

**COUNCIL OF THE COUNTY OF MAUI**

**ENVIRONMENTAL, AGRICULTURAL, AND  
CULTURAL PRESERVATION COMMITTEE**

March 8, 2019

**Committee  
Report No. \_\_\_\_\_**

Honorable Chair and Members  
of the County Council  
County of Maui  
Wailuku, Maui, Hawaii

Chair and Members:

Your Environmental, Agricultural, and Cultural Preservation Committee, having met on January 29, 2019, makes reference to General Communication 17-10, from David Cohan, U.S. Department of Energy, relating to the adoption of the Hawaii State Energy Conservation Code.

By correspondence dated January 15, 2019, the Acting Director of Public Works transmitted a proposed bill entitled "A BILL FOR AN ORDINANCE REPEALING CHAPTER 16.16A, MAUI COUNTY CODE, AND ESTABLISHING A NEW CHAPTER 16.16B, MAUI COUNTY CODE, PERTAINING TO THE ENERGY CODE," and a bound volume entitled "2015 INTERNATIONAL ENERGY CONSERVATION CODE."

The purpose of the proposed bill is to repeal Chapter 16.16A, Maui County Code ("MCC"), and establish a new Chapter 16.16B, MCC. The new chapter would adopt the 2015 International Energy Conservation Code, as amended by the provisions set forth in the new chapter to tailor the Energy Code to the County's needs.

Your Committee notes the County has a deadline of March 31, 2019, to adopt its own version of the Energy Code, or the State version will become the County's interim code.

Your Committee further notes the Energy Code regulates minimum energy conservation requirements for new buildings. The Code addresses energy conservation requirements for all aspects of energy uses in both commercial and residential construction, including heating and ventilating, lighting, water heating, and power usage for appliances and building systems. The Energy Code sets forth minimum

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requirements for exterior envelope insulation, certain window and door ratings, duct insulation, lighting and power efficiency, and water distribution insulation, and is divided into a section for commercial use and a section for residential use.

Howard Wiig, Energy Analyst, Hawaii State Energy Office, State Department of Business, Economic Development and Tourism, said the 2015 International Energy Conservation Code recognized a new Tropical Climate Zone directed specifically at Hawaii.

Mr. Wiig said the Energy Code is a response to climate change and the need to reduce carbon emissions. The Energy Code promotes building efficiencies. He said the Energy Code strives to meet a goal of zero net energy, meaning the amount of energy a home is using is roughly equal to the amount of energy its rooftop produces.

The Acting Director of Public Works said the Department's Development Services Administration Division administers four building-related codes, the Building Code, Electrical Code, Plumbing Code, and Energy Code. The Department has inspectors for the first three codes, but not for the Energy Code. The Department relies on design professionals to stamp plans and certify they are in accordance with County Energy Code requirements.

A representative of the Department said the Department worked with stakeholders to craft the proposed amendments. The intent of the proposed amendments is to provide design professionals added flexibility and lower construction costs. He noted Kauai County is thus far the only county in Hawaii to adopt the updated Energy Code. Kauai County adopted the updated Energy Code, with local amendments, by Ordinance 1043 (2018).

Your Committee discussed specific impacts of the Energy Code. Your Committee requested the Department have an informational

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meeting prior to the Council's consideration of the proposed bill on first reading.

Your Committee voted 7-0 to recommend passage of the proposed bill on first reading, incorporating nonsubstantive revisions, and filing of the communication. Committee Chair Sinenci, Vice-Chair Kama, and members King, Lee, Molina, Paltin, and Sugimura voted "aye."

Your Committee is in receipt of a revised proposed bill, approved as to form and legality by the Department of the Corporation Counsel, incorporating nonsubstantive revisions.

