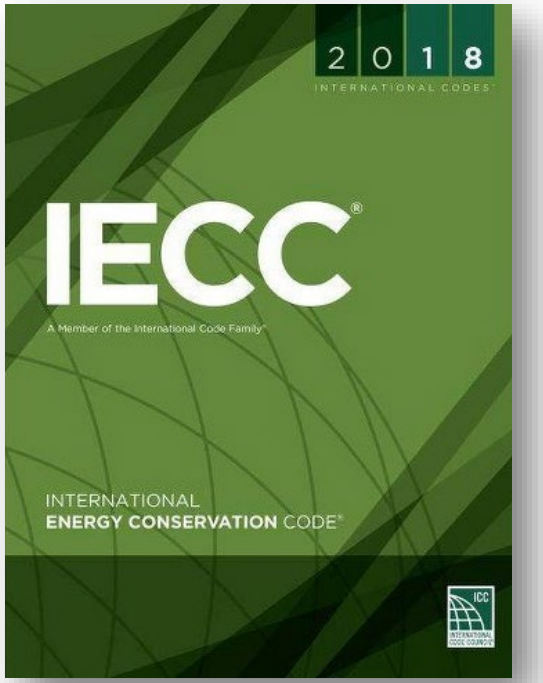
Contact Your Advisor

Reach out to your county's representative

Visit hawaiienergy.com for all application forms and complete program details. Start saving energy and money on your next project.

Section 1

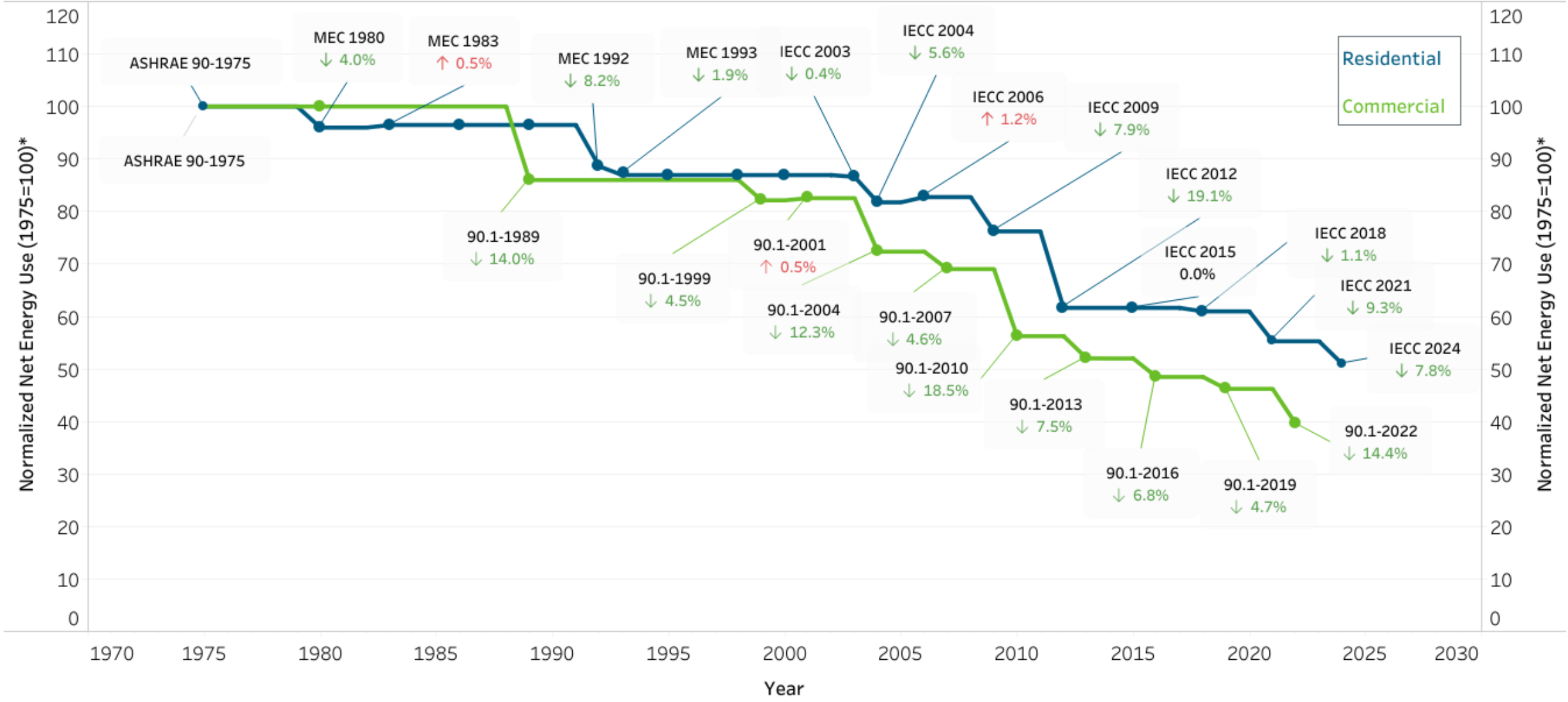
Introduction & Scope



U.S. DEPARTMENT OF ENERGY

Estimated Improvement in Residential & Commercial Energy Codes
(1975 - 2024)

Pacific Northwest NATIONAL LABORATORY



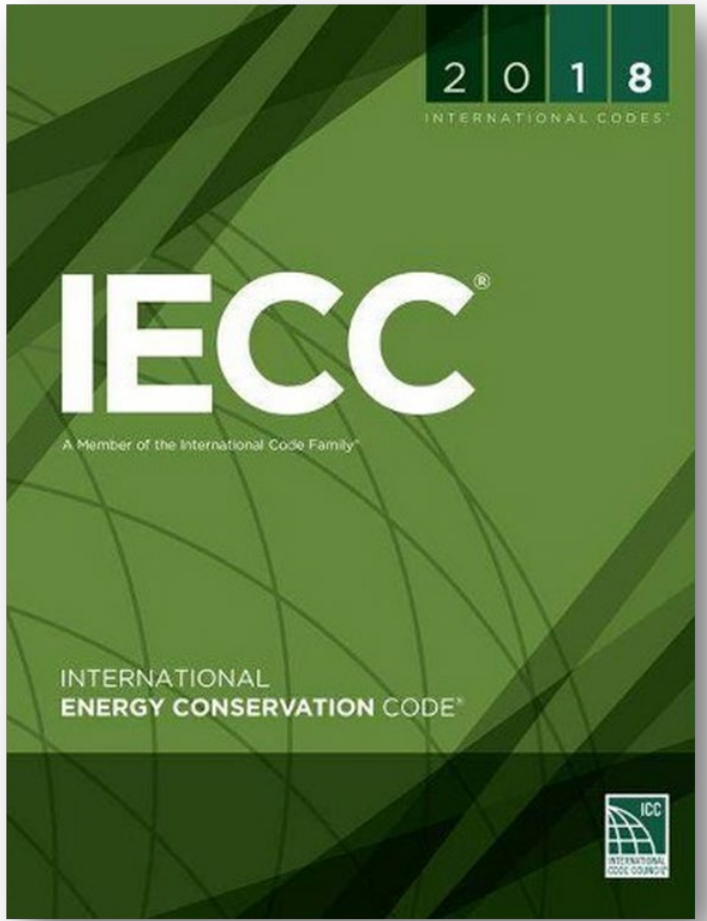
*Net energy use includes the contribution of renewable energy generation

Source: https://public.tableau.com/app/profile/doebecp/viz/HistoricalModelEnergyCodeImprovement/CombinedHistoricalCodeImprovement_1

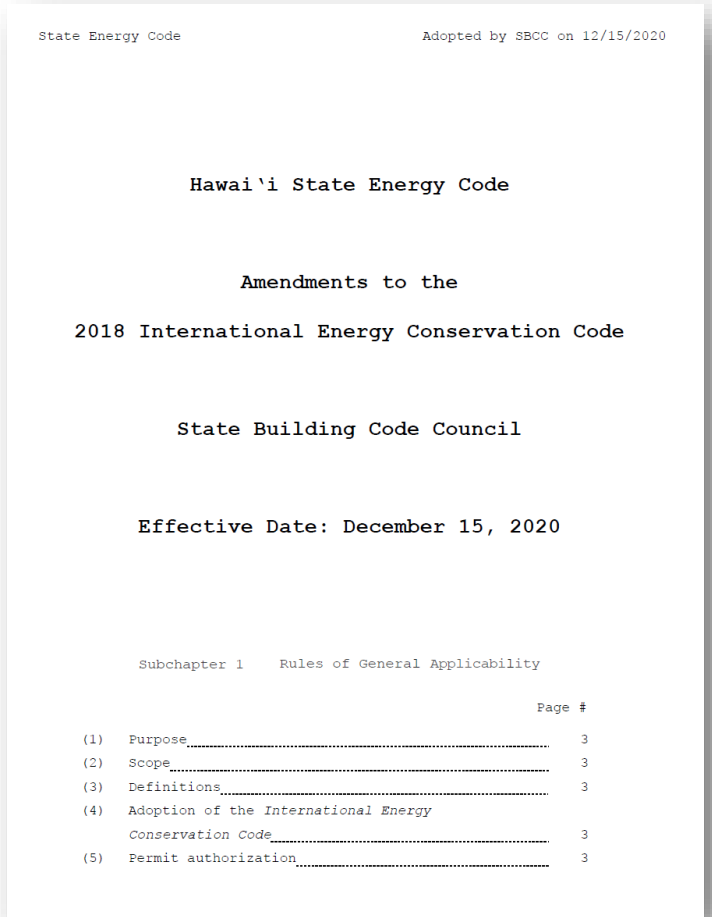
2018 IECC Adoption

Dec. 15, 2020 – State adoption

Hawaii:	(no County amendments)
Kauai:	Oct. 10, 2024
Maui:	Nov. 23, 2022
Honolulu:	Aug. 23, 2023 adoption, Nov. 23, 2023 effective



State amendments
12 pages



State Energy Code — Adopted by SBCC on 12/15/2020

Hawai`i State Energy Code

Amendments to the

2018 International Energy Conservation Code

State Building Code Council

Effective Date: December 15, 2020

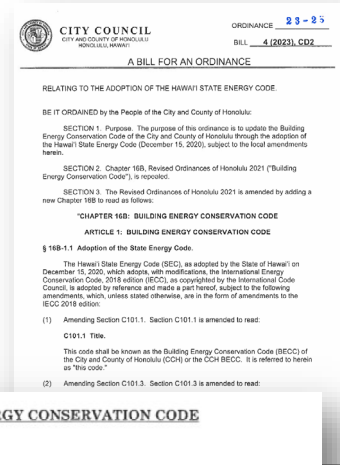
Subchapter 1 Rules of General Applicability

Page #

(1) Purpose 3
(2) Scope 3
(3) Definitions 3
(4) Adoption of the *International Energy Conservation Code* 3
(5) Permit authorization 3

County amendments

Honolulu
38 pages



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAI'I

ORDINANCE 23-25
BILL 4 (2023), CD2

A BILL FOR AN ORDINANCE

RELATING TO THE ADOPTION OF THE HAWAI'I STATE ENERGY CODE.

BE IT ORDAINED by the People of the City and County of Honolulu:

SECTION 1. Purpose. The purpose of this ordinance is to update the Building Energy Conservation Code of the City and County of Honolulu through the adoption of the Hawai'i State Energy Code (December 15, 2020), subject to the local amendments herein.

SECTION 2. Chapter 16B, Revised Ordinances of Honolulu 2021 ("Building Energy Conservation Code"), is repealed.

SECTION 3. The Revised Ordinances of Honolulu 2021 is amended by adding a new Chapter 16B to read as follows:

"CHAPTER 16B: BUILDING ENERGY CONSERVATION CODE

ARTICLE 1: BUILDING ENERGY CONSERVATION CODE

§ 16B-1.1 Adoption of the State Energy Code.

The Hawai'i State Energy Code (SEC), as adopted by the State of Hawai'i on December 15, 2020, which adopts, with modifications, the International Energy Conservation Code, 2018 edition (IECC), as copyrighted by the International Code Council, is adopted by reference and made a part hereof, subject to the following amendments, which, unless stated otherwise, are in the form of amendments to the IECC 2018 edition:

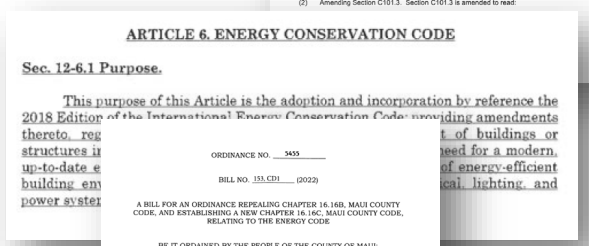
(1) Amending Section C101.1. Section C101.1 is amended to read:

C101.1 Title.

This code shall be known as the Building Energy Conservation Code (BECC) of the City and County of Honolulu (CCH) or the CCH BECC. It is referred to herein as "this code."

(2) Amending Section C101.3. Section C101.3 is amended to read:

Kauai
12 pages

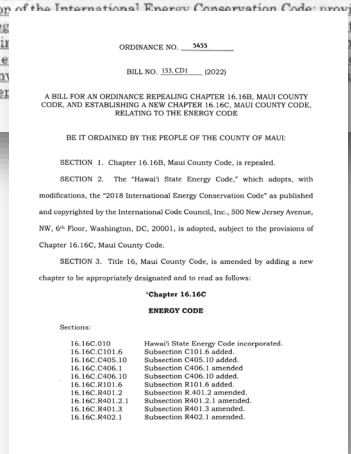


ARTICLE 6. ENERGY CONSERVATION CODE

Sec. 12-6.1 Purpose.

This purpose of this Article is the adoption and incorporation by reference the 2018 Edition of the International Energy Conservation Code; providing amendments thereto, reg... of buildings or structures i... need for a modern, up-to-date e... of energy-efficient building env... cal, lighting, and power syster...

Maui
13 pages



ORDINANCE NO. 3455

BILL NO. 153, CD1 (2022)

A BILL FOR AN ORDINANCE REPEALING CHAPTER 16.16B, MAUI COUNTY CODE, AND ESTABLISHING A NEW CHAPTER 16.16C, MAUI COUNTY CODE, RELATING TO THE ENERGY CODE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

SECTION 1. Chapter 16.16B, Maui County Code, is repealed.

SECTION 2. The "Hawai'i State Energy Code," which adopts, with modifications, the "2018 International Energy Conservation Code" as published and copyrighted by the International Code Council, Inc., 500 New Jersey Avenue, NW, 6th Floor, Washington, DC, 20001, is adopted, subject to the provisions of Chapter 16.16C, Maui County Code.

SECTION 3. Title 16, Maui County Code, is amended by adding a new chapter to be appropriately designated and to read as follows:

"Chapter 16.16C

ENERGY CODE

Sections:

16.16C.010	Hawai'i State Energy Code incorporated.
16.16C.C101.6	Subsection C101.6 added.
16.16C.C405.10	Subsection C405.10 added.
16.16C.C406.1	Subsection C406.1 amended
16.16C.C406.10	Subsection C406.10 added.
16.16C.R101.6	Subsection R101.6 added.
16.16C.R401.2	Subsection R.401.2 amended.
16.16C.R401.2.1	Subsection R401.2.1 amended.
16.16C.R401.3	Subsection R401.3 amended.
16.16C.R402.1	Subsection R402.1 amended.

https://codes.iccsafe.org/content/iecc2018

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

https://www.resilientoahu.org/energycode

https://www.mauicounty.gov/1308/Building-Plans-Review-Section

https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division

Scope

Today's topic

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) and R-2 ≥ 4 stories

Scope

Mixed use buildings

- Commercial code for commercial portion
- Residential code for residential portion
  ≤ 3 stories

https://www.drhorton.com/hawaii/oahu/ewa-beach/kohina-at-hoopili

What's covered

Envelope

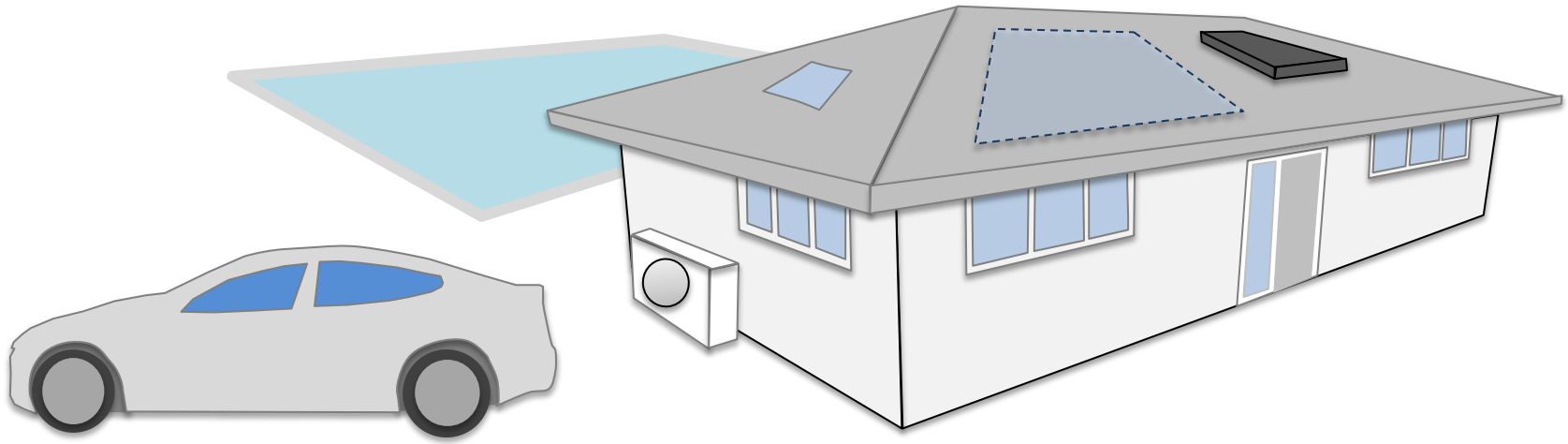
Roof
Walls
Windows & skylights
Air leakage

Systems

Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fans
Solar readiness } **Honolulu Amendment**
EV readiness }
Solar readiness } **Maui Amendment**
EV readiness }



Not covered

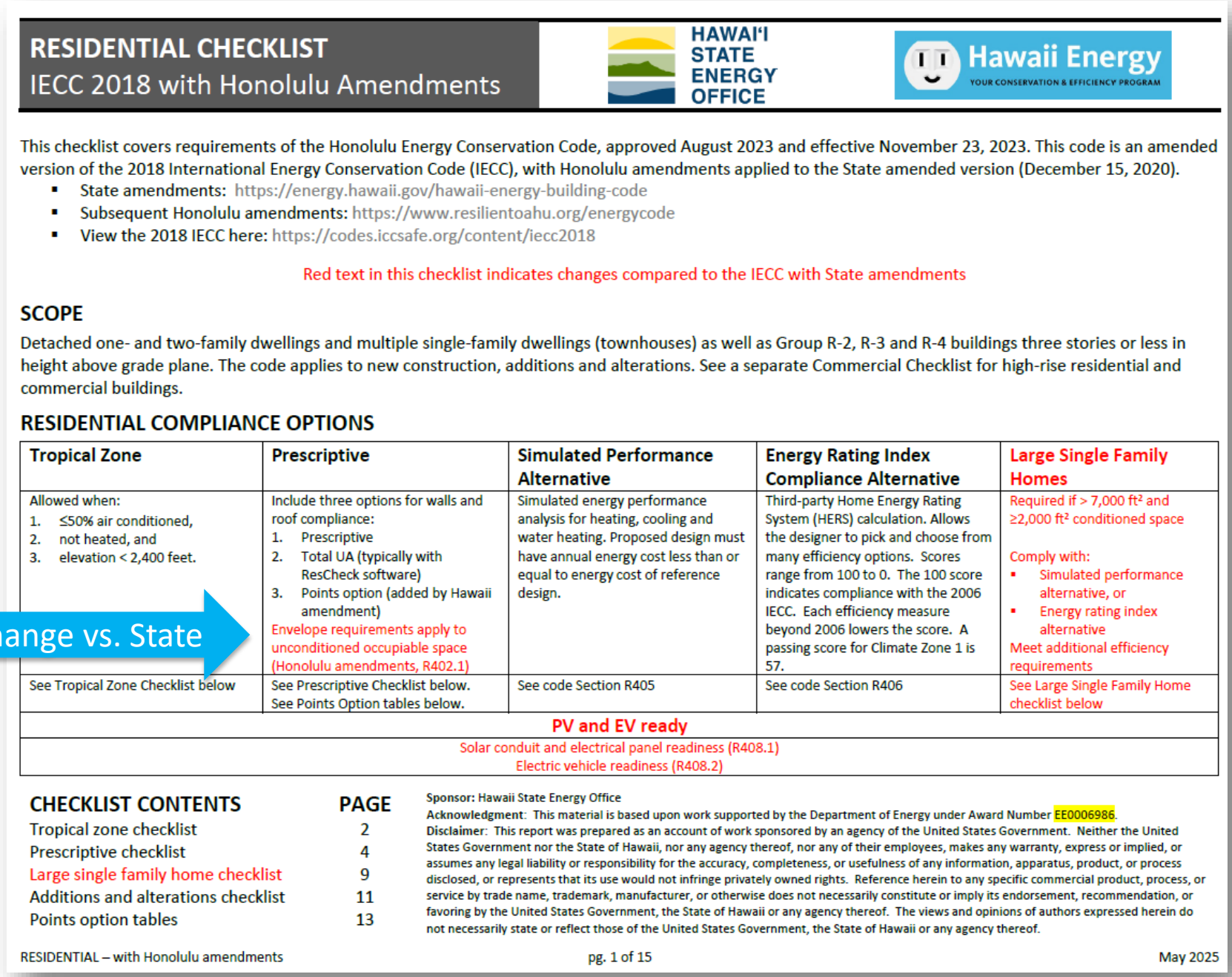
AC efficiency
Water heater efficiency
Plug-in lighting
Appliances

Resources

Checklist versions

1. State amendments
2. Honolulu amendments
3. Maui amendments

Red text = change vs. State



RESIDENTIAL CHECKLIST
IECC 2018 with Honolulu Amendments

HAWAI'I STATE ENERGY OFFICE

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

This checklist covers requirements of the Honolulu Energy Conservation Code, approved August 2023 and effective November 23, 2023. This code is an amended version of the 2018 International Energy Conservation Code (IECC), with Honolulu amendments applied to the State amended version (December 15, 2020).

