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2015 IECC Residential: Overview of the Residential Requirements

Howard Wiig, Hawaii State Energy Office

Eric Makela, Cadmus

Section I

INTRODUCTION



Structure of the 2015 IECC

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Residential Provisions

Chapter 1 – Scope and Administration

Chapter 2 – Definitions

Chapter 3 – General Requirements

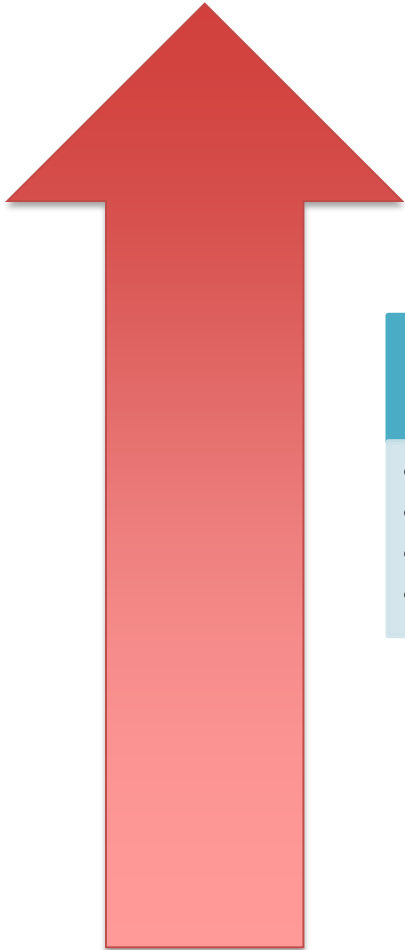
Chapter 4 – Residential Energy Efficiency

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Energy Savings Potential for Adoption of the 2015 IECC



Cumulative Residential energy savings compared to the 2006 IECC

- **2 GWh/yr in 2016**
- 369 GWh/yr in 2026
- 687 GWh/yr in 2030
- 1,317 GWh/yr in 2036

Cumulative Commercial energy savings compared to ASHRAE Standard 90.1-2004

- **11 GWh/yr in 2016**
- 715 GWh/yr in 2026
- 1,304 GWh/yr in 2030
- 3,386 GWh/yr in 2036

Cumulative Net Savings

- **13 GWh/yr in 2016**
- 1,084 GWh/yr in 2026
- 1,991 GWh/yr 2030
- 4,703 GWh/yr in 2036

How Much is a Gigawatt:
Power for approximately 200,000 homes for one year



Section II

RESIDENTIAL PROVISIONS: AN OVERVIEW





Section R401

General



Compliance Options

Tropical Zone

Section R401.2.1

- Residential buildings in tropical zone at elevations below 2,400ft
- Best suited for sites with large yards of dense landscaping

Prescriptive

Sections R401-R404

- No trade-offs permitted
- No tools needed
- Historically the preferred compliance option of designers in Hawaii

Total UA Alternative

Section R402.1.5

- U-factor and assembly area used to determine trade off
- Calculation performed using approved method
- U.S. DOE REScheck

Performance

Section R405

- Mandatory provisions must be met
- Simulated energy performance analysis for heating, cooling and SHW
- Proposed design must have annual energy cost less than or equal to energy cost of reference design

Energy Rating Index

Section R406

- Mandatory provisions must be met
- Building envelope requirements of 2009 IECC





Section R402



Prescriptive Building Thermal Envelope



Table R402.1.2 Insulation and Fenestration Requirements by Component

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

¹Proposed County Amendment

Specific Insulation Requirements

R402.2 Hawaii Specific

R402.2 Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.13.

Exception:

Above-grade walls and ceilings shall be permitted to comply with **Section R407 Points Option.**



Glazed Fenestration SHGC

R402.3.2 Hawaii Specific

Glazed fenestration SHGC. Fenestration shall have a maximum *solar heat gain coefficient* as specified in Table R402.1.2. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.



Points Option

R407 NEW!

SECTION R407

POINTS OPTION

- **R407.1 General (Prescriptive).** Above-grade walls and roofs are permitted to comply with the points option as an alternative to complying with Section R401.2.1 and R402.2.
- **R407.2 Requirements.** One or more efficiency measures shall be selected for roof and *above-grade* wall systems from Table R407.1 that cumulatively equal or exceed 0 (zero) points.
- As an alternative, *above-grade walls* and roofs are permitted to comply separately by scoring 0 (zero) or greater.