Your Environmental, Agricultural, and Cultural Preservation Committee RECOMMENDS the following:

1. That Bill \_\_\_\_\_ (2019), attached hereto, entitled "A BILL FOR AN ORDINANCE REPEALING CHAPTER 16.16A, MAUI COUNTY CODE, AND ESTABLISHING A NEW CHAPTER 16.16B, MAUI COUNTY CODE, PERTAINING TO THE ENERGY CODE," be PASSED ON FIRST READING and be ORDERED TO PRINT; and
2. That General Communication 17-10 be FILED.

This report is submitted in accordance with Rule 8 of the Rules of the Council.



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SHANE M. SINENCI, Chair

ORDINANCE NO. \_\_\_\_\_

BILL NO. \_\_\_\_\_ (2019)

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

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

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

SECTION 2. The “2015 *International Energy Conservation Code*®” as copyrighted and first published in 2014 by the International Code Council, Inc., 4051 West Flossmoor Road, Country Club Hills, IL 60478, is hereby incorporated herein by reference and made a part of hereof and adopted, subject to the provisions of Chapter 16.16B, Maui County Code, as herein enacted and as hereafter may be amended.

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

**“Chapter 16.16B**

**ENERGY CODE**

Sections:

16.16B.010	The International Energy Conservation Code incorporated.
16.16B.C101.1	Subsection C101.1 amended.
16.16B.C101.4	Subsection C101.4 amended.
16.16B.C102.1	Subsection C102.1 amended.
16.16B.C103.1	Subsection C103.1 deleted in its entirety and replaced.

16.16B.C103.3	Subsection C103.3 deleted in its entirety and replaced.
16.16B.C103.4	Subsection C103.4 deleted in its entirety and replaced.
16.16B.C103.5	Subsection C103.5 deleted in its entirety and replaced.
16.16B.C104	Section C104 deleted in its entirety and replaced.
16.16B.C106.1.1	Subsection C106.1.1 amended.
16.16B.C106.1.2	Subsection C106.1.2 amended.
16.16B.C107	Section C107 deleted in its entirety and replaced.
16.16B.C108	Section C108 deleted in its entirety and replaced.
16.16B.C109	Section C109 deleted in its entirety and replaced.
16.16B.C201.3	Subsection C201.3 amended.
16.16B.C402.1.1	Subsection C402.1.1 amended.
16.16B.C402	Table C402.1.3 deleted in its entirety and replaced.
16.16B.C402.2.3	Subsection C402.2.3 amended.
16.16B.C402.4.3.5	Subsection C402.4.3.5 added.
16.16B.C402.5	Subsection C402.5 amended.
16.16B.C403.2.4.2.4	Subsection C403.2.4.2.4 added.
16.16B.C405.2	Subsection C405.2 amended.
16.16B.C405.2.4	Subsection C405.2.4 amended.
16.16B.C405.10	Subsection C405.10 added.
16.16B.C406.3	Subsection C406.3 amended.
16.16B.C407.3	Subsection C407.3 amended.
16.16B.C407.4	Subsection C407.4 deleted.
16.16B.C407.4.1	Subsection C407.4.1 amended.
16.16B.C407.6	Subsection C407.6 amended.
16.16B.C407.6.1	Subsection C407.6.1 deleted.
16.16B.C407.6.3	Subsection C407.6.3 amended.
16.16B.C408.2	Subsection C408.2 amended.
16.16B.C408.2.4.1	Subsection C408.2.4.1 deleted.
16.16B.C408.3.1	Subsection C408.3.1 amended.
16.16B.C501.4	Subsection C501.4 amended.
16.16B.C503.3.1	Subsection C503.3.1 amended.
16.16B.R101.1	Subsection R101.1 amended.
16.16B.R101.4	Subsection R101.4 amended.
16.16B.R102.1	Subsection R102.1 amended.
16.16B.R103.1	Subsection R103.1 deleted in its entirety and replaced.
16.16B.R103.3	Subsection R103.3 deleted in its entirety and replaced.