- State amendments: https://energy.hawaii.gov/hawaii-energy-building-code
- Subsequent Honolulu amendments: https://www.resilientoahu.org/energycode
- View the 2018 IECC here: https://codes.iccsafe.org/content/iecc2018

Red text in this checklist indicates changes compared to the IECC with State amendments

SCOPE

Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane. The code applies to new construction, additions and alterations. See a separate Commercial Checklist for high-rise residential and commercial buildings.

RESIDENTIAL COMPLIANCE OPTIONS

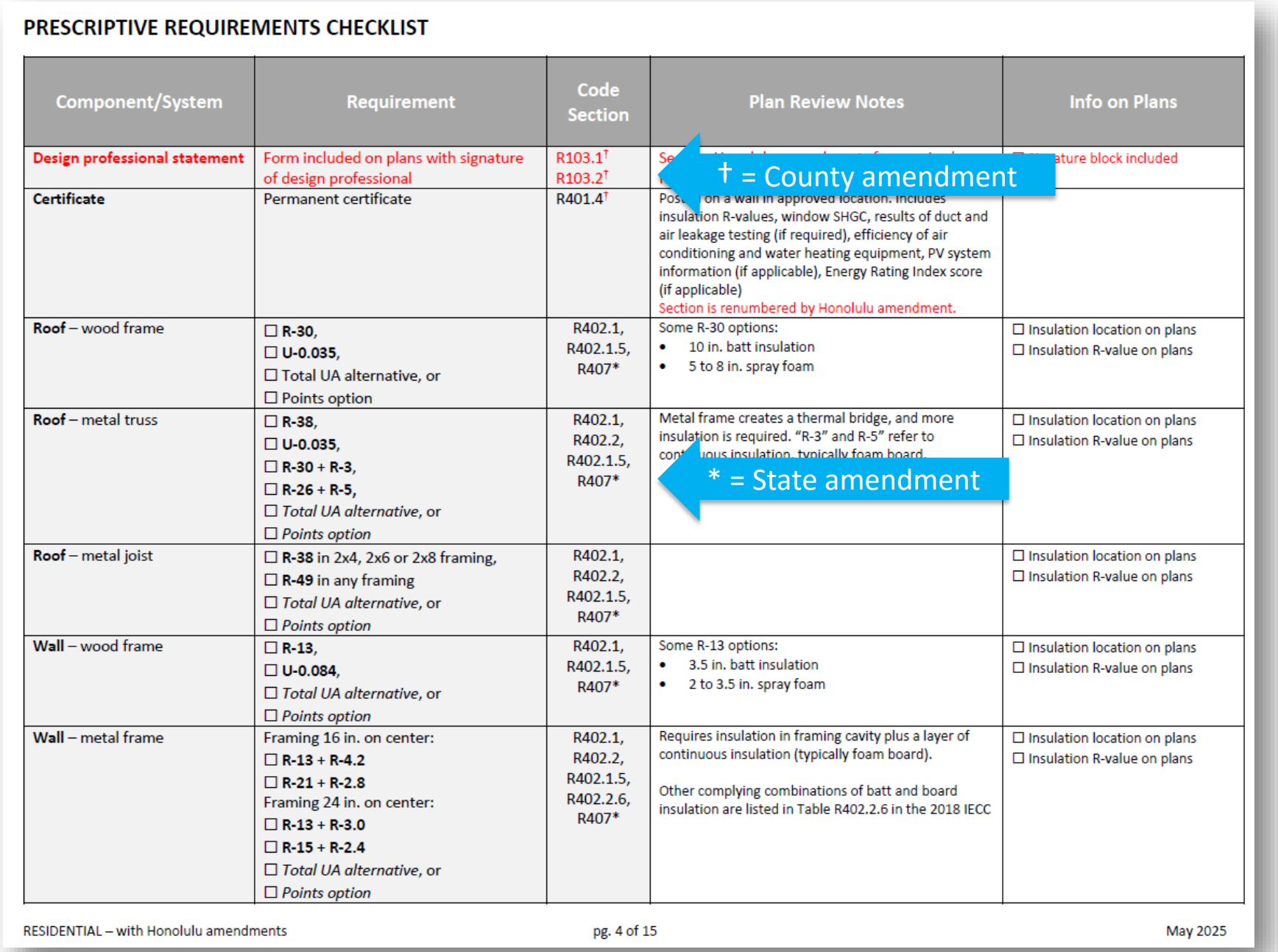
Tropical Zone	Prescriptive	Simulated Performance Alternative	Energy Rating Index Compliance Alternative	Large Single Family Homes
Allowed when: 1. ≤50% air conditioned, 2. not heated, and 3. elevation < 2,400 feet.	Include three options for walls and roof compliance: 1. Prescriptive 2. Total UA (typically with ResCheck software) 3. Points option (added by Hawaii amendment) Envelope requirements apply to unconditioned occupiable space (Honolulu amendments, R402.1)	Simulated energy performance analysis for heating, cooling and water heating. Proposed design must have annual energy cost less than or equal to energy cost of reference design.	Third-party Home Energy Rating System (HERS) calculation. Allows the designer to pick and choose from many efficiency options. Scores range from 100 to 0. The 100 score indicates compliance with the 2006 IECC. Each efficiency measure beyond 2006 lowers the score. A passing score for Climate Zone 1 is 57.	Required if > 7,000 ft² and ≥2,000 ft² conditioned space Comply with: ▪ Simulated performance alternative, or ▪ Energy rating index alternative Meet additional efficiency requirements
See Tropical Zone Checklist below	See Prescriptive Checklist below. See Points Option tables below.	See code Section R405	See code Section R406	See Large Single Family Home checklist below
PV and EV ready Solar conduit and electrical panel readiness (R408.1) Electric vehicle readiness (R408.2)				

CHECKLIST CONTENTS

Sponsor: Hawaii State Energy Office
Acknowledgment: This material is based upon work supported by the Department of Energy under Award Number EE0006986.

Resources

Checklist example page



PRESCRIPTIVE REQUIREMENTS CHECKLIST

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Design professional statement	Form included on plans with signature of design professional	R103.1† R103.2†	Se…	…ature block included
Certificate	Permanent certificate	R401.4†	Pos… on a wall in approved location. Includes insulation R-values, window SHGC, results of duct and air leakage testing (if required), efficiency of air conditioning and water heating equipment, PV system information (if applicable), Energy Rating Index score (if applicable) Section is renumbered by Honolulu amendment.	
Roof – wood frame	☐ **R-30**, ☐ **U-0.035**, ☐ Total UA alternative, or ☐ Points option	R402.1, R402.1.5, R407*	Some R-30 options: • 10 in. batt insulation • 5 to 8 in. spray foam	☐ Insulation location on plans ☐ Insulation R-value on plans
Roof – metal truss	☐ **R-38**, ☐ **U-0.035**, ☐ **R-30** + **R-3**, ☐ **R-26** + **R-5**, ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R407*	Metal frame creates a thermal bridge, and more insulation is required. "R-3" and R-5" refer to cont…ous insulation, typically foam board.	☐ Insulation location on plans ☐ Insulation R-value on plans
Roof – metal joist	☐ **R-38** in 2x4, 2x6 or 2x8 framing, ☐ **R-49** in any framing ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R407*		☐ Insulation location on plans ☐ Insulation R-value on plans
Wall – wood frame	☐ **R-13**, ☐ **U-0.084**, ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.1.5, R407*	Some R-13 options: • 3.5 in. batt insulation • 2 to 3.5 in. spray foam	☐ Insulation location on plans ☐ Insulation R-value on plans
Wall – metal frame	Framing 16 in. on center: ☐ **R-13** + **R-4.2** ☐ **R-21** + **R-2.8** Framing 24 in. on center: ☐ **R-13** + **R-3.0** ☐ **R-15** + **R-2.4** ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R402.2.6, R407*	Requires insulation in framing cavity plus a layer of continuous insulation (typically foam board). Other complying combinations of batt and board insulation are listed in Table R402.2.6 in the 2018 IECC	☐ Insulation location on plans ☐ Insulation R-value on plans

RESIDENTIAL – with Honolulu amendments pg. 4 of 15 May 2025

† = County amendment

* = State amendment

Resources

HSEO Website

Past training materials

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

April 23 and 24, 2024 – Maui Energy Code Updates

This code update moves Maui from the 2015 to the 2018 International Energy Conservation Code, with updated County amendments. Join these sessions to learn how these changes will affect your projects.

Low-rise residential requirements

- Slide Deck: Residential 2018 IECC with Maui Amendments
- Checklist: Residential 2018 IECC with Maui Amendments
- Video Recording: April 23rd Residential Training

Commercial and high-rise residential requirements

- Slide Deck: Commercial 2018 IECC with Maui Amendments
- Checklist: Commercial 2018 IECC with Maui Amendments
- Video Recording: April 24th Commercial Training

This workshop is approved by AIA for 1.5 LU (HSW).

December 5 and 6, 2023 – Honolulu Energy Code Updates

This code update moves Honolulu from the 2015 to the 2018 International Energy Conservation Code, with updated County amendments. Join these sessions to learn how these changes will affect your projects.

Low-rise residential requirements

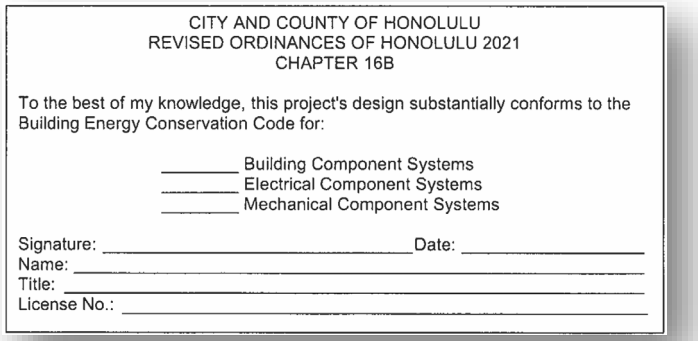
- Presentation: Honolulu Energy Code Low-rise Residential Requirements
- Checklist: Residential 2018 IECC with Honolulu Amendments
- Video Recording: December 5th Residential Training

Commercial and high-rise residential requirements

- Presentation: Honolulu Energy Code Commerical and High-rise Residential Requirements
- Checklist: Commerical 2018 IECC with Honolulu Amendments
- Video Recording: December 6th Commercial Training

Section 2

Compliance

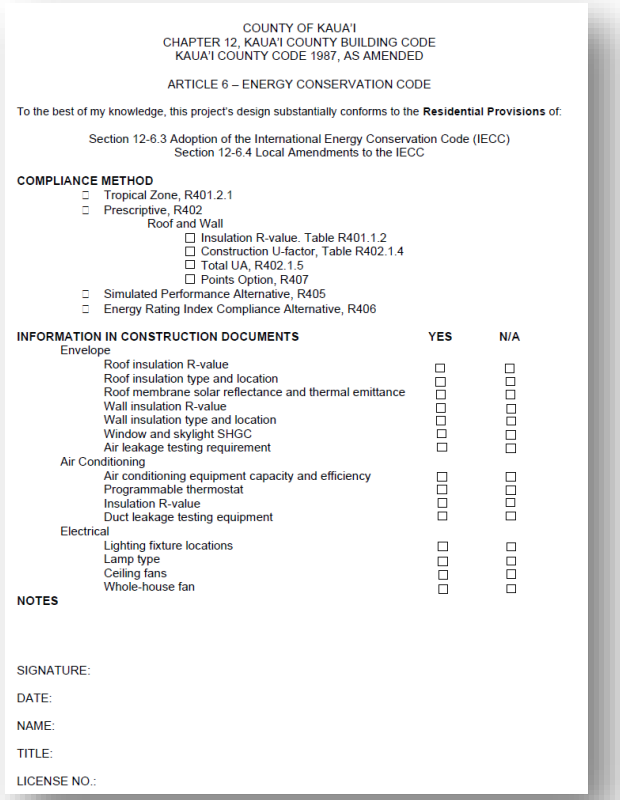


CITY AND COUNTY OF HONOLULU
REVISED ORDINANCES OF HONOLULU 2021
CHAPTER 16B

To the best of my knowledge, this project's design substantially conforms to the Building Energy Conservation Code for:

_____ Building Component Systems
_____ Electrical Component Systems
_____ Mechanical Component Systems

Signature: _____ Date: _____
Name: _____
Title: _____
License No.: _____



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

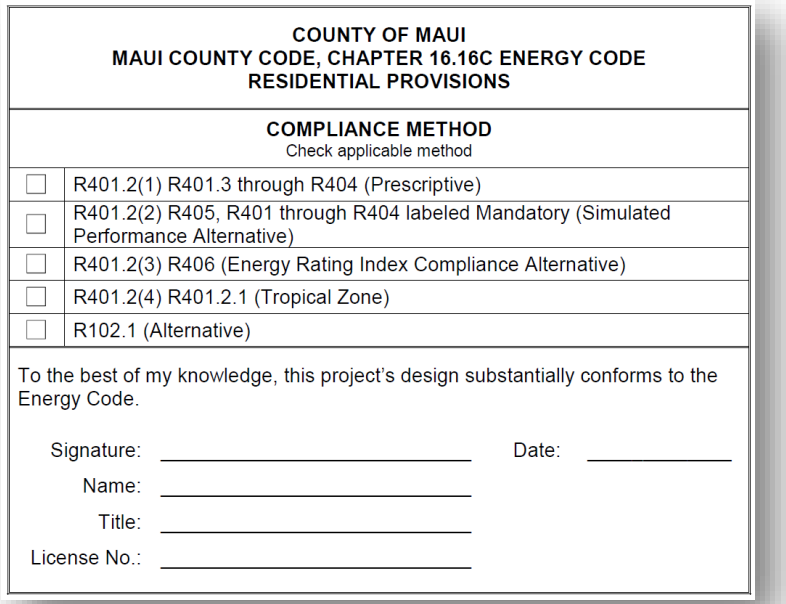
SIGNATURE:

DATE:

NAME:

TITLE:

LICENSE NO.:



COUNTY OF MAUI
MAUI COUNTY CODE, CHAPTER 16.16C 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 options – low-rise residential

1. Tropical Zone
   - ≤50% air conditioned
   - not heated
   - elevation < 2,500 feet (5,000 feet)

Maui Amendment

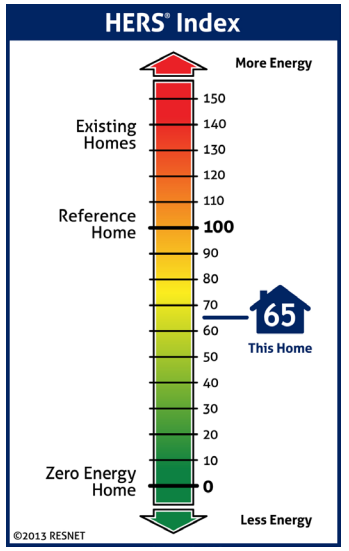
2. Prescriptive
   - Envelope (+ Points Option)
   - Systems
   - Electrical power and lighting systems

State Amendment

3. Simulated performance alternative
   - Proposed design energy cost ≤ standard reference design
4. Energy rating index (ERI)
   - ERI ≤ 57
5. Large homes
   - Honolulu: >7,000 ft^2
   - Maui: 1 & 2-family homes ≥5,000 ft^2 conditioned floor area

Honolulu & Maui Amendments

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



Design professional certification (R103.2)

CITY AND COUNTY OF HONOLULU
REVISED ORDINANCES OF HONOLULU 2021
CHAPTER 16B

To the best of my knowledge, this project's design substantially conforms to the Building Energy Conservation Code for:

_____ Building Component Systems
_____ Electrical Component Systems
_____ Mechanical Component Systems

Signature: _____ Date: _____
Name: _____
Title: _____
License No.: _____

Honolulu Amendment

Design professional certification (R103.1)

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.:

Kauai Amendment

Design professional certification

Maui

Sample energy code certification block

COUNTY OF MAUI
MAUI COUNTY CODE, CHAPTER 16.16C 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.: _____

https://www.mauicounty.gov/1308/Building-Plans-Review-Section

Certificate (R401.3)

- Permanent certificate
- Completed by the builder or registered design professional

Maui Amendment

- Utility room or approved location
- Includes
  - R-values of insulation
  - U-factors and SHGC of fenestration
  - Air leakage test results (if applicable)
  - Equipment efficiencies

EXAMPLE

Energy Efficiency Certificate

Insulation Rating		*R*-Value		*R*-Value
Ceiling /Roof		*R*-		*R*-
Walls	Frame	*R*-	Mass	*R*-
	Basement	*R*-	Crawl space	*R*-
Floors	Over unconditioned space	*R*-	Slab edge	*R*-
Ducts	Attic	*R*-	Other	*R*-

Air Leakage Test Results					
Blower door		ACH/50 Pa.	Duct testing		Cfm/100 ft²

Fenestration Rating	NFRC U-Factor	NFRC SHGC
Window	*U*-	
Opaque door	*U*-	
Skylight	*U*-	

Equipment Performance	Type	Efficiency	
Heating system			AFUE
Cooling system			SEER
Water heater			EF

Indicate if the following have been installed (an efficiency shall not be listed)

☐ electric furnace ☐ gas-fire unvented room heater ☐ baseboard electric heater

Designer/builder			
Code edition		Date	

Source: ICC, https://shop.iccsafe.org/

Section 3

Tropical Zone Compliance Path

Tropical Zone Option (R401.2.1)

Can use this path if

- ≤50% air conditioned,
- not heated, and
- elevation < 2,400 feet (5,000 feet)

Maui Amendment

Tropical Zone Option (R401.2.1)

Motivations behind the Tropical Zone Option

- 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

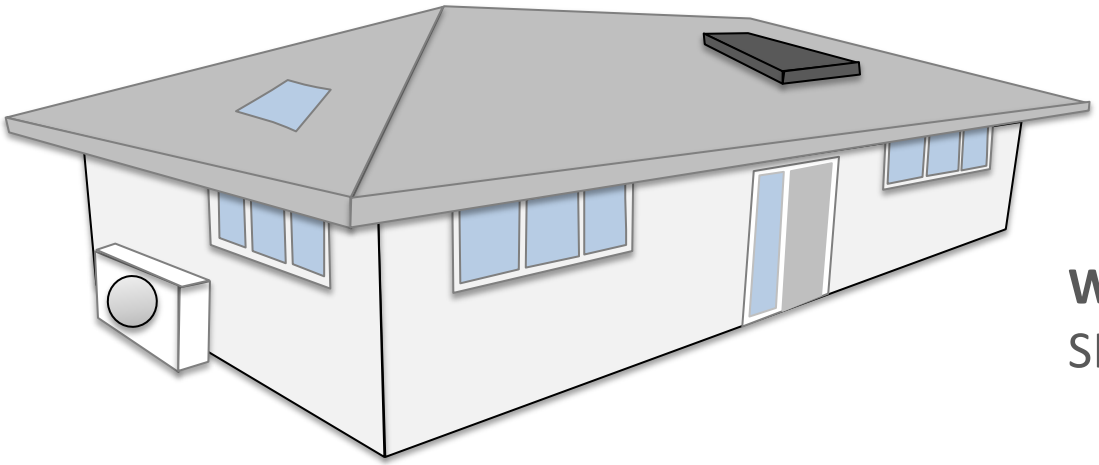
Lower indoor air temperature
Lower ceiling temperature
Increased air movement

Tropical Zone - Snapshot

Water heating
Solar*

Skylights
U-factor ≤ 0.75

Roof
R-19 or R-13+cool roof*



AC efficiency
SEER ≥ 14
(Federal standard)

Walls
No requirement

Windows
SHGC varies with overhang size

High efficacy lighting

Natural ventilation openings

Ceiling fan wiring

* Some exceptions

Tropical Zone Option (R401.2.1)

State amended 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 R402.1.2.