Table R407

Points Option - Wood Framed Walls

Walls		Standard Home Points	Tropical Home Points
Wood Framed			
	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 insulation + 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	Not Applicable	2
	House floor area $\leq 1,000$ ft ²	1	1
	House floor area $\geq 2,500$ ft ²	-1	-1
	Energy Star Fans ⁸	1	1
	Install 1 kW or greater of solar electric	1	1



Table R407

Points Option - Metal Framed Walls

Walls		Standard Home Points	Tropical Home Points
Metal Framed			
	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 insulation + 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	<u>0</u>	<u>1</u>
	Ductless Air Conditioner ⁷	<u>1</u>	<u>1</u>
	<u>1.071 X Federal Minimum SEER for Air Conditioner</u>	<u>1</u>	<u>1</u>
	<u>1.142 X Federal Minimum SEER for Air Conditioner</u>	<u>2</u>	<u>2</u>
	No air conditioning installed	<u>Not Applicable</u>	<u>2</u>
	House floor area \leq 1,000 ft ²	<u>1</u>	<u>1</u>
	House floor area \geq 2,500 ft ²	<u>-1</u>	<u>-1</u>
	Energy Star Fans ⁷	<u>1</u>	<u>1</u>
	Install 1 kW or greater of solar electric	<u>1</u>	<u>1</u>



Table R407

Points Option- Footnotes

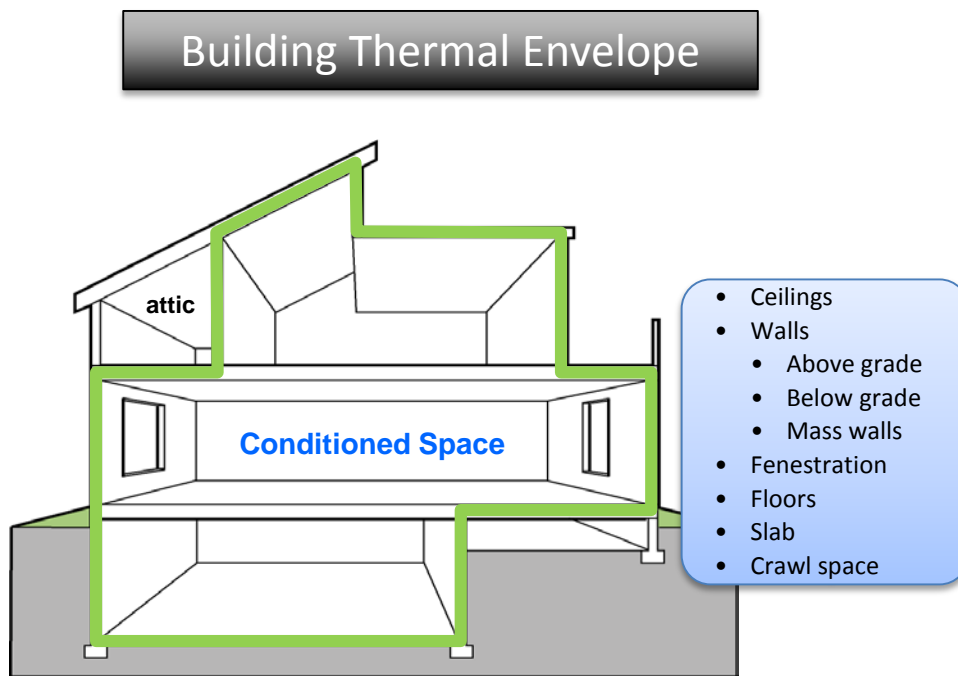
- ¹ Cool roof with three-year aged solar reflectance of 0.55 and 3-year aged thermal emittance of 0.75 or 3-year aged solar reflectance index of 64.
- ² One cfm/ft² attic venting.
- ³ Radiant barrier shall have an emissivity of no greater than 0.05 as tested in accordance with ASTM E-408. The radiant barrier shall be installed in accordance with the manufacturer's installation instructions.
- ⁴ Walls with covering with a reflectance of ≥ 0.64 .
- ⁵ Energy Star rated appliances include refrigerators, dishwashers, and clothes washers and must be installed for the Certificate of Occupancy
- ⁶ The wall projection factor is equal to the horizontal distance from the surface of the wall to the farthest most point of the overhang divided by the vertical distance from the first floor level to the bottom most point of the overhang.
- ⁷ All air conditioning systems in the house must be ductless to qualify for this credit.
- ⁸ Install ceiling fans in all bedrooms and the largest space that is not used as a bedroom.



Air Leakage (Mandatory)