16.16B.R103.4	Subsection R103.4 deleted in its entirety and replaced.
16.16B.R103.5	Subsection R103.5 deleted in its entirety and replaced.
16.16B.R104	Section R104 deleted in its entirety and replaced.
16.16B.R106.1.1	Subsection R106.1.1 amended.
16.16B.R106.1.2	Subsection R106.1.2 amended.
16.16B.R107	Section R107 deleted in its entirety and replaced.
16.16B.R108	Section R108 deleted in its entirety and replaced.
16.16B.R109	Section R109 deleted in its entirety and replaced.
16.16B.R201.3	Subsection R201.3 amended.
16.16B.R401.2	Subsection R401.2 amended.
16.16B.R401.2.1	Subsection R401.2.1 amended.
16.16B.R401.3	Subsection R401.3 amended.
16.16B.R402.1	Subsection R402.1 amended.
16.16B.R402	Table R402.1.2 deleted in its entirety and replaced.
16.16B.R402.2	Subsection R402.2 amended.
16.16B.R402.3.2	Subsection R402.3.2 amended.
16.16B.R402.4.1.2	Subsection R402.4.1.2 amended.
16.16B.R403.5.5	Subsection R403.5.5 added.
16.16B.R404.2	Subsection R404.2 added.
16.16B.R404.3	Subsection R404.3 added.
16.16B.R405	Table R405.5.2(1) amended.
16.16B.R407	Section R407 added.
16.16B.R501.4	Subsection R501.4 amended.
16.16B.R503.1.1	Subsection R503.1.1 amended.

**16.16B.010 The International Energy Conservation Code**

**incorporated.** The “2015 International Energy Conservation Code®” herein referred to as the “International Energy Conservation Code,” “Energy Code,” or “this code,” as copyrighted and first published in 2014 by the International Code Council, Inc. 4051 West Flossmoor Road, Country Club Hills, IL 60478, is incorporated by reference and made a part hereof, subject to the amendments set

forth in chapter 16.16B, Maui County Code, as hereinafter enacted and as hereinafter may be amended.

**16.16B.C101.1 Subsection C101.1 amended.** Subsection C101.1 of the International Energy Conservation Code is amended to read as follows:

**C101.1 Title.** This code shall be known as the *International Energy Conservation Code of the County of Maui*, and shall be cited as such. It is referred to herein as “this code.”

**16.16B.C101.4 Subsection C101.4 amended.** Subsection C101.4 of the International Energy Conservation Code is amended to read as follows:

**C101.4 Applicability.** Where, in any specific case, different sections of this code or other adopted codes specify different materials, methods of construction or other requirements, the [most restrictive shall govern.] code official shall determine which code requirement prevails. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**16.16B.C102.1 Subsection C102.1 amended.** Subsection C102.1 of the International Energy Conservation Code is amended to read as follows:

**C102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been approved by the code official as meeting the intent of this code. The code official may allow lower energy conservation standards for nonstandard building materials, unique or limitations of design, special methods of construction, and geographical location. The code official may require construction plans, research reports, and tests prepared by a registered design professional in order to allow such lower standards.

**16.16B.C103.1 Subsection C103.1 deleted in its entirety and replaced.**  
Subsection C103.1 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**C103.1 General.** When the requirements in this code apply to a building as specified in Section C101, then all plans, specifications, or other construction documents submitted for a building, electrical, or plumbing permit required by the jurisdiction shall comply with this code and shall be prepared, designed, approved, and observed by a registered design professional as required by Chapter 464 of the Hawaii Revised Statutes, as amended. The registered design professional shall provide on the plans a statement certifying that the project substantially conforms with this code.

**Exception:** Any building, electrical, or plumbing work that is not required to be prepared, designed, approved, or observed by a licensed architect or engineer pursuant to Chapter 464 of the Hawaii Revised Statutes, as amended.