Window SHGC Requirements

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

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 R402.1.4.
6. Permanently installed lighting is in accordance with Section R404.
7. The roof/ceiling complies with one of the following options:
   a. Comply with one of the roof surface options in Table C402.3 and install R-13 insulation or greater.
   b. Install R-19 insulation or greater.
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. 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.

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

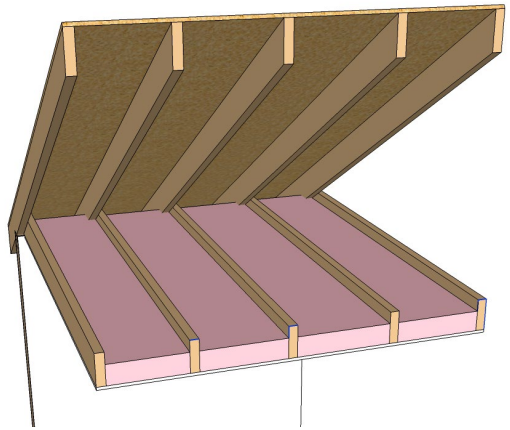
Ceiling fans

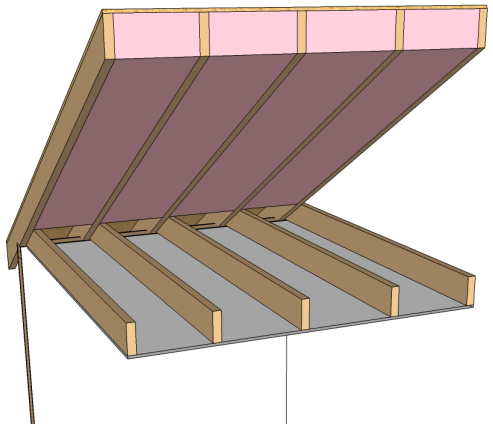
Solar water heating

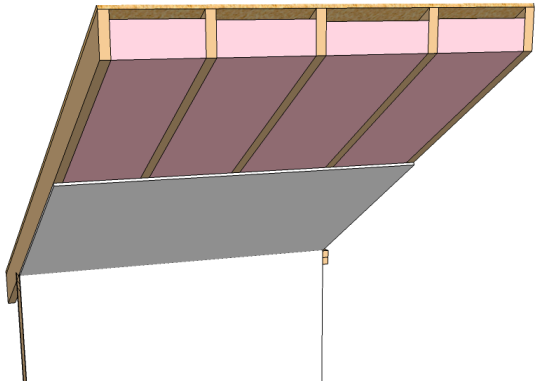
Lighting

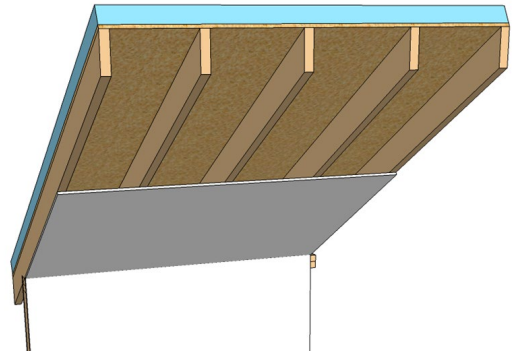
Envelope air sealing

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









Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

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

Typical insulation thickness required

Insulation type	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”

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

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

Cool roof definitions (C402.3)

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

Architect: Daniel Sandomire, Armstrong Builders

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

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

Cool roof definitions (C402.3)

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

www.hansonrooftile.com

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

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

Cool roof definitions (C402.3)

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

http://coolroofhawaii.com

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

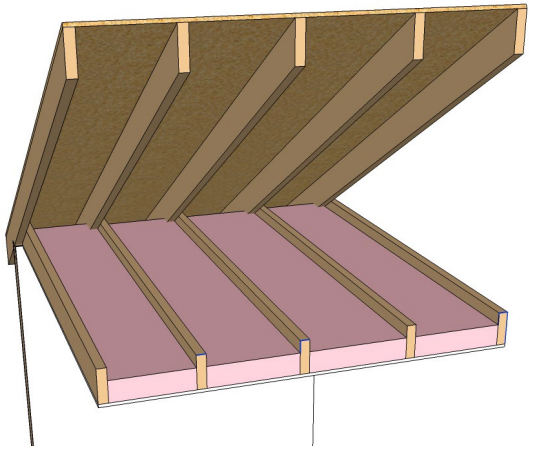
Solar water heating

Lighting

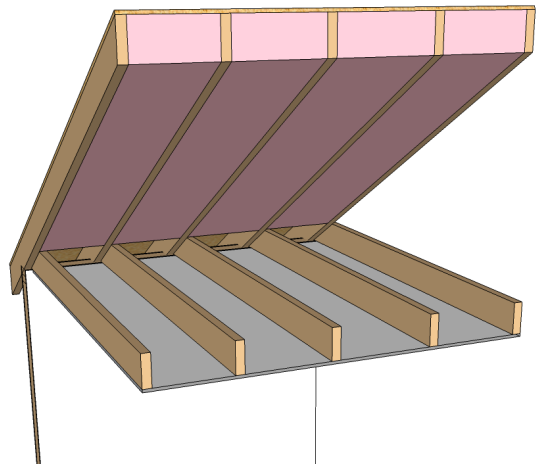
Envelope air sealing

If there is an attic

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



Attic must be vented



Attic must be unvented

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

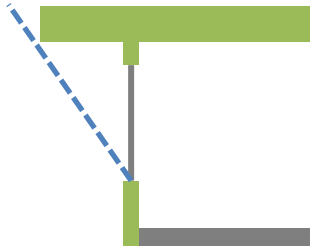
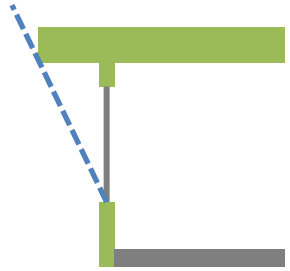
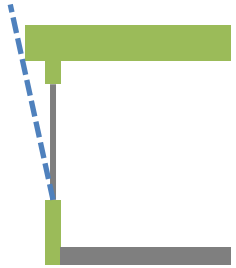
Envelope air sealing

No requirements!

Tropical Zone Option (R401.2.1)

- Roof insulation
- Wall
- **Windows**
- Skylights
- Natural ventilation
- Ceiling fans
- Solar water heating
- Lighting
- Envelope air sealing

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

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

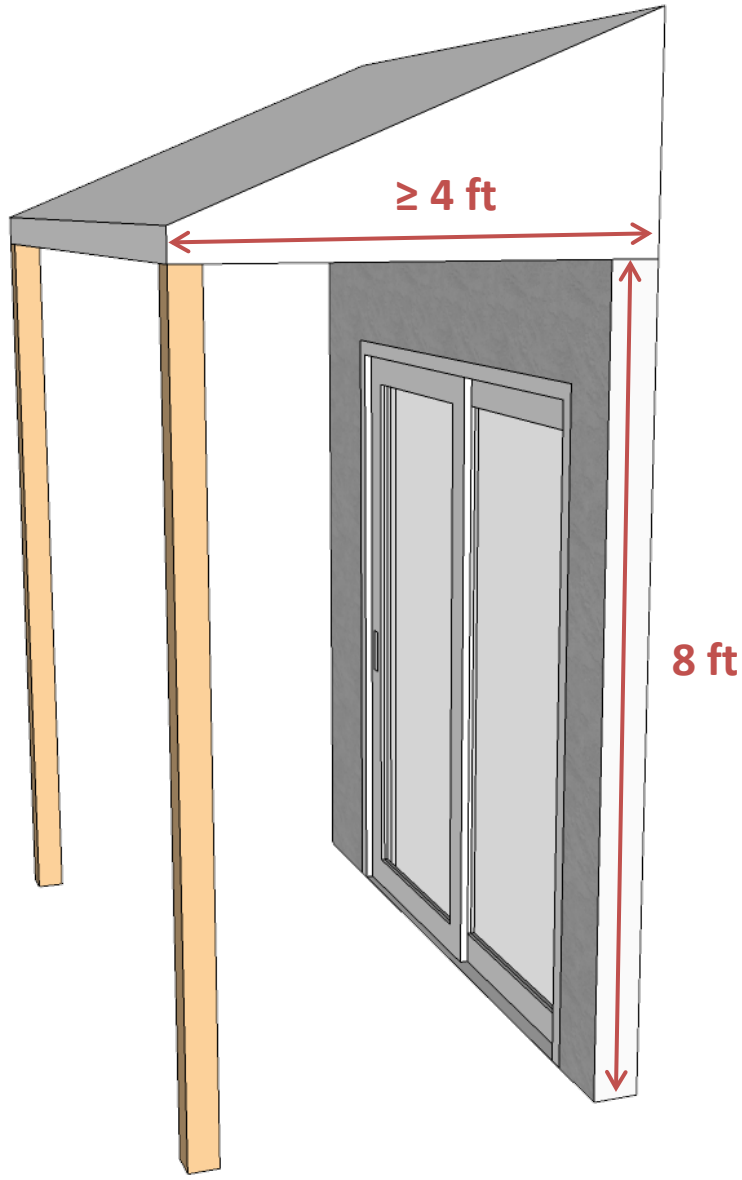
Solar water heating

Lighting

Envelope air sealing

Overhang size that allows clear glass to comply?

PF ≥ 0.5



Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

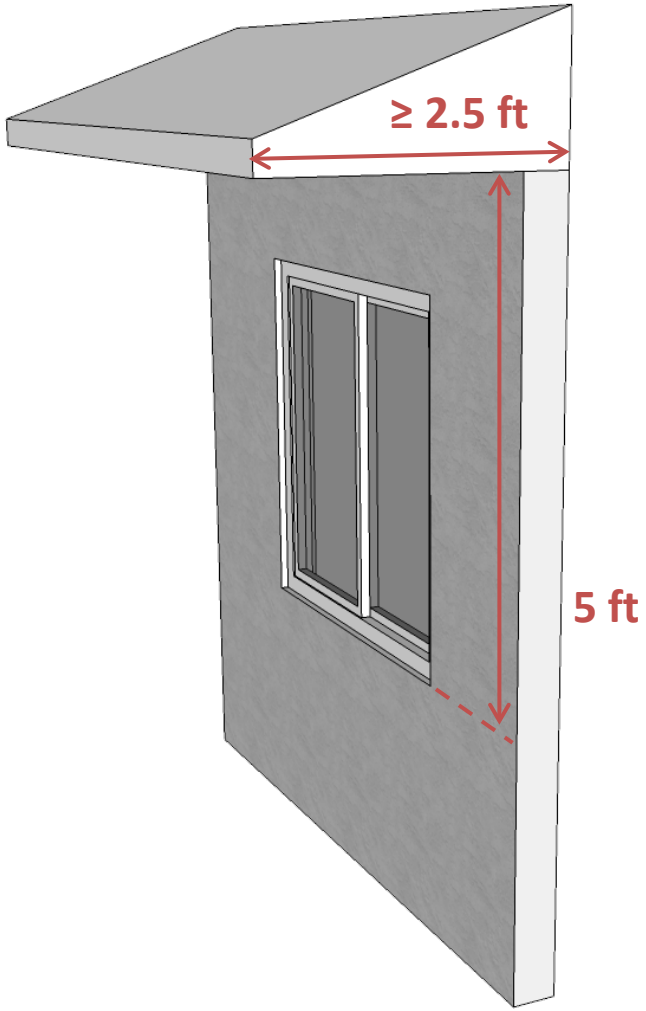
Solar water heating

Lighting

Envelope air sealing

Overhang size that allows clear glass to comply?

PF ≥ 0.5



Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

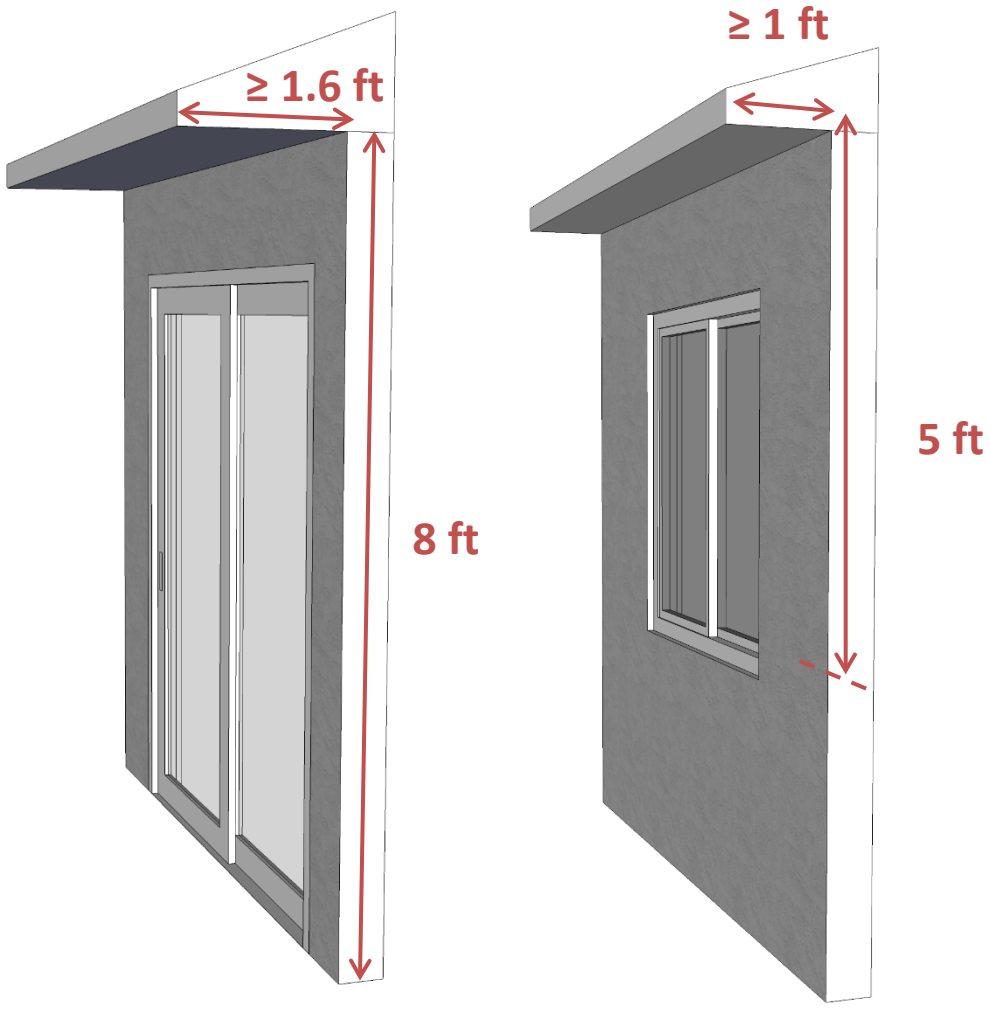
Solar water heating

Lighting

Envelope air sealing

Overhang size that allows clear glass to comply?

North-facing windows
PF ≥ 0.2

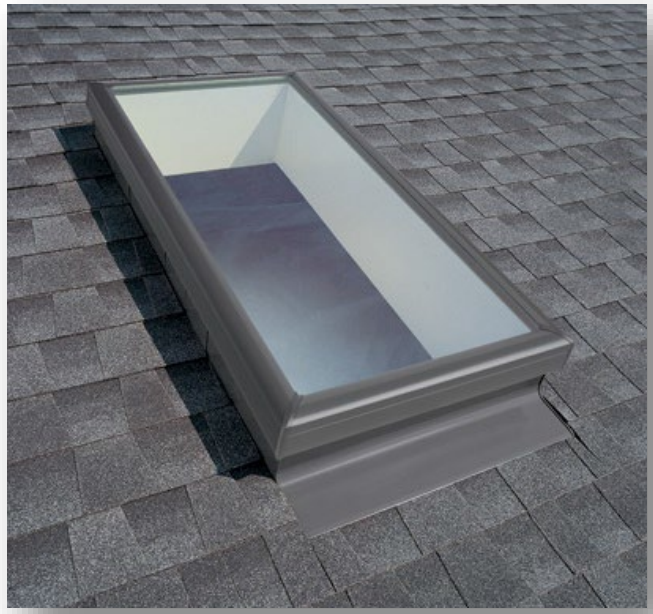


Tropical Zone Option (R401.2.1)

Roof insulation
Wall
Windows
Skylights
Natural ventilation
Ceiling fans
Solar water heating
Lighting
Envelope air sealing

U-factor ≤ 0.75

Requires double-pane skylights



www.veluxusa.com

Tropical Zone Option (R401.2.1)

Roof insulation
Wall
Windows
Skylights
Natural ventilation
Ceiling fans
Solar water heating
Lighting
Envelope air sealing

Operable windows

- Ventilation area ≥ 14% of floor area in each room
- Or equivalent fan

Bedroom interior doors can be secured open

Bedroom windows two different directions

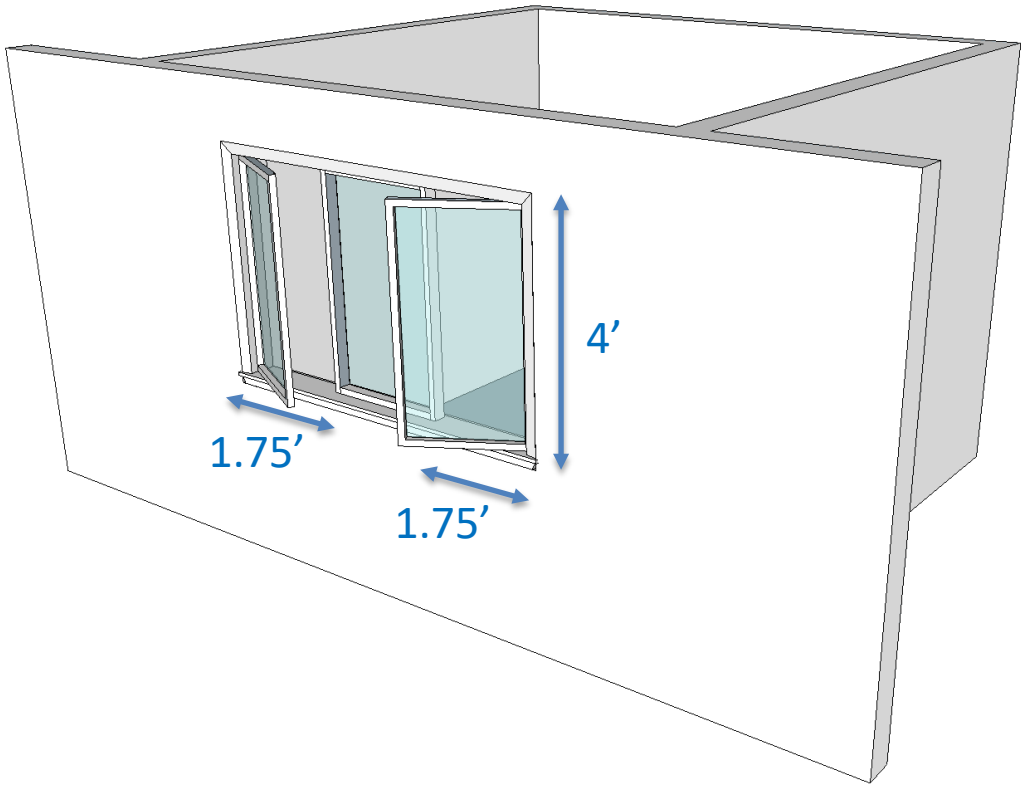
- If there are two exterior walls

Tropical Zone Option (R401.2.1)