R402.4

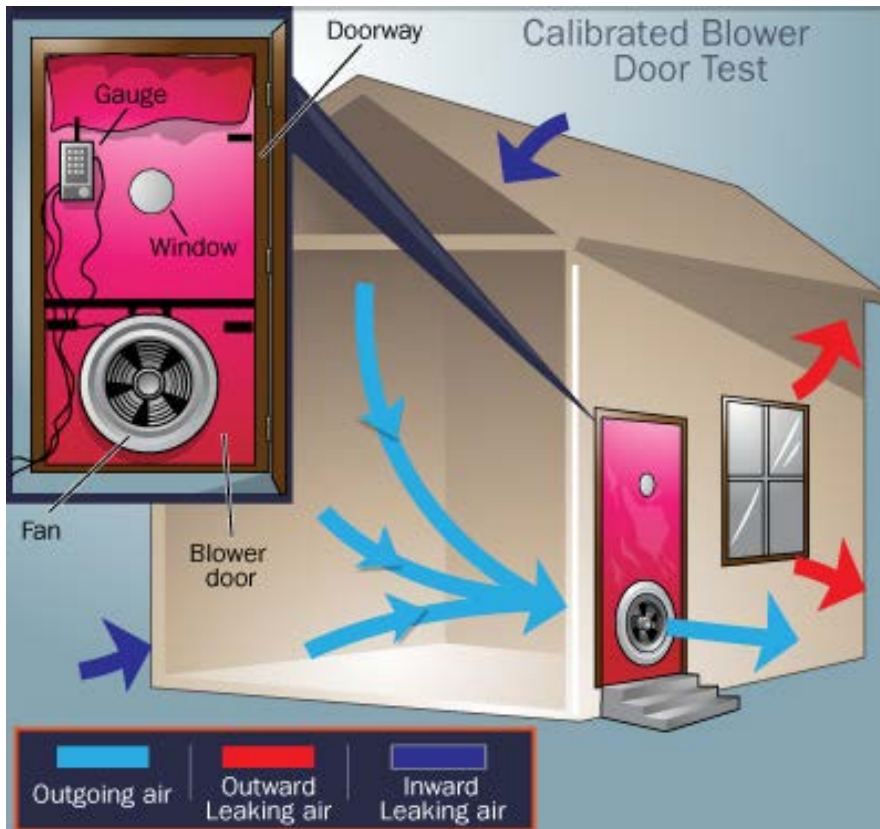
All components must be installed in accordance with manufacturer's instructions and in accordance with Table R402.4.1.1. An approved third party is permitted to inspect components for compliance (R402.4.1.1 Installation).



- Homes must be tested and verified as having ≤ 5 ACH when tested at pressure differential of 0.2 inches w.g. (50 Pa).
- Testing may be conducted by a third party and can occur any time after rough-in and installation of building envelope penetrations.



Testing R402.4.1.2



Recessed Lighting

R402.4.5

R402.4.5

Recessed lighting must be IC-rated and labeled with an air leakage rate not more than 2 cfm when tested at a pressure differential of 75 Pa.





Section R403

Systems



Duct Testing (Mandatory) and Duct Leakage (Prescriptive)

R403.3.3 and R403.3.4

Duct Tightness Verification

Rough-In Test

Total leakage ≤ 4 cfm/per 100 ft² of conditioned floor area when tested at a pressure differential of 0.1 in w.g. (25Pa) across roughed-in system, including manufacturer's air handler enclosure, and all register boots taped or otherwise sealed.

If air handler not installed at time of test, total air leakage ≤ 3 cfm/per 100 ft².

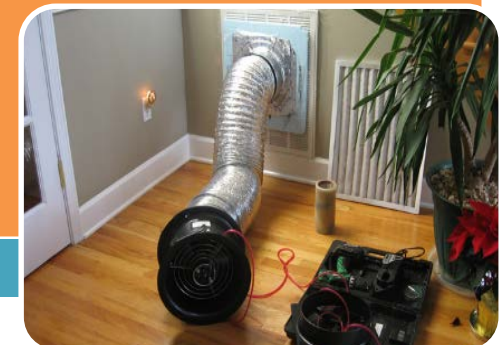
Post Construction Test

Total leakage ≤ 4 cfm/per 100 ft² of conditioned floor area when tested at a pressure differential of 0.1 in w.g. (25Pa) across entire system, including manufacturer's air handler enclosure, and all register boots taped or otherwise sealed.

Exception: Test not required if air handler and all ducts are within conditioned space.

Written Report

Qualified third parties permitted to conduct duct testing.



Solar Water Heating

R403.5.4 Hawaii Specific

- **Section R403.5.5 Solar water heating.** Solar water heating systems are required for new single-family residential construction pursuant to HRS 196-6.5.





Section 404

Electrical Power and Lighting Systems



Lighting Equipment

R404.1

- A minimum of 75 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.



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



Ceiling Fans

R404.2 Hawaii Specific

- **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.



Option Three - Simulated Performance Alternative R405

- Mandatory requirements of prescriptive path must be met to comply with performance path.
- Proposed design must have annual energy cost *less than or equal to* annual energy cost of standard referenced design.
- Hawaii specific amendments to Table R405.5.2(1) permit energy neutral trade-offs.

Table R405.5.2(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating Systems	<p>As proposed for other than electric heating without a heat pump, where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of section C403 of the ICC Commercial Provisions.</p> <p>Fuel type: <u>same as proposed design</u></p> <p>Efficiencies: <u>Electric: Air source heat pump with prevailing federal minimum standards</u> <u>Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards</u> <u>Nonelectric boilers: natural gas boiler with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.7</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Cooling systems	<p>As proposed</p> <p>Fuel type: <u>Electric</u></p> <p>Efficiency: <u>in accordance with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.7</p>	<p>As proposed</p> <p>As proposed</p>
Service water heating	<p>As proposed</p> <p>Fuel type: <u>same as proposed design</u></p> <p>Efficiency: <u>in accordance with prevailing federal minimum standards</u></p> <p>Use: Same as proposed design</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>gal/day = 30+(10x Nbr)</u></p>



CADMUS



Howard C. Wiig

Energy Analyst, Hawaii State Energy Office

Office (808) 587-3811

howard.c.wiig@hawaii.gov