**16.16B.C103.3 Subsection C103.3 deleted in its entirety and replaced.**

Subsection C103.3 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**C103.3 Examination of documents.** Examination of documents shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C103.4 Subsection C103.4 deleted in its entirety and replaced.**

Subsection C103.4 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**C103.4 Amended construction documents.** Amended construction documents shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C103.5 Subsection C103.5 deleted in its entirety and replaced.**

Subsection C103.5 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**C103.5 Retention of construction documents.** Retention of construction documents shall comply with the provisions of Chapter



1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C104 Section C104 deleted in its entirety and replaced.**

Section C104 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION C104**  
**INSPECTIONS**

**C104.1 General.** Inspections shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C106.1.1 Subsection C106.1.1 amended.** Subsection C106.1.1

of the International Energy Conservation Code is amended to read as follows:

**C106.1.1 Conflicts.** [Where] The code official shall make the final determination in the event conflicts occur between provisions of this code and referenced codes and standards[, the provisions of this code shall apply].

**16.16B.C106.1.2 Subsection C106.1.2 amended.** Subsection C106.1.2

of the International Energy Conservation Code is amended to read as follows:

**C106.1.2 Provisions in referenced codes and standards.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the code official shall determine which shall take precedence between the provisions of this code[, as applicable, shall take precedence over] or the provisions in the referenced code or standard.

**16.16B.C107 Section C107 deleted in its entirety and replaced.**

Section C107 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION C107**  
**FEES**

**C107.1 General.** Fees shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C108 Section C108 deleted in its entirety and replaced.**

Section C108 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION C108**  
**STOP WORK ORDER**

**C108.1 General.** Stop work orders shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C109 Section C109 deleted in its entirety and replaced.**

Section C109 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION C109**  
**VARIANCES AND APPEALS**

**C109.1 General.** Variances and appeals shall comply with the variances and appeals provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.C201.3 Subsection C201.3 amended.** Subsection C201.3 of the

International Energy Conservation Code is amended to read as follows:

**C201.3 Terms defined in other codes.** Terms that are not defined in this code but are defined in the International Building Code[, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code] or the International Residential Code shall have the meanings ascribed to them in those codes.

**16.16B.C402.1.1 Subsection C402.1.1 amended.** Subsection C402.1.1

of the International Energy Conservation Code is amended to read as follows:

**C402.1.1 Low-energy buildings.** The following low-energy buildings, or portions thereof separated from the remainder of the building by building thermal envelope assemblies complying with this section, shall be exempt from the building thermal envelope provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft<sup>2</sup> (10.7 W/m<sup>2</sup>) or 1.0 watt per square foot (10.7 W/m<sup>2</sup>) of floor area for space conditioning purposes.
2. [Those that do not contain conditioned space.] Unconditioned space that does not contain habitable space.
3. Greenhouses, towers, walls, and similar uses.

**16.16B.C402 Table C402.1.3 deleted in its entirety and replaced.**

Table C402.1.3 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**TABLE C402.1.3  
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM  
REQUIREMENTS, R-VALUE METHOD<sup>a</sup>**

<u>CLIMATE ZONE</u>	<u>1</u>	
	<u>All Other</u>	<u>Group R</u>
<b><u>Roofs</u></b>		
<u>Insulation entirely above roof deck</u>	<u>R-10ci</u>	<u>R-12.5ci</u>
<u>Metal buildings<sup>a b</sup></u>	<u>R-30 or R-19 w/cool roof</u>	<u>R-30 or R-19 w/cool roof</u>
<u>Attic and other room</u>	<u>R-30 or R-19 w/cool roof</u>	<u>R-30 or R-19 w/cool roof</u>
<b><u>Walls, above grade</u></b>		
<u>Mass</u>	<u>R-5.7ci<sup>c</sup></u>	<u>R-5.7ci<sup>c</sup></u>
<u>Metal building</u>	<u>R-13 + R-6.5ci</u>	<u>R-13 + R-6.5ci</u>
<u>Metal framed</u>	<u>R-13 + R-5ci</u>	<u>R-13 + R-5ci</u>
<u>Wood framed and other</u>	<u>R-13 + R-3.8ci or R-20</u>	<u>R-13 + R-3.8ci or R-20</u>