- Roof insulation
- Wall
- Windows
- Skylights
- **Natural ventilation**
- Ceiling fans
- Solar water heating
- Lighting
- Envelope air sealing

Ventilation area ≥ 14% of floor area

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

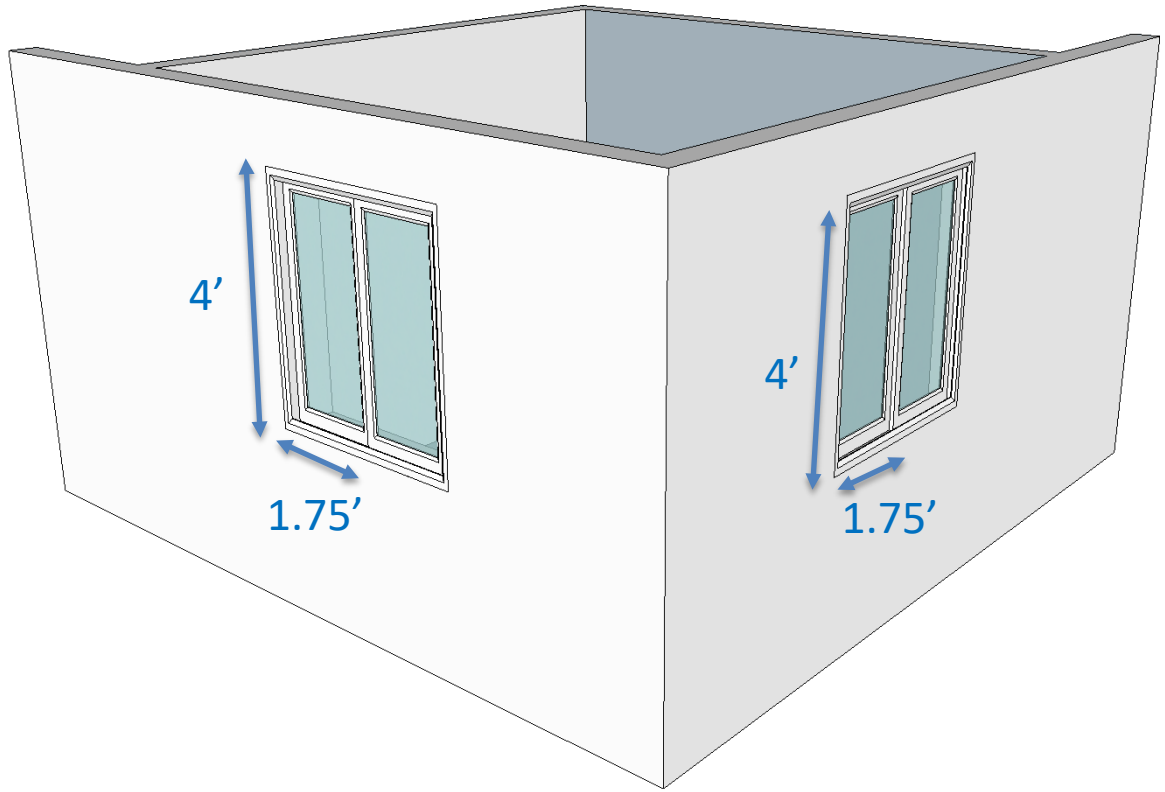


Tropical Zone Option (R401.2.1)

- Roof insulation
- Wall
- Windows
- Skylights
- **Natural ventilation**
- Ceiling fans
- Solar water heating
- Lighting
- Envelope air sealing

Ventilation area ≥ 14% of floor area

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



Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

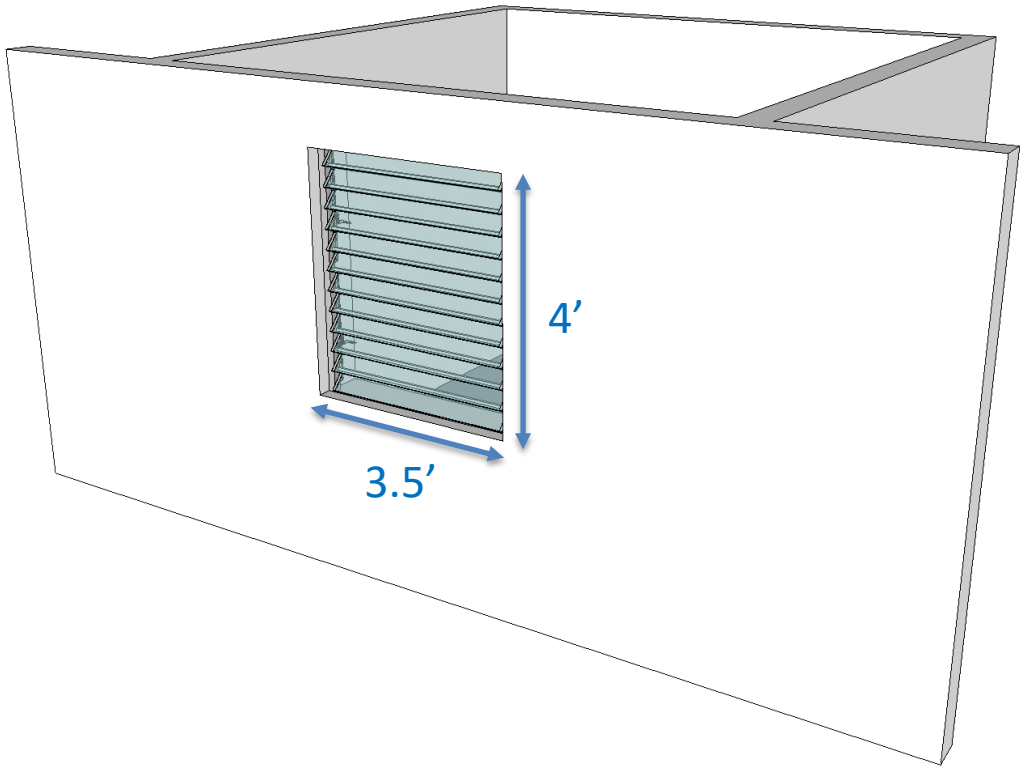
Solar water heating

Lighting

Envelope air sealing

Ventilation area ≥ 14% of floor area

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

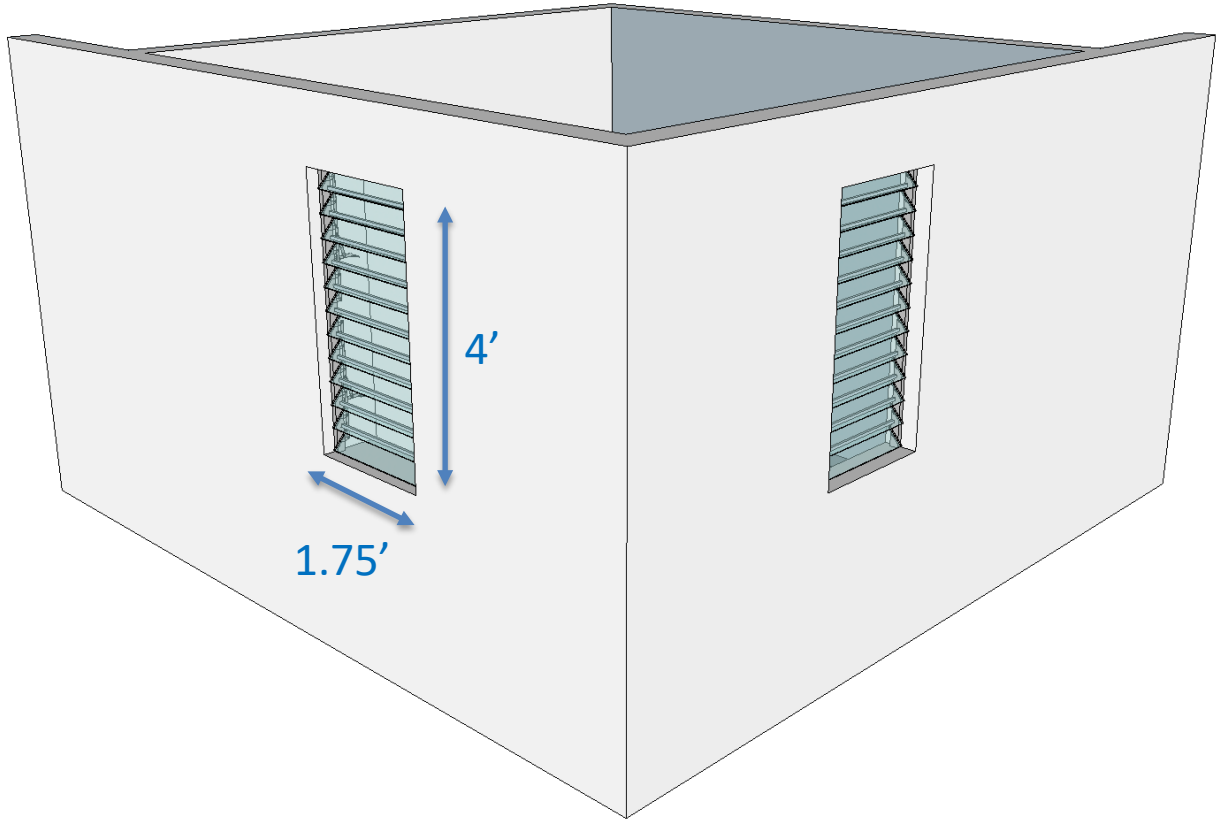


Tropical Zone Option (R401.2.1)

- Roof insulation
- Wall
- Windows
- Skylights
- **Natural ventilation**
- Ceiling fans
- Solar water heating
- Lighting
- Envelope air sealing

Ventilation area ≥ 14% of floor area

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

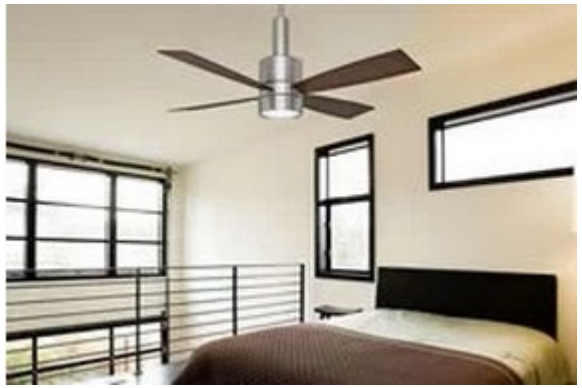


Tropical Zone Option (R401.2.1)

Roof insulation
Wall
Windows
Skylights
Natural ventilation
Ceiling fans
Solar water heating
Lighting
Envelope air sealing

Ceiling fans or rough-ins

- Bedrooms + largest space



Tropical Zone Option (R401.2.1)

Roof insulation
Wall
Windows
Skylights
Natural ventilation
Ceiling fans
Solar water heating
Lighting
Envelope air sealing

Solar, wind or other renewable > 90%

Tropical Zone Option (R401.2.1)

- Roof insulation
- Wall
- Windows
- Skylights
- Natural ventilation
- Ceiling fans
- Solar water heating
- **Lighting**
- Envelope air sealing

High efficacy ≥ 90% of permanently installed lamps

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

Source: DOE/NREL PIX20307

Honolulu Amendment →

HIGH-EFFICACY LIGHTING means an efficacy of not less than 70 lumens per watt for lamps and 55 lumens per watt for fixtures.

Tropical Zone Option (R401.2.1)

Roof insulation

Wall

Windows

Skylights

Natural ventilation

Ceiling fans

Solar water heating

Lighting

Envelope air sealing

Walls, floor and ceilings that separate AC spaces and non-AC spaces use air-tight construction

Tropical Zone Option (R401.2.1)

TROPICAL ZONE REQUIREMENTS CHECKLIST

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Tropical zone qualification	▪ ≤ 50% of the dwelling unit has AC ▪ No heating installed ▪ Elevation < 2,400 ft	R401.2.1*	Dwellings that do not meet all these criteria must use another compliance option.	☐ AC space clearly indicated (if applicable)
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. See also: https://energy.hawaii.gov/resources/solar-water-heater-variance and https://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0196/HRS_0196-0006_0005.htm	☐ 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 Jalousie windows exempt.	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	≥ 90% 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

Tropical Zone Option (R401.2.1)

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 (or provide a ventilation fan) ▪ 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 ☐ Ventilation fans on plans (if applicable)
Ceiling fans	Ceiling fans or rough-ins required for: ▪ Each bedroom ▪ Largest space not used as a bedroom	R401.2.1*	A "rough-in" is an electrical junction box mounted in the ceiling that is rated for ceiling fan installation.	☐ Ceiling fan locations 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 State amendment

END OF TROPICAL ZONE CHECKLIST

Section 4

Prescriptive Compliance Option

Prescriptive Requirements - Snapshot

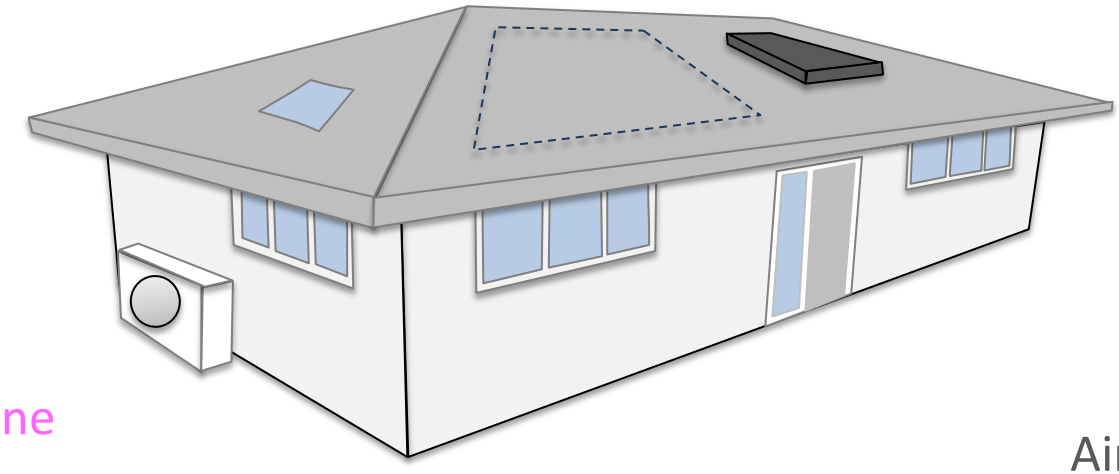
Skylights
SHGC ≤ 0.30
U-factor ≤ 0.75

Water heating
Solar*

Roof
R-30*

Walls
Wood: R-13
Metal: R-13 +R-4.2*
Mass: R3/4*

AC efficiency
SEER ≥ 14
(Federal standard)



Windows
SHGC ≤ 0.25

Air leakage testing

EV readiness

Maui Amendments

Solar ready zone

EV readiness

Ceiling fan wiring

Honolulu Amendments

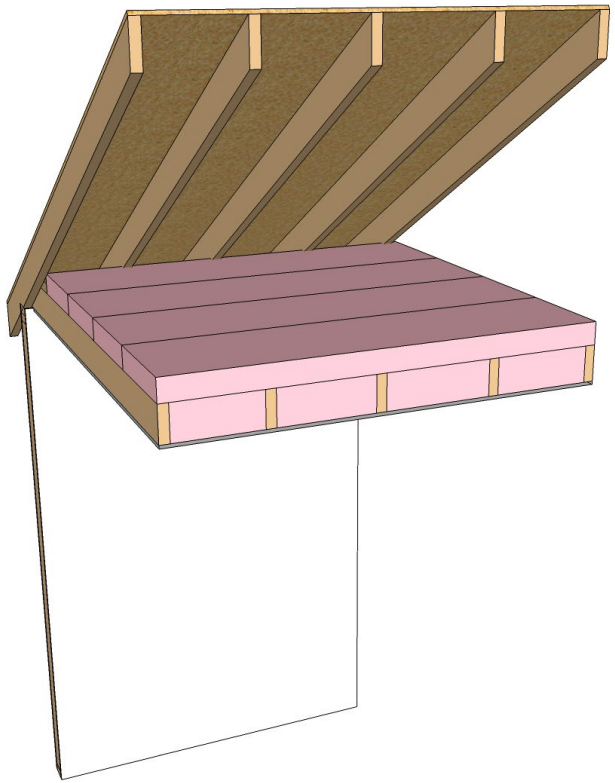
Solar conduit and PV panel readiness

High efficacy lighting

* Some exceptions

Section 5

Prescriptive - Envelope



Envelope - Prescriptive

- 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

Envelope - Prescriptive

- 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

Minimum Insulation R-value

TABLE R402.1.2 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.32	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5/13
4 except Marine	0.32	0.55	0.40	49	20 or 13+5[h]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.30	0.55	NR	49	20 or 13+5[h]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.30	0.55	NR	49	20+5[h] or 13+10[h]	15/20	30[g]	15/19	10, 4 ft	15/19
7 and 8	0.30	0.55	NR	49	20+5[h] or 13+10[h]	19/21	38[g]	15/19	10, 4 ft	15/19

Envelope - Prescriptive

- 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

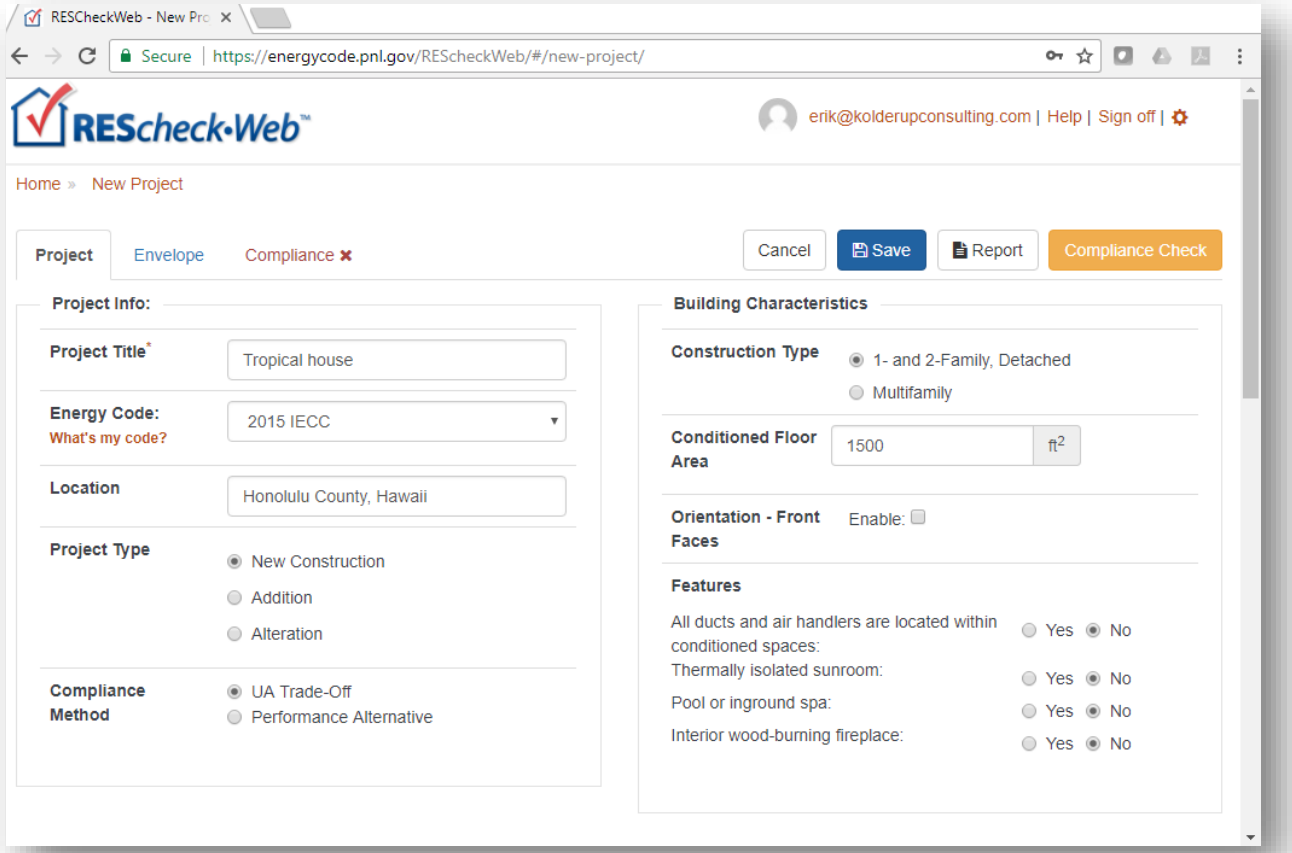
Maximum Assembly U-factor

TABLE R402.1.4 EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.084	0.165	0.064	0.360	0.477
3	0.32	0.55	0.030	0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.32	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.30	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.30	0.55	0.026	0.045	0.060	0.033	0.050	0.055
7 and 8	0.30	0.55	0.026	0.045	0.057	0.028	0.050	0.055

Envelope - Prescriptive

- 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



Envelope - Prescriptive

- 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

Measure **Metal Framed Walls**	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

Envelope – Prescriptive (R402.1)

Residential envelope exemptions

1. Those with a peak design rate of energy usage less than 3. 4 Btu/h•ft^2 10.7 W/m^2) or 1.0 watt/ft^2 (10. 7 W/m^2) of floor area for space conditioning purposes.
2. Unconditioned space that does not contain occupiable space.

Honolulu Amendment

Residential envelope exemptions

1. Those with a peak design rate of energy usage less than 3. 4 Btu/h•ft^2 10.7 W/m^2) or 1.0 watt/ft^2 (10. 7 W/m^2) of floor area for space conditioning purposes.
2. Unconditioned space that does not contain habitable space.
3. Unconditioned dwellings with enclosed habitable areas less than 1,100 square feet.
4. Dwellings with permitted, off-grid, self supplying photovoltaic with battery back up.

Maui Amendment

These cases are exempt from envelope requirements

Envelope - Prescriptive

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
3. Jalousie windows exempt **State Amendment**

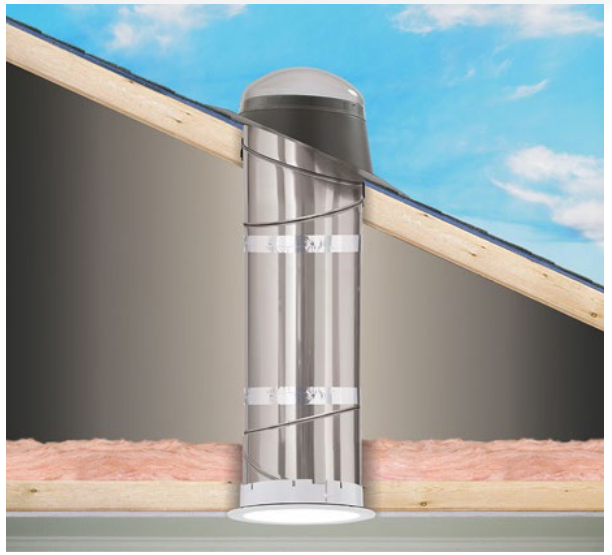
Envelope - Prescriptive

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



www.veluxusa.com

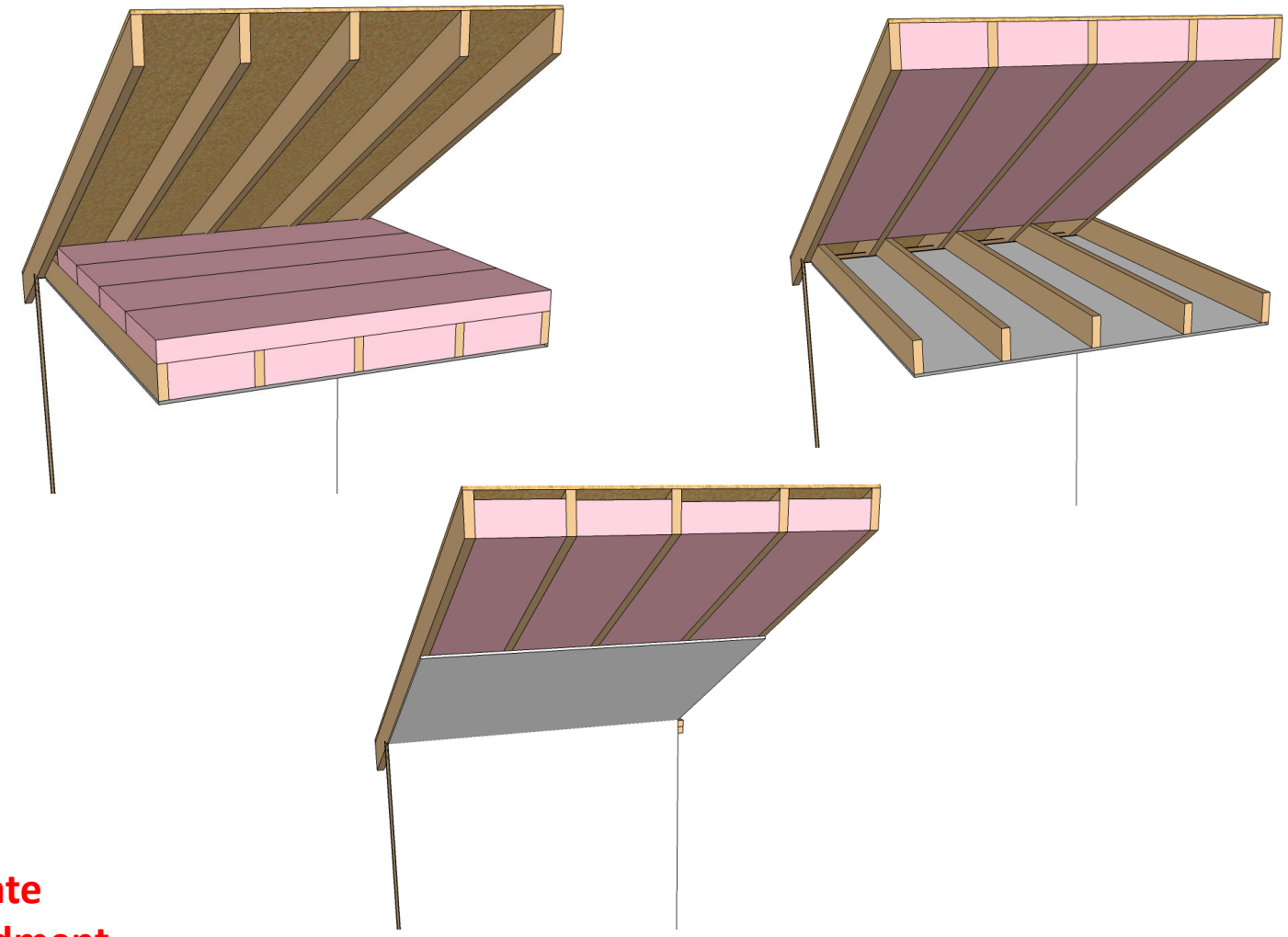
Envelope - Prescriptive

Ceiling – <u>wood framed</u>

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)



State Amendment

Envelope - Prescriptive

Ceiling – <u>steel truss</u>

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

Ceiling – <u>steel joist</u>

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

(Table R402.2.6)

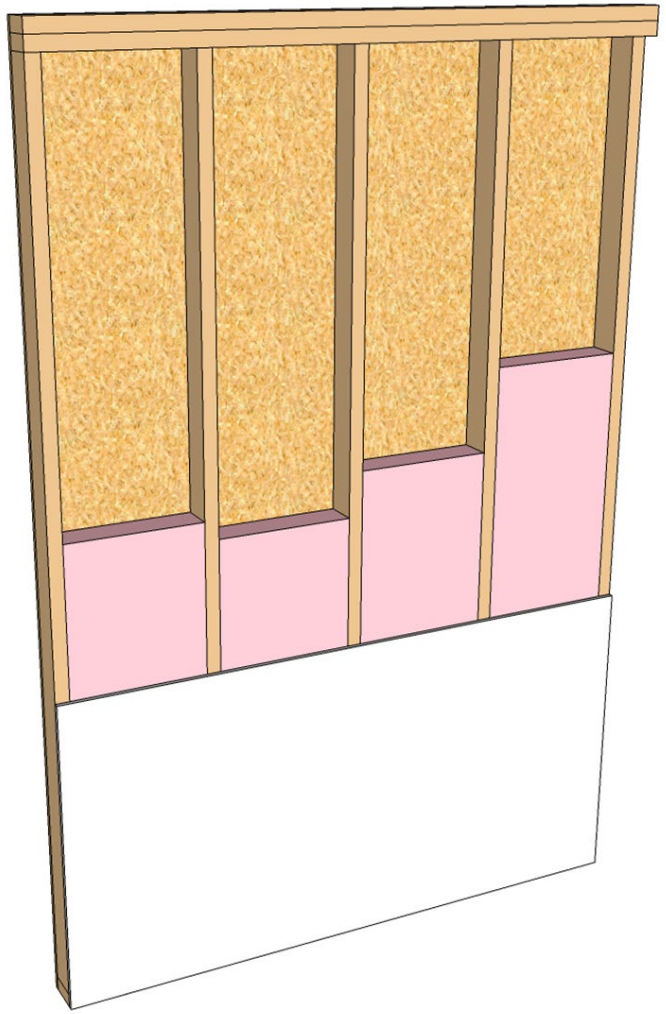
Insulation type & thickness	R-38	R-49
Batt	10-12”	15”
Blown-in	15”	19”
Open-cell spray foam	~10”	
Closed-cell spray foam	~6”	

Envelope - Prescriptive

Walls – <u>wood frame</u>

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

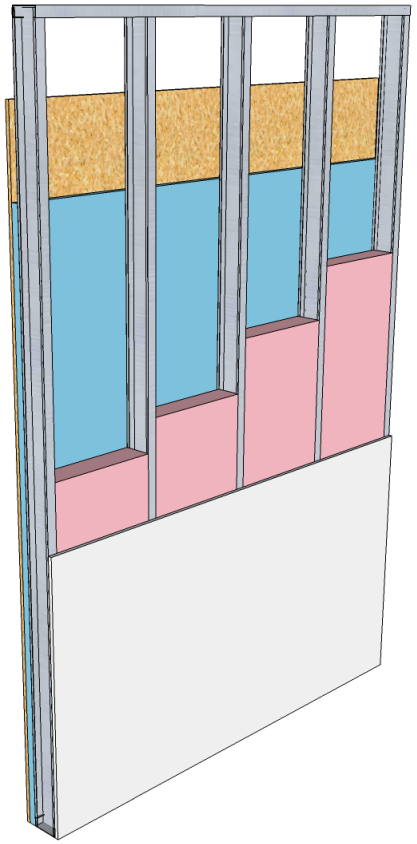
Insulation type & thickness	R-13
Batt or blown-in	3.5”
Open-cell spray foam	3-4”
Closed-cell spray foam	2-3”
Polystyrene board	2.75”
Polyisocyanurate board	2”



Envelope - Prescriptive

Walls – <u>metal frame</u>

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.

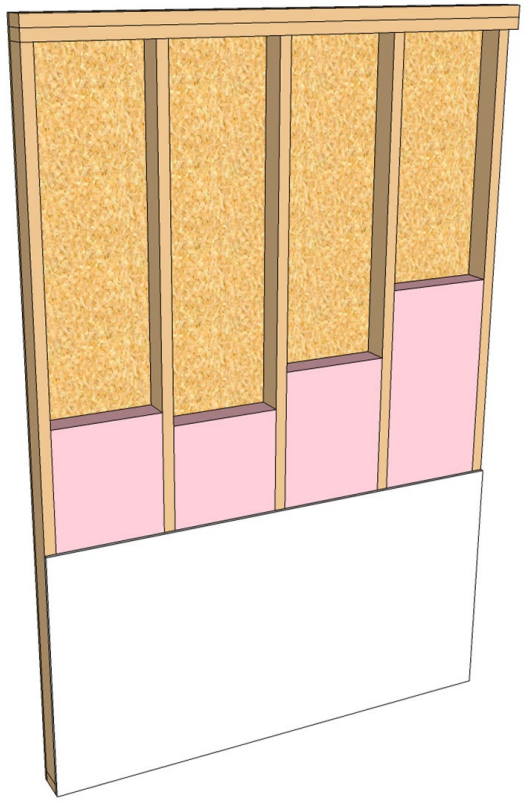
Or use the points option (R407)

State Amendment

Envelope - Prescriptive

Why is extra insulation is required with metal framing?

R-13 in wood frame

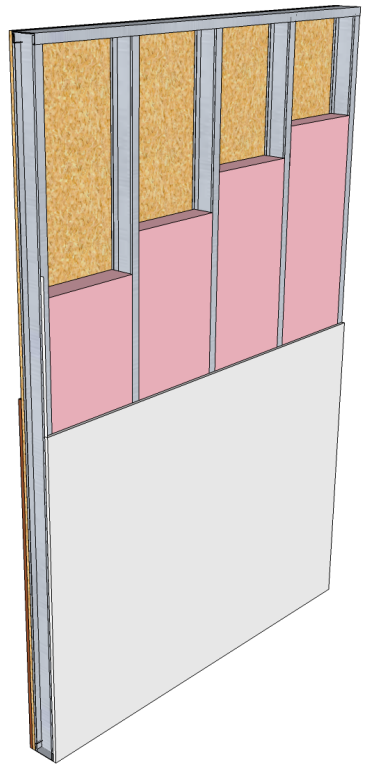


U-factor
0.089

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

Envelope - Prescriptive

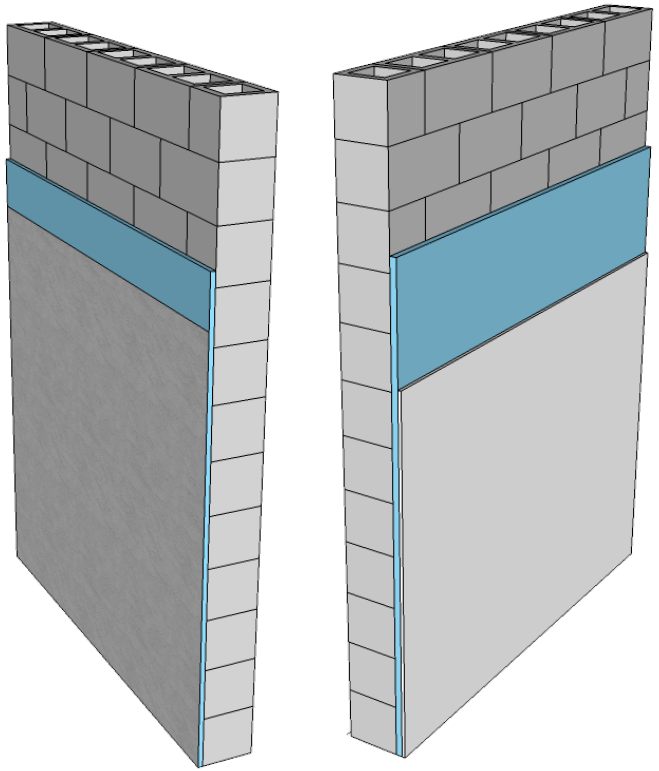
Walls – mass

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)

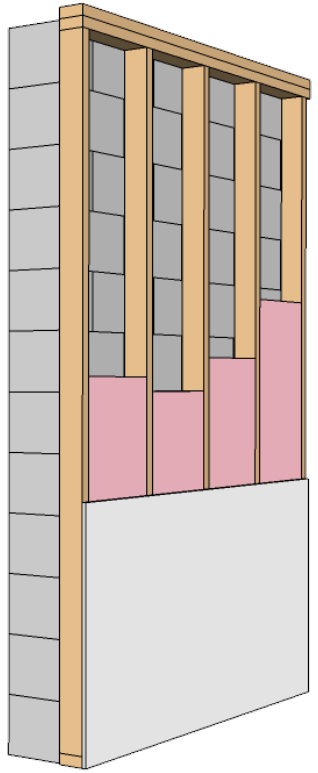
Or use the points option (R407)

State Amendment

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

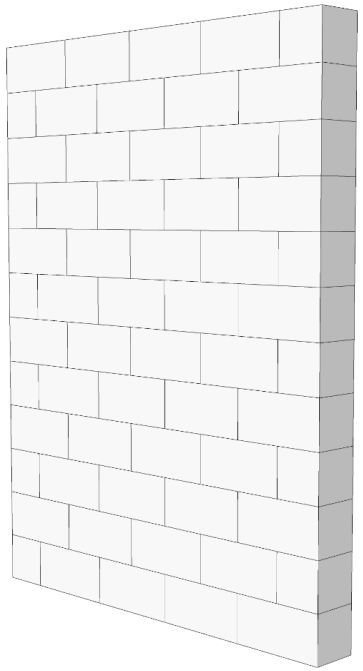
Envelope - Prescriptive

Walls – mass

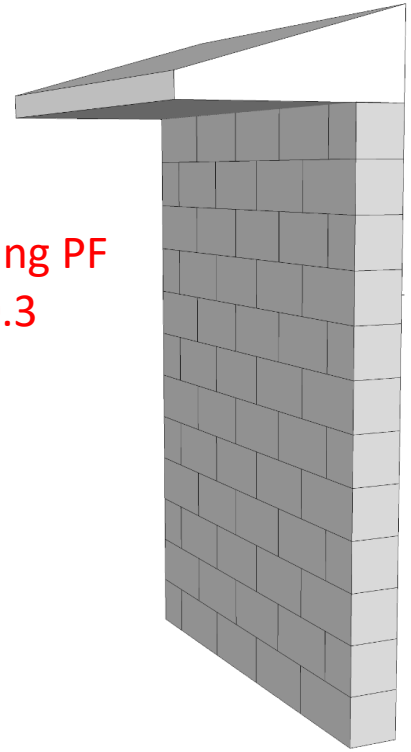
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Alternatives by State Amendment

Exterior light reflectance ≥ 0.64



Overhang PF ≥ 0.3



Thickness ≥ 6 inches + unpainted finish with or without clear sealer

Honolulu Amendment

Envelope - Prescriptive

Floors

1. R-0 (Table R402.1.2)

Honolulu & Maui
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

State Amendment

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

Measure **Wood Framed Walls**	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

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

Measure **Metal Framed Walls**	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

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

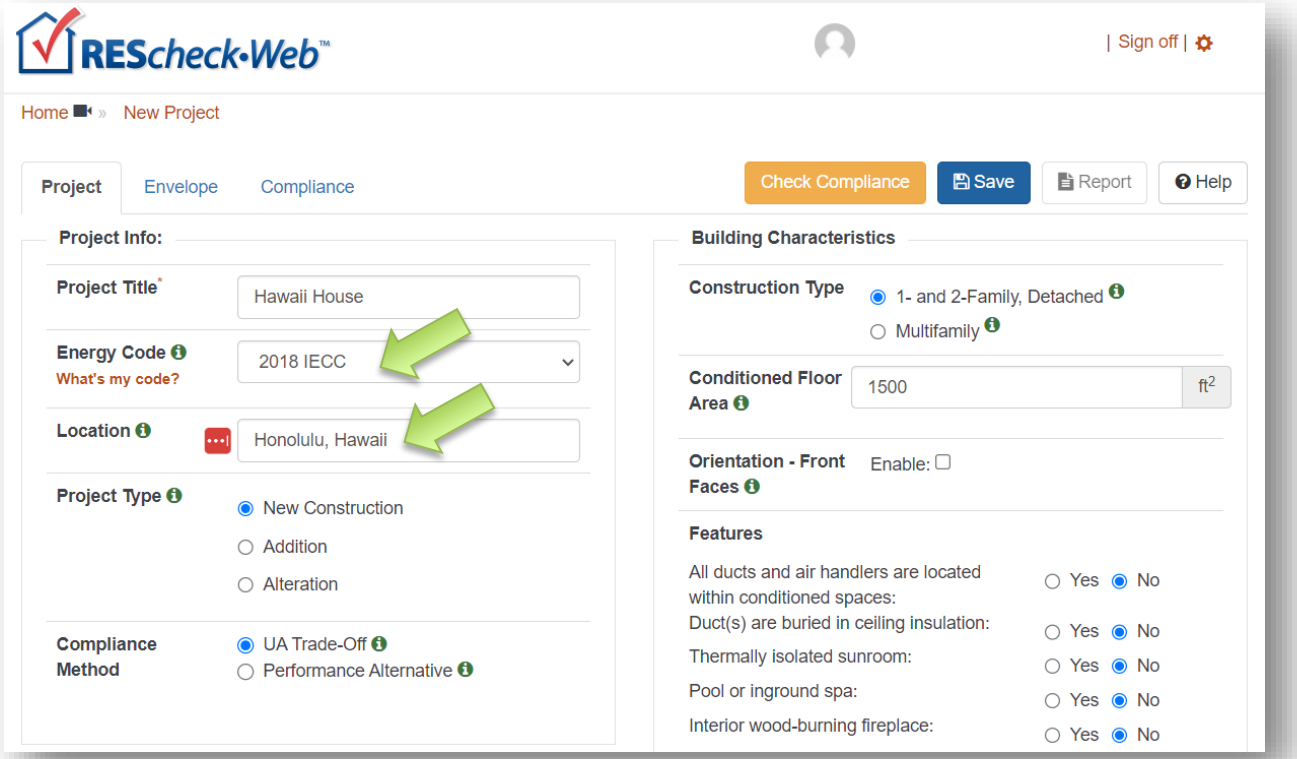
Measure **Mass Walls**	Standard Home Points	Tropical Home Points
R-3/4 Insulation	0	1
R-0 Wall insulation	-1	0
R-0 Wall Insulation + high reflectance walls[4]	0	1
R-0 Wall + 90% high efficacy lighting and Energy Star Appliances[5]	1	2
R-0 Wall Insulation + exterior shading wpf=0.3[6]	0	1
R-19 Roof/ceiling Insulation	-1	0
R-19 + Cool roof membrane[1] or Radiant Barrier[3]	0	1
R-19 Roof Insulation + Attic Venting[2]	0	1
R-30 Roof/ceiling Insulation	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