<b><u>Walls, below grade</u></b>		
<u>Below-grade wall</u>	<u>NR</u>	<u>NR</u>
<b><u>Floors</u></b>		
<u>Mass</u>	<u>NR</u>	<u>NR</u>
<u>Joist/framing</u>	<u>NR</u>	<u>NR</u>
<b><u>Slab-on-grade floors</u></b>		
<u>Unheated slabs</u>	<u>NR</u>	<u>NR</u>
<u>Heated slabs<sup>d</sup></u>	<u>R-7.5 for 12" below</u>	<u>R-7.5 for 12" below</u>
<b><u>Opaque doors</u></b>		
<u>Nonswinging</u>	<u>R-4.75</u>	<u>R-4.75</u>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 pound per cubic foot = 16 kg/m<sup>3</sup>.

ci = Continuous insulation, NR = No requirement, LS = Liner system.

- a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
- b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.
- c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft<sup>2</sup> °F. See Section C402.2.3.
- d. Steel floor joist systems shall be insulated to R-38.

**16.16B.C402.2.3 Subsection C402.2.3 amended.** Subsection C402.2.3

of the International Energy Conservation Code is amended to read as follows:

**C402.2.3 Thermal resistance of above-grade walls.** The minimum thermal resistance (R-value) of materials installed in the wall cavity between framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly.

**Exceptions:** Continuous insulation for wood, mass, and metal framed walls are not required when one or more of the following conditions are met:

1. Walls have a covering with a reflectance of equal to or greater than 0.64.
2. Walls have overhangs with a projection factor equal to or greater than 0.3. The projection factor is the horizontal distance from the surface of the wall to the furthest extremity of the overhang divided by the vertical distance from the first floor level to the underside of the overhang.

3. Concrete, concrete masonry unit, and similar mass walls 6 inches or greater in thickness.

The *R*-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.1.3.

“Mass walls” shall include walls:

1. Weighing not less than 35 psf (170 kg/m<sup>2</sup>) of wall surface area.
2. Weighing not less than 25 psf (120 kg/m<sup>2</sup>) of wall surface area where the material weight is not more than 120 pcf (1900 kg/m<sup>3</sup>).
3. Having a heat capacity exceeding 7 Btu/ft<sup>2</sup> · °F (144 kJ/m<sup>2</sup> · K).
4. Having a heat capacity exceeding 5 Btu/ft<sup>2</sup> · °F (103 kJ/m<sup>2</sup> · K), where the material weight is not more than 120 pcf (1900 kg/m<sup>3</sup>).

**16.16B.C402.4.3.5 Subsection C402.4.3.5 added.** Subsection C402.4.3

of the International Energy Conservation Code is amended by adding a new Subsection C402.4.3.5 to read as follows:

**C402.4.3.5 Area-weighted SHGC.** In commercial buildings, an area-weighted average of fenestration products shall be permitted to satisfy SHGC requirements.

**16.16B.C402.5 Subsection C402.5 amended.** Subsection C402.5 of the

International Energy Conservation Code is amended to read as follows:

**C402.5 Air leakage—thermal envelope (Mandatory).** The thermal envelope of buildings shall comply with Sections C402.5.1 through C402.5.8, or the building thermal envelope [shall] may be tested in accordance with ASTM E 779 at a pressure differential of 0.3 inch water gauge (75 Pa) [or an equivalent method approved by the code official] and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/ft<sup>2</sup> (0.2 L/s · m<sup>2</sup>). Where compliance is based on such testing, the building shall also comply with Sections C402.5.5, C402.5.6 and C402.5.7.

**16.16B.C403.2.4.2.4 Subsection C403.2.4.2.4 added.** Subsection C403.2.4.2 of the International Energy Conservation Code is amended by adding a new Subsection C403.2.4.2.4 to read as follows:

**C403.2.4.2.4 Door switches.** Opaque and glass doors opening to the outdoors in hotel and motel sleeping units, guest suites, and time-share condominiums, shall be provided with controls that disable the mechanical cooling, or reset the cooling setpoint to 90° F or greater, within five minutes of the door opening. Mechanical cooling may remain enabled if the outdoor air temperature is below the space temperature.