See also checklist

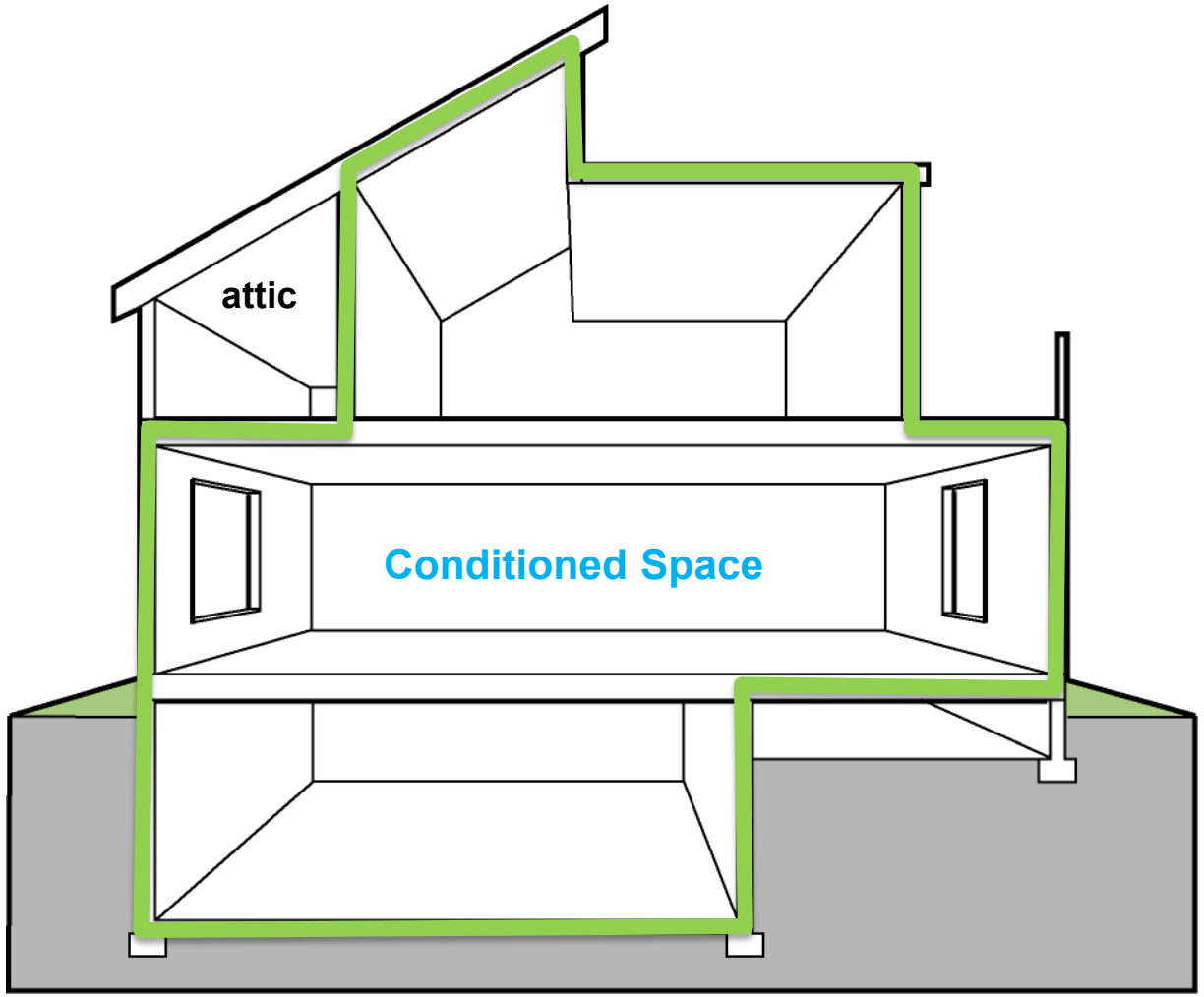
Envelope – Total UA (R402.1.4)

Alternative to prescriptive envelope

- 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)



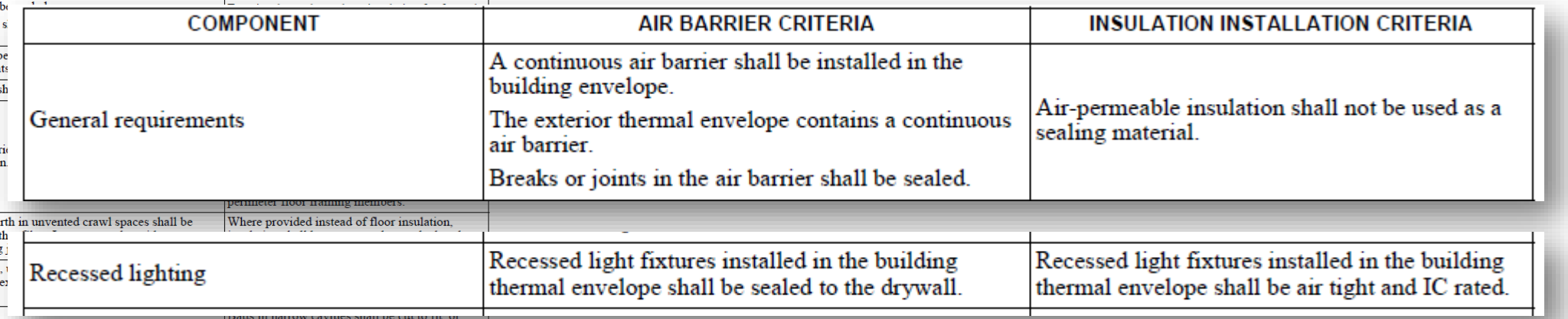
Installation details in Table R402.4.1.1

- Continuous air barrier
- Breaks or joints are sealed
- Recessed lighting
- Around windows and skylights

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 skylight	
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.

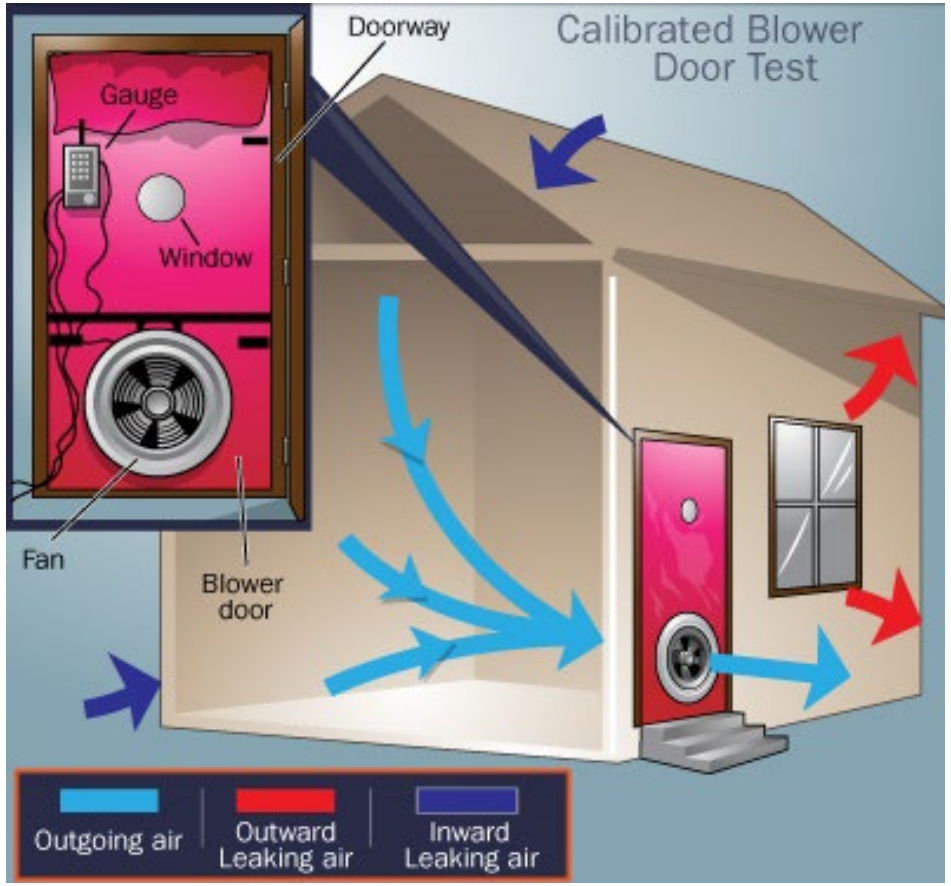
Envelope – Air Leakage (R402.4)

Testing

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

Testing conducted by an approved third party

Maui Amendment



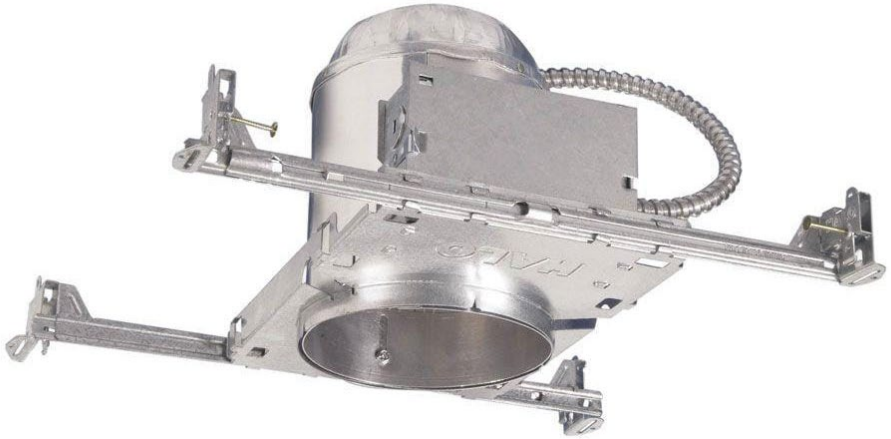
Envelope – Air Leakage (R402.4)

Fenestration air leakage

- ≤ 0.3 cfm/ft^2 for windows, skylights and sliding doors
- ≤ 0.5 cfm/ft^2 for swinging doors
- Exception for site-built

Recessed lighting in thermal envelope

- IC rated (insulation contact)
- Labeled ≤ 2 cfm at 75 Pa



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

Or Tropical Zone option

Section 6

Prescriptive - Systems

What's covered

Envelope

Roof
Walls
Windows & skylights
Air leakage

Systems

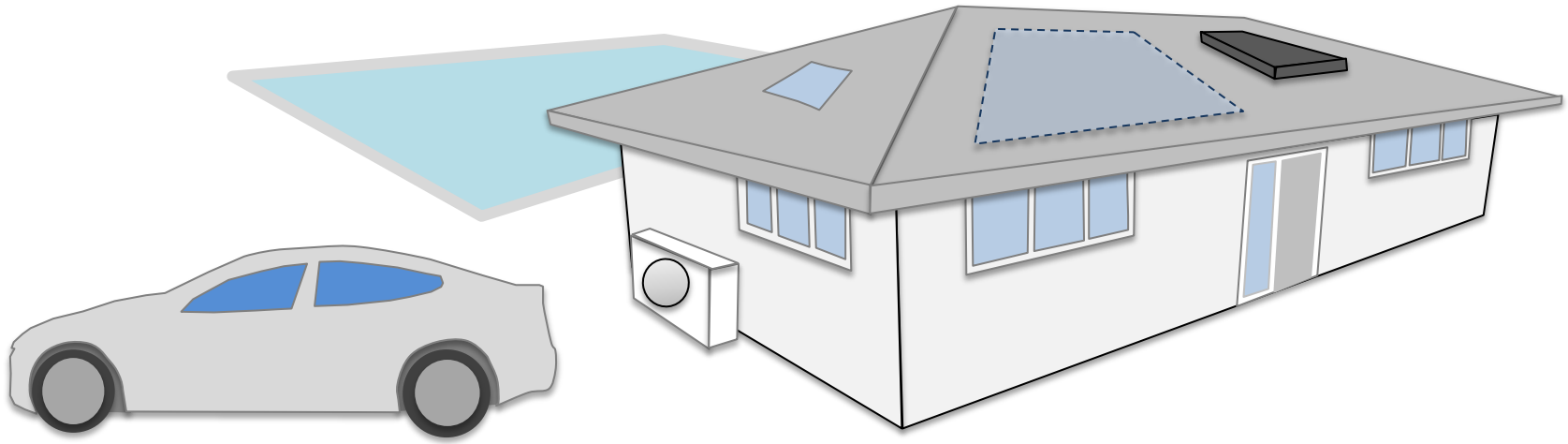
Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fans

Solar readiness
EV readiness
} **Honolulu Amendment**

Solar readiness
EV readiness
} **Maui Amendment**



Not covered

AC efficiency
Water heater efficiency
Plug-in lighting
Appliances

Systems – AC Requirements

Programmable thermostat

Duct sealing & fastening

Source: www.energycodes.gov

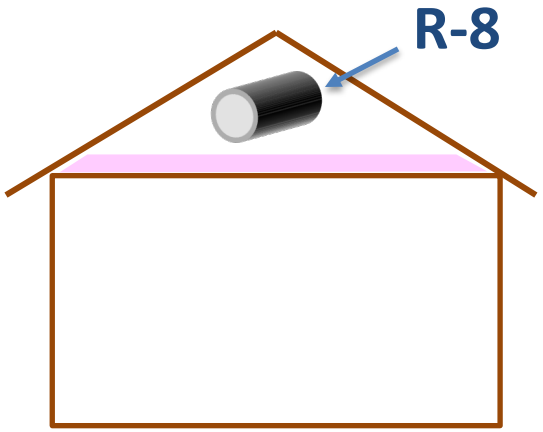
Duct insulation

Duct testing

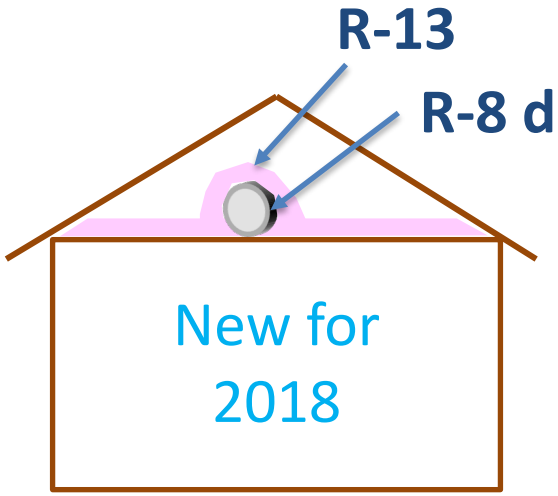
Source: DOE/NREL PIX04869

Systems – Duct Insulation

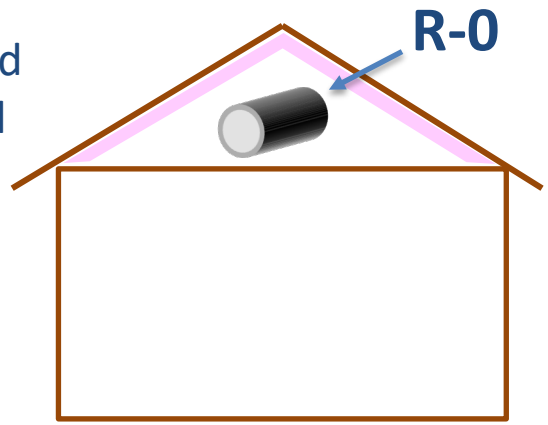
In attic



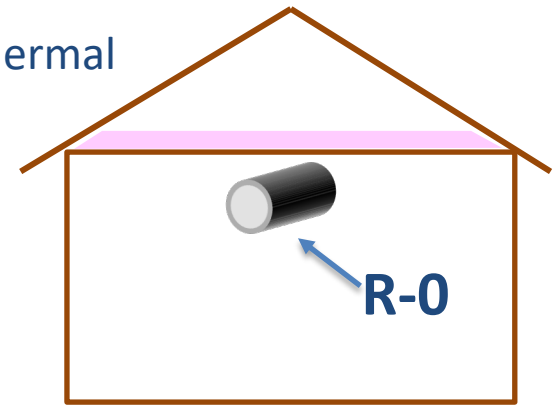
Buried in ceiling insulation



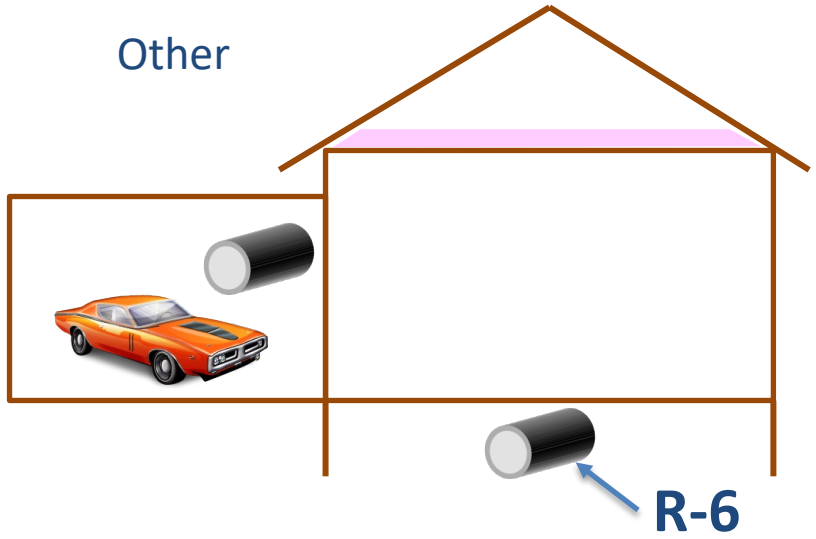
In insulated and sealed attic



Within thermal envelope



Other



Systems – Duct Insulation

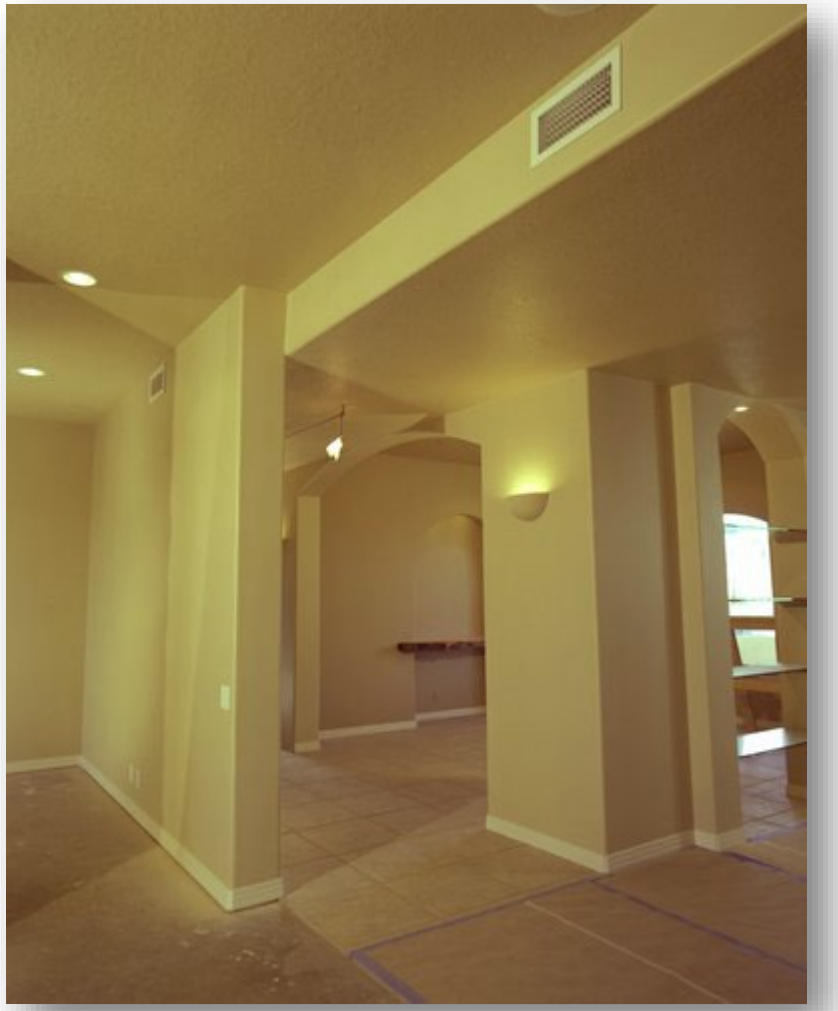
Examples

R-6 (~1.75” thick)