**16.16B.C405.2 Subsection C405.2 amended.** Subsection C405.2 of the International Energy Conservation Code is amended to read as follows:

**C405.2 Lighting controls (Mandatory).** Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4 and C405.2.5.

**Exceptions:** Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.
4. Spaces that use 60% or less of designated watts per square foot are exempt from sections C405.2.2 (Time-switch controls) and C405.2.3 (Daylight-responsive controls).

**16.16B.C405.2.4 Subsection C405.2.4 amended.** Subsection C405.2.4 of the International Energy Conservation Code is amended to read as follows:

**C405.2.4 Specific applications controls.** Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

3. Hotel and motel sleeping units, [and] guest suites, and time-share condominiums shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.  
**Exception:** Lighting and switched receptacles controlled by captive key systems.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided that the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space.

**16.16B.C405.10 Subsection C405.10 added.** Section C405 of the International Energy Conservation Code is amended by adding a new Subsection C405.10 to read as follows:

**C405.10 Sub-metering (Mandatory).** In new buildings with tenants, metering shall be collected individually for each tenant occupying 1,000 ft<sup>2</sup> (total enclosed and unenclosed) (93 m<sup>3</sup>) or more. Tenants shall have access to data collected for their space. A tenant is defined as “one who rents or leases from a landlord.”

**16.16B.C406.3 Subsection C406.3 amended.** Subsection C406.3 of the International Energy Conservation Code is amended to read as follows:

**C406.3 Reduced lighting power density.** The total interior lighting power (watts) of the building shall be determined by using [90] 80 percent of the lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or by using [90] 80 percent of the interior lighting power allowance calculated by the Space-by-Space Method in Section C405.4.2.

**16.16B.C407.3 Subsection C407.3 amended.** Subsection C407.3 of the

International Energy Conservation Code is amended to read as follows:

**C407.3 Performance-based compliance.** Compliance based on total building performance requires that a proposed building (proposed design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design. Energy prices shall be taken from a reputable source [approved by the code official], such as the Department of Energy, Energy Information Administration's State Energy Price and Expenditure Report. [Code officials shall be permitted to require time-of-use pricing in energy cost calculations.] Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual energy cost of the proposed design.

**Exception:** Jurisdictions that require site energy (1 kWh=3413 Btu) rather than energy cost as the metric of comparison.

**16.16B.C407.4 Subsection C407.4 deleted.** Subsection C407.4 of the

International Energy Conservation Code is deleted in its entirety.

**16.16B.C407.4.1 Subsection C407.4.1 amended.** Subsection C407.4.1

of the International Energy Conservation Code is amended to read as follows:

**C407.4.1 Compliance report.** [Permit submittals shall include a] A report documenting that the proposed design has annual energy costs less than or equal to the annual energy costs of the standard reference design shall be submitted to the owner or owner's representative. The compliance documentation shall include the following information:

1. Address of the building.
2. An inspection checklist documenting the building component characteristics of the proposed design as specified in Table C407.5.1(1). The inspection checklist shall show the estimated annual energy cost for both the standard reference design and the proposed design.
3. Name of individual completing the compliance report.
4. Name and version of the compliance software tool.



**16.16B.C407.6 Subsection C407.6 amended.** Subsection C407.6 of the

International Energy Conservation Code is amended to read as follows:

**C407.6 Calculation software tools.** Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the standard reference design and the proposed design and shall include the following capabilities.

1. Building operation for a full calendar year (8,760 hours).
2. Climate data for a full calendar year (8,760 hours) and shall reflect approved coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
3. Ten or more thermal zones.
4. Thermal mass effects.
5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
6. Part-load performance curves for mechanical equipment.
7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
8. Printed [code official] inspection checklist listing each of the proposed design component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings including, but not limited to, *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF.

**16.16B.C407.6.1 Subsection C407.6.1 deleted.** Subsection C407.6.1 of

the International Energy Conservation Code is deleted in its entirety.

**16.16B.C407.6.3 Subsection C407.6.3 amended.** Subsection C407.6.3

of the International Energy Conservation Code is amended to read as follows:

**C407.6.3 Exceptional calculation methods.** Where the simulation program does not model a design, material or device of the proposed design, an exceptional calculation method [shall] may be used [where approved by the code official]. Where there are multiple designs, materials or devices that the simulation program does not model, each shall be calculated separately and exceptional savings determined for each. The total exceptional savings shall not

constitute more than half of the difference between the baseline building performance and the proposed building performance. [Applications for approval of an] An exceptional method shall include all of the following:

1. Step-by-step documentation of the exceptional calculation method performed, detailed enough to reproduce the results.
2. [Copies of all] All spreadsheets used to perform the calculations.
3. A sensitivity analysis of energy consumption where each of the input parameters is varied from half to double the value assumed.
4. The calculations shall be performed on a time step basis consistent with the simulation program used.
5. The performance rating calculated with and without the exceptional calculation method.

**16.16B.C408.2 Subsection C408.2 amended.** Subsection C408.2 of the

International Energy Conservation Code is amended to read as follows:

**C408.2 Mechanical systems and service water-heating systems commissioning and completion requirements.** [Prior to the final mechanical and plumbing inspections, the] The registered design professional or approved agency shall provide evidence of mechanical systems commissioning and completion in accordance with the provisions of this section to the owner or owner's authorized agent.

Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the code official upon request in accordance with Sections C408.2.4 and C408.2.5.

**Exceptions:** The following systems are exempt:

1. Mechanical systems and service water heater systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3 that serve individual dwelling units and sleeping units.

**16.16B.C408.2.4.1 Subsection C408.2.4.1 deleted.** Subsection C408.2.4.1 of the International Energy Conservation Code is deleted in its entirety.

**16.16B.C408.3.1 Subsection C408.3.1 amended.** Subsection C408.3.1 of the International Energy Conservation Code is amended to read as follows:

**C408.3.1 Functional testing.** [Prior to passing final inspection, the] The registered design professional shall provide to the owner or owner's representative evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's instructions. Functional testing shall be in accordance with Section C408.3.1.1 and C408.3.1.2 for the applicable control type.

**16.16B.C501.4 Subsection C501.4 amended.** Subsection C501.4 of the International Energy Conservation Code is amended to read as follows:

**C501.4 Compliance.** Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions and regulations for alterations, repairs, additions and changes of occupancy or relocation, [respectively, in the International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code and NFPA 70.] as adopted by the authorities having jurisdiction.

**16.16B.C503.3.1 Subsection C503.3.1 amended.** Subsection C503.3.1 of the International Energy Conservation Code is amended to read as follows:

**C503.3.1 Roof replacement.** Roof [replacements shall comply with Table C402.1.3 or C402.1.4 where the existing roof assembly is part of the building thermal envelope and contains insulation entirely above the roof deck.] replacement of uninsulated roofs shall include at least one of the following:

1. Energy Star compliant roof covering.
2. Radiant barrier.

3. Attic ventilation via solar attic fan(s), ridge ventilation, or gable ventilation.

**16.16B.R101.1 Subsection R101.1 amended.** Subsection R101.1 of the International Energy Conservation Code is amended to read as follows:

**R101.1 Title.** This code shall be known as the *International Energy Conservation Code* of the County of Maui, and shall be cited as such. It is referred to herein as “this code.”

**16.16B.R101.4 Subsection R101.4 amended.** Subsection R101.4 of the International Energy Conservation Code is amended to read as follows:

**R101.4 Applicability.** Where, in any specific case, different sections of this code or other adopted codes specify different materials, methods of construction or other requirements, the [most restrictive shall govern.] code official shall determine which code requirement prevails. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**16.16B.R102.1 Subsection R102.1 amended.** Subsection R102.1 of the International Energy Conservation