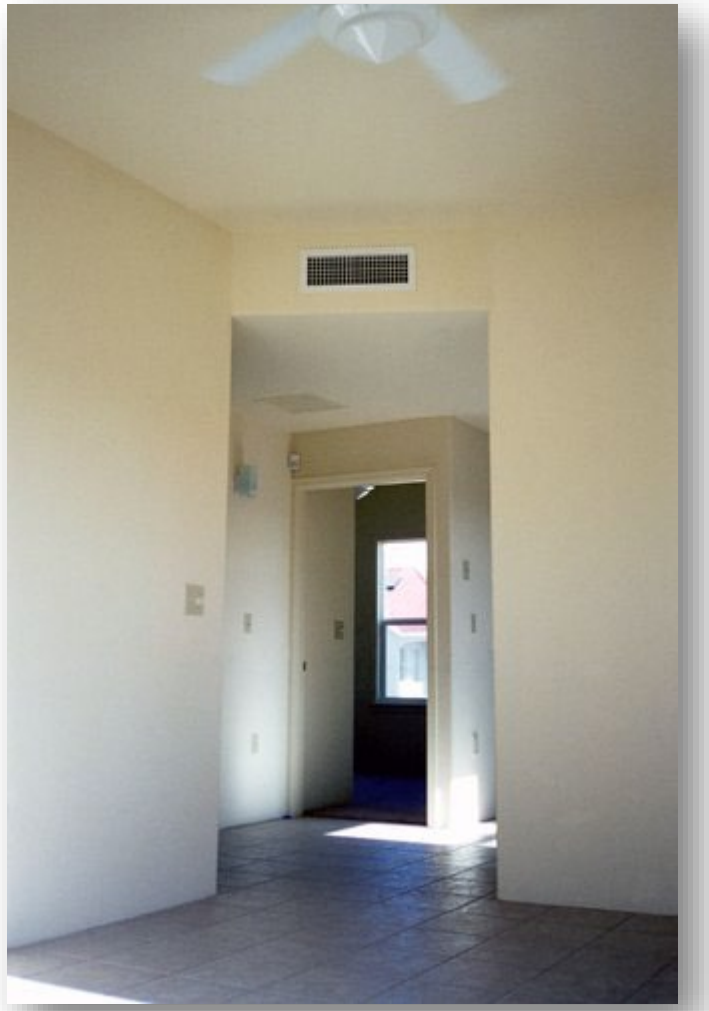
R-8 (~2.5” thick)

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

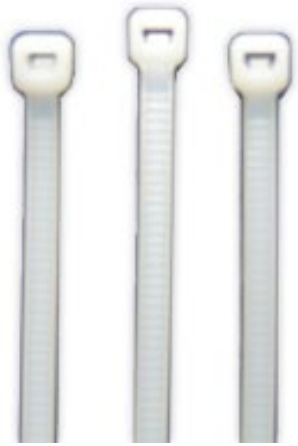
Systems – Duct Sealing (R403.3.2)

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

State Amendment

More information

https://energy.hawaii.gov/what-we-do/energy-efficiency/solar-water-heat-variance/

https://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0196/HRS_0196-0006_0005.htm

Systems – Service Hot Water

Circulation systems (R403.5.1.1)

- If a pump is installed, automatic temperature and demand controls required

Heat trace systems (R403.5.1.1)

- If a heat trace is installed, automatic temperature controls required

Demand recirculation systems (R403.5.2)

- Control based on signal from user action
- Limit on hot water temperature entering cold water piping

(Water heaters covered by Federal standards)

Systems – Service Hot Water

R-3 hot water pipe insulation required (R403.5.3)

- Pipe ≥ ¾” diameter
- Serving more than one dwelling
- Outside conditioned space
- From water heater to manifold
- Under a slab
- Buried
- In recirculating systems

R-3 required except for:

- Piping under a slab
- Buried piping
- Piping serving only one dwelling unit

Honolulu Amendment

R-3 insulation (typically ½”)

Systems – Pools and Spas (R403.10)

On/off switch

Time switch

Cover for heated pool

- Unless >75% solar or heat pump

Courtesy Daniel Sandomire, Armstrong Builders

Section 7

Prescriptive - Electrical & Lighting

What's covered

Envelope

Roof
Walls
Windows & skylights
Air leakage

Systems

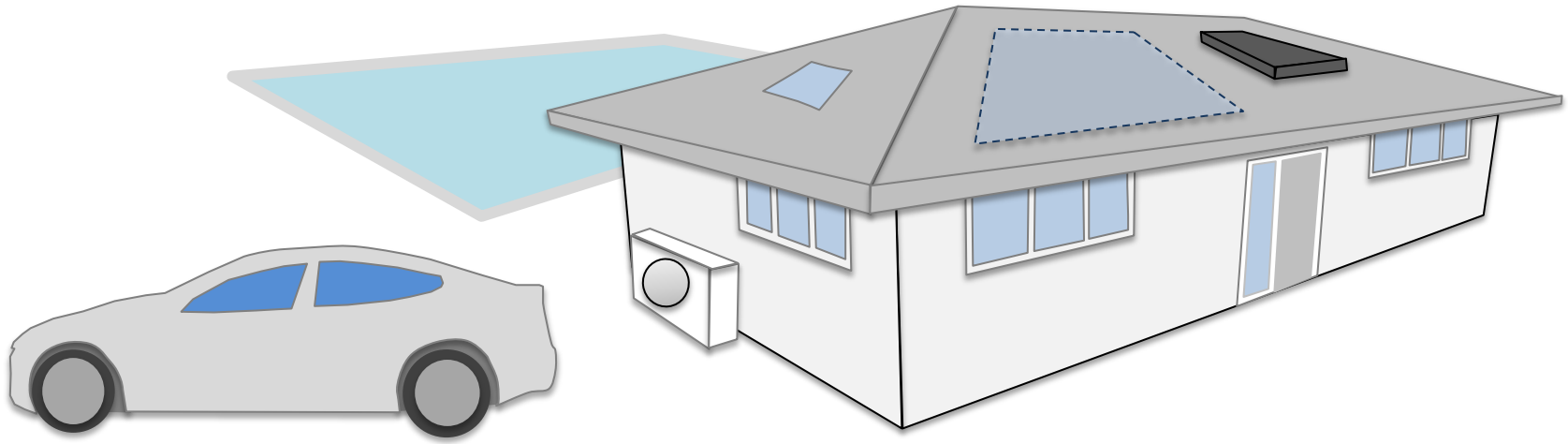
Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fans

Solar readiness
EV readiness
Honolulu Amendment

Solar readiness
EV readiness
Maui Amendment



Not covered

AC efficiency
Water heater efficiency
Plug-in lighting
Appliances

Lighting (R404.1)

High efficacy
≥ 90% of lamps

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

HIGH-EFFICACY LIGHTING means an efficacy of not less than 70 lumens per watt for lamps and 55 lumens per watt for fixtures.

Honolulu Amendment

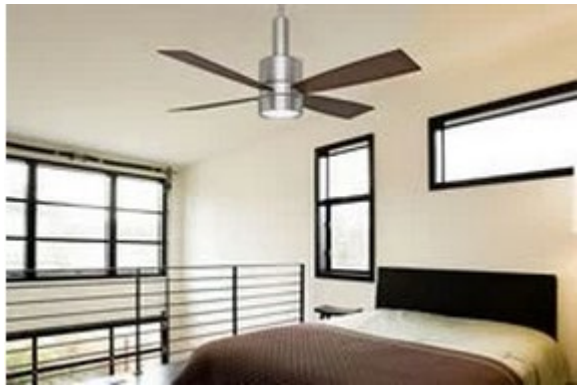
Source: DOE/NREL PIX20307

LED

Ceiling Fans (R404.2)

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

State Amendment



Exception: For production home building, ceiling fan junction boxes shall be provided for bedrooms and the largest interior space that is not used as a bedroom, and ceiling fan equipment shall be provided as a buyer's option.

Honolulu Amendment

Section 8

Solar and Electric Vehicle Readiness

https://www.clippercreek.com/

What's covered

Envelope

Roof
Walls
Windows & skylights
Air leakage

Systems

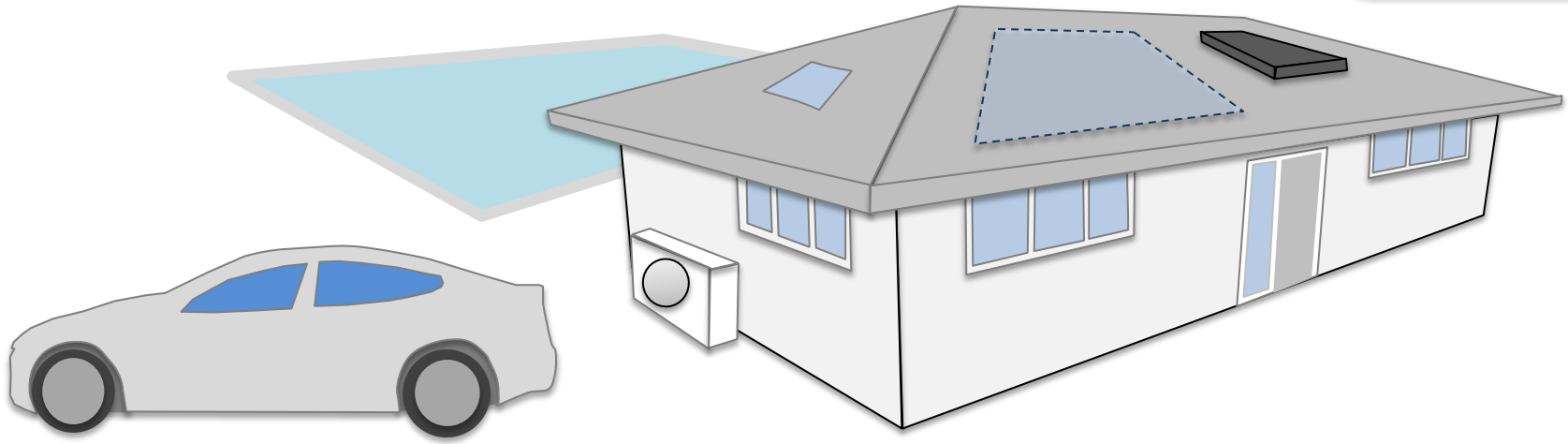
Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fans

Solar readiness
EV readiness
Honolulu Amendment

Solar readiness
EV readiness
Maui Amendment



Not covered

AC efficiency
Water heater efficiency
Plug-in lighting
Appliances

Solar Readiness

Honolulu amendment

R408.1

Solar conduit and electrical panel readiness

- Plans show:
  - A location for solar equipment
  - Pathway for conduit
- Electrical panel reserve capacity:
  - Single family/duplex: 5kW PV per unit
  - Multi-family: sized for common area load or roof space
- Conduit installed for new buildings
  - Electrical panel to inverter location
  - Inverter location to underside of roof

Maui amendment

Appendix RA Solar-Ready Provisions

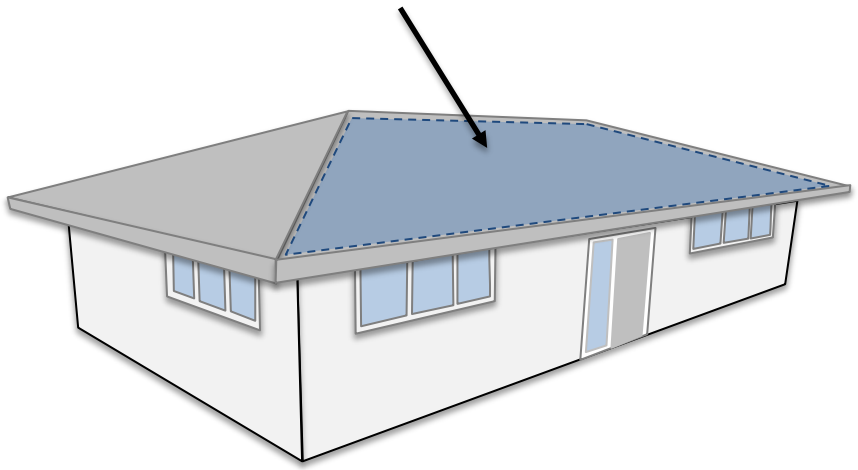
- Area reserved for PV or solar thermal system
- Pathways for routing of conduit or plumbing
- Electrical panel reserved space
- Permanent certificate near electrical panel

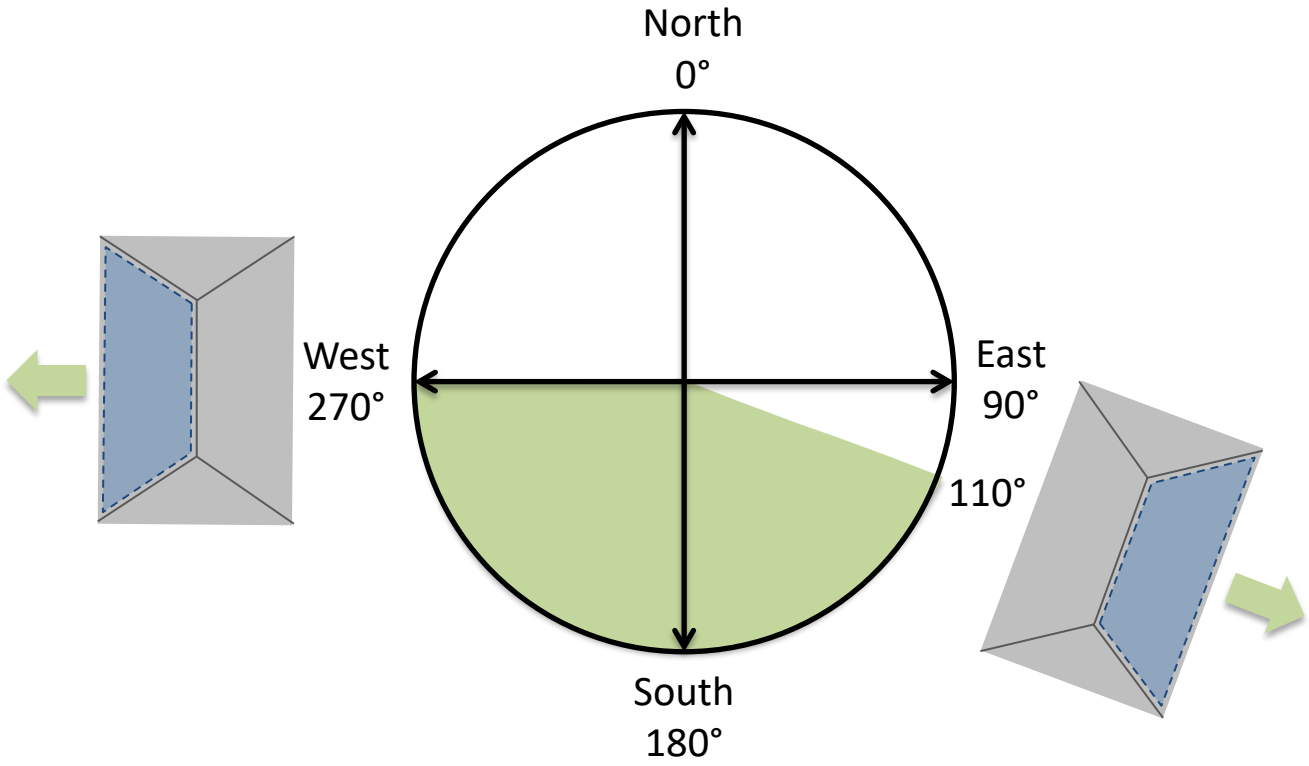
Solar Readiness - Appendix RA (Maui)

Maui amendment

When is compliance required?

When there is roof area ≥ 600 ft^2





That is oriented between 110° and 270°

Solar Readiness - Appendix RA (Maui)

Maui amendment

Exceptions

- Permanently installed on-site renewable energy system
- Roof is shaded >70% of daylight hours
- Tropical Zone compliance or Energy Rating Index compliance

Solar Readiness - Appendix RA (Maui)

Maui amendment

Solar-ready zone area requirements

(Excluding mandatory fire code setback or access areas)

Total area

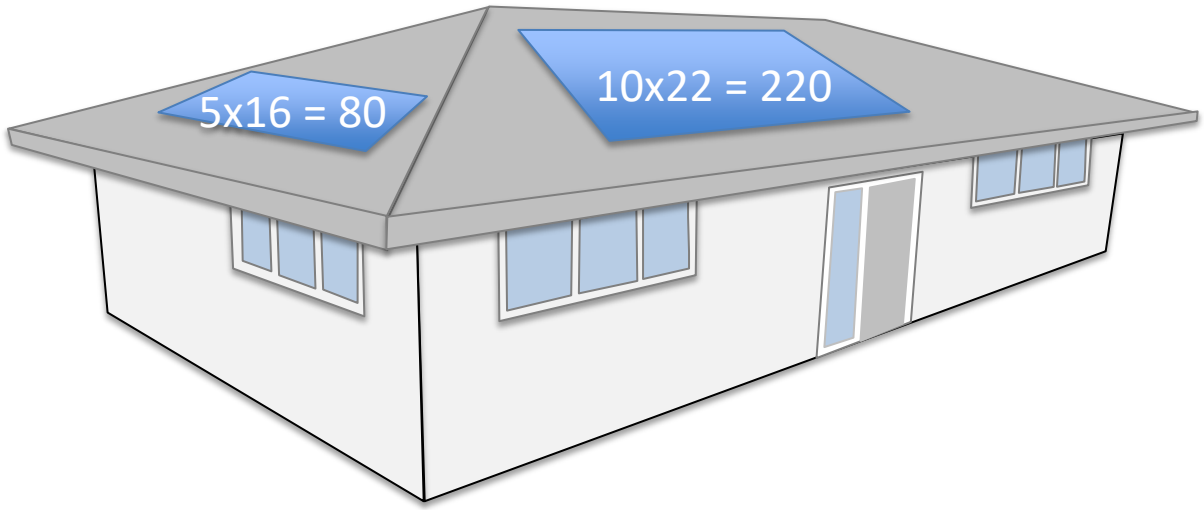
- ≥ 300 ft^2, or
- ≥ 150 ft^2 for townhouses ≤ 2,000 ft^2 floor area

Multiple separate areas ok

Minimum area dimensions

- ≥ 5 ft wide
- ≥ 80 ft^2

Example



Solar Readiness - Appendix RA (Maui)

Maui amendment

Other requirements

Free from obstructions

Roof load documentation

Interconnection pathway for conduit or plumbing

Electrical service reserved space

Construction documentation certificate

Electric Vehicle Readiness (R404.3)

HONOLULU R408.2

- Dedicated receptacle or junction box
- Minimum AC Level 2 charge
  (208 to 24OVAC 1-phase minimum 16A)
- In each enclosed attached garage

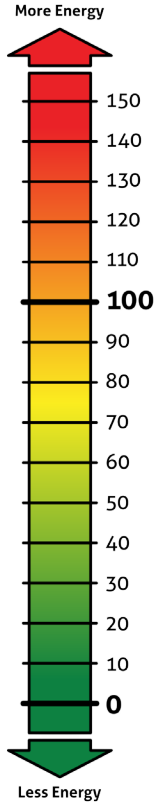
MAUI R404.3

- Dedicated receptacle
- Minimum AC Level 2 charge
- In each enclosed attached garage

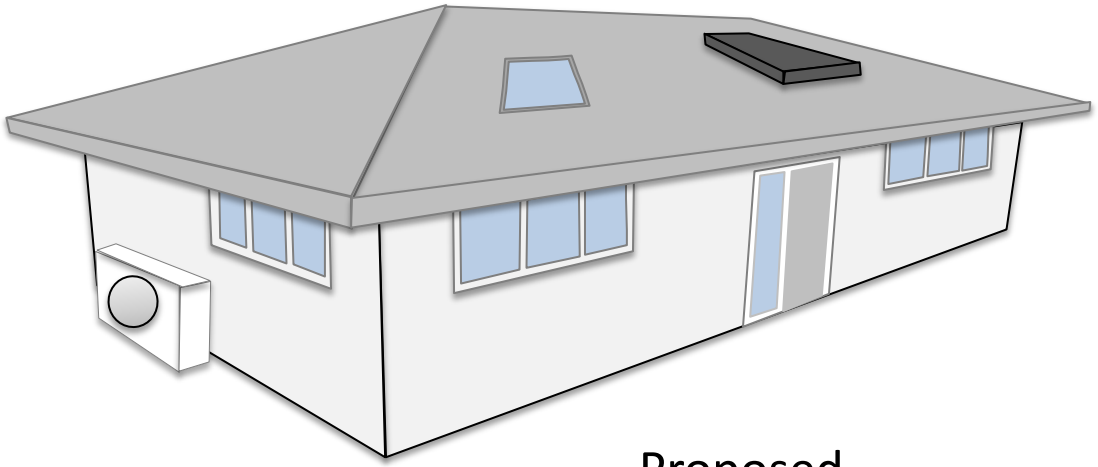
https://www.clippercreek.com/

Section 9

Performance Compliance Options

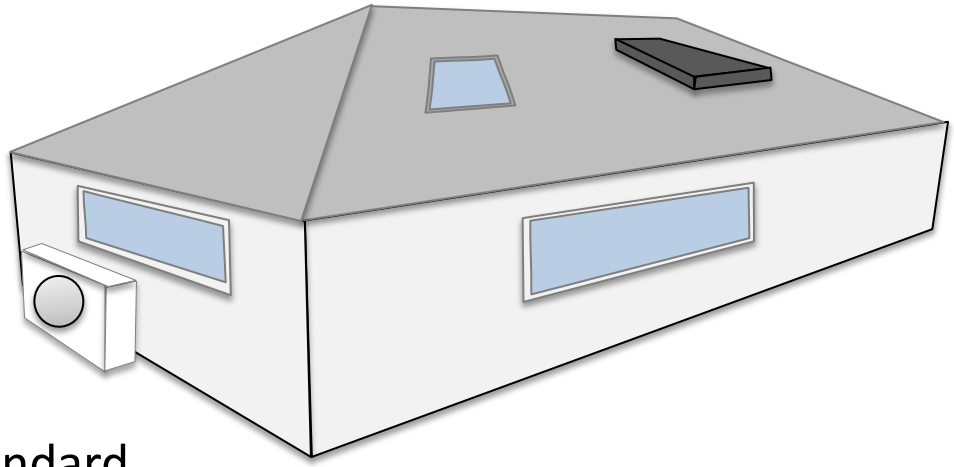


Simulated Performance Alternative (R405)



Proposed design $/year

≤



Standard reference design $/year

Common software

- REM/Rate and REM/Design
- Ekotrope
- EnergyGauge USA
- IC3 (Texas A&M)

Standard reference design

- Prescriptive envelope
- Window area ≤ 15% of floor area
- Windows equally distributed all sides
- No window shading
- Proposed cooling system
- Proposed water heating system

Energy Rating Index Compliance (R406)

Compliance

- Mandatory requirements
- Envelope performance ≥ 2009 IECC
- Energy Rating Index ≤ 57 (was 52)
- Verification by approved third party

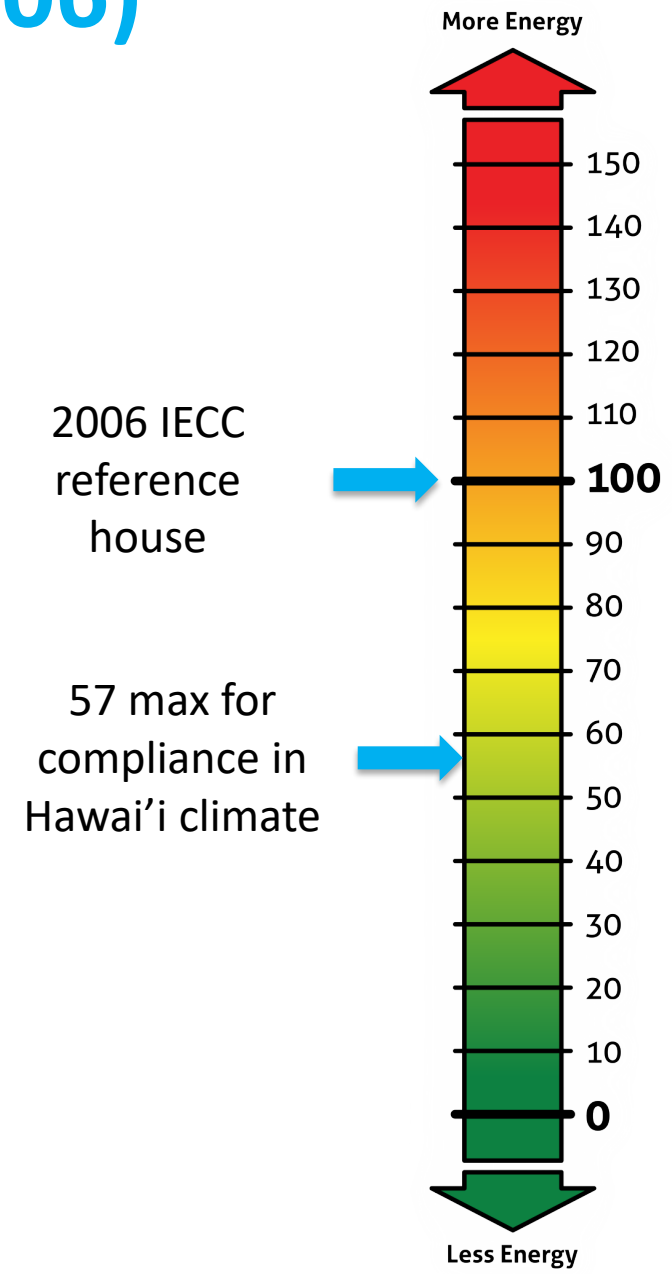
Accredited providers

https://www.resnet.us/providers/accredited-providers/accredited-rating-providers/

Accredited software tools (Dec. 2023)

https://www.resnet.us/providers/accredited-providers/hers-software-tools/

- Ekotrope
- EnergyGauge USA
- REM/Rate



Section 10

Large homes compliance

Large home compliance (Honolulu R401.3)

All single-family homes ≥ 7000 ft²

- Demand response controls
  - Electric water heaters
  - AC >2.5 tons
  - Pool and spa pumps
  - Electric pool and spa heaters
- Walls
  - R-13 minimum, or
  - Solar reflectance ≥0.30
- Roofs any two:
  - R30
  - Attic ventilation
  - Cool roof

≥ 7000 ft² and ≥ 2000 ft² of A/C space

- Compliance alternative:
  - Simulated performance alternative, 10% better than reference design, or
  - Energy rating index alternative, ERI<52
- HVAC must be multi-stage variable capacity
- Thermostats capable of demand response

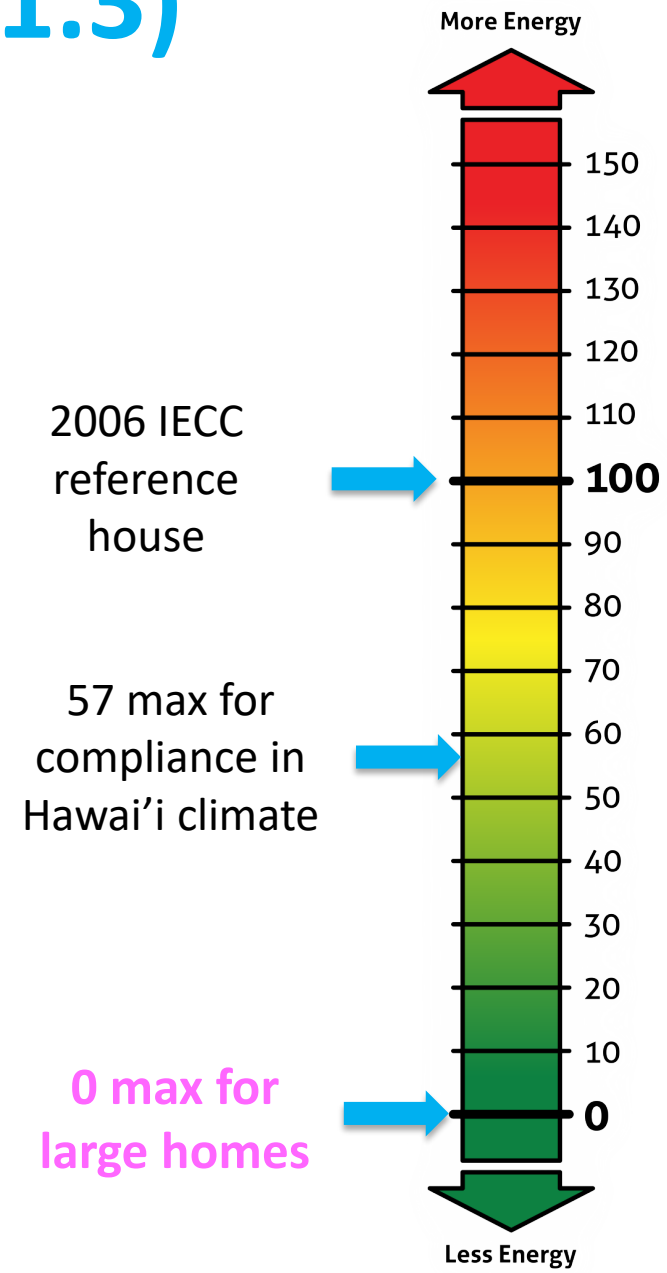
Honolulu Amendment

Large home compliance (Maui R401.3)

Maui Amendment

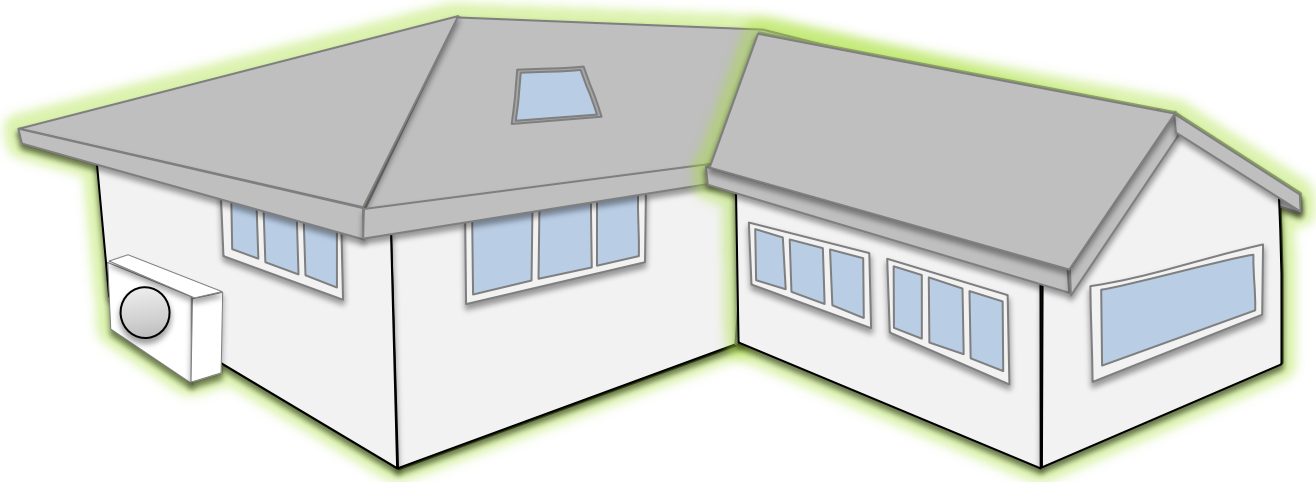
R401.2 Compliance. New one- or two-family residential buildings with five thousand square feet or more of conditioned floor area must achieve a verified maximum energy rating index (ERI) score of zero. All projects must also comply with one of the following:

1. Sections R401.3 through R404.
2. Section R405 and the provisions of Section R401 through R404 labeled "Mandatory."
3. An energy rating index (ERI) approach in Section R406.
4. The tropical zone requirements in Subsection R401.2.1.



Section 11

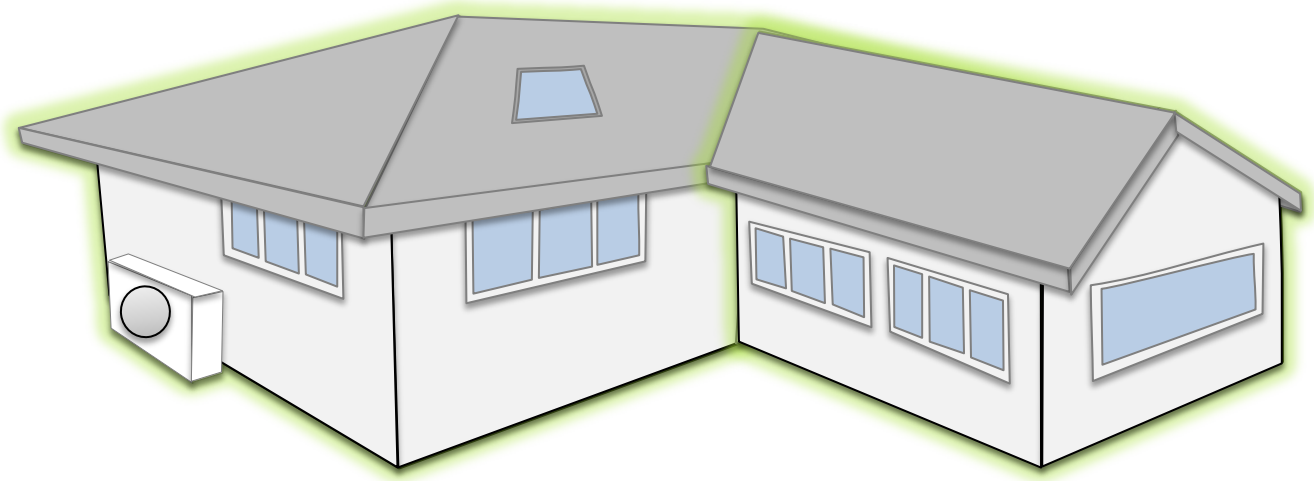
Existing Building Compliance



Additions (R502)

Three options

1. New construction requirements for addition alone
2. Performance method for existing + addition
3. Existing + addition no more energy than existing



Envelope

New roof

New walls

New windows & skylights

Air leakage

Systems

New AC

New duct

New water heating

New lighting

Alterations (R503)

General requirement for alterations

Altered components meet new construction requirements

Example alterations

- New windows in existing wall
- Replaced windows with sash and frame
- New AC system
- New water heating system
- New lighting systems
- Replace wall siding
- Roof replacement

Some exceptions

Alterations (R503)

Roof

Meet new construction insulation requirements

Exceptions

- Roof repair – no requirement
- Roof recover – no requirement
- Roof replacement – State amendment

***ROOF REPLACEMENT**. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.*

Roof replacement options

1. R-30 insulation or cool roof
2. R-19 or cool roof (Tropical Zone)
3. Choose two
   1. Energy Star roof covering
   2. Radiant barrier
   3. Attic ventilation
   4. Exceptions listed in C402.3
4. Shake on battens replaced with equal or better performance

1. Portions covered by:
   - Photovoltaic systems or components.
   - Solar air or water-heating systems or components.
   - Roof gardens or landscaped roofs.
   - Above-roof decks or walkways.
   - Skylights.
   - HVAC systems and components, and other opaque objects mounted above the roof.
2. Portions shaded during summer solstice
3. Portions ballasted with stone 17 lb/sf

Alterations (R503)

Walls

R-value or U-factor for new construction

Exceptions

- Wall cavity is not exposed
- Wall cavity is filled with insulation

Alterations (R503)

Windows

0.25 SHGC for new windows and replacement windows or skylights

(Area weighted average allowed)

Skylights

U-factor ≤ 0.75

SHGC ≤ 0.30

(Area weighted average allowed)

Exception

- Glazing-only repairs of existing windows and skylights

Alterations (R503)

Air conditioning systems

New systems and components meet new construction requirements

Exceptions

- Duct extensions of less than 40 ft in unconditioned space

Water heating systems

New systems and components meet new construction requirements

Alterations (R503)

Lighting

High efficacy ≥ 90% of lamps

Exceptions

- Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

Section 12

Wrap Up

Wrap Up – Compliance Alternatives

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

4. Energy rating index (ERI)
   - ERI ≤ 57
5. Large homes
   - Honolulu and Maui

Q&A

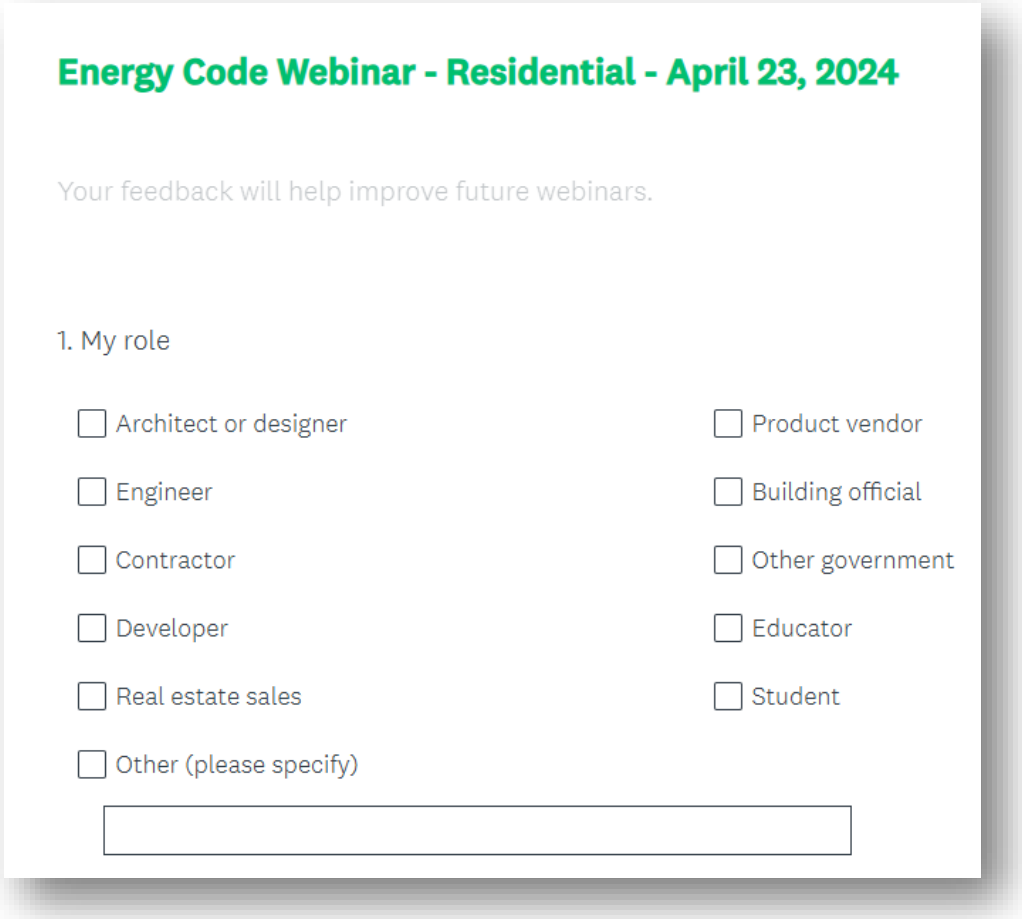
Howard Wiig, State Energy Office

Erik Kolderup, PE, Kolderup Consulting

Justin Bizer, Hawaii Energy

Evaluation Survey

https://www.surveymonkey.com/r/6GCJ3ZP



For more energy code information

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2018 IECC available:

- http://iccsafe.org/publications
- https://codes.iccsafe.org/content/iecc2018

State Energy Code Website: https://energy.hawaii.gov/hawaii-building-energy-code

Honolulu : https://www.resilientoahu.org/energycode

Maui: https://www.mauicounty.gov/1308/Building-Plans-Review-Section

Kauai: https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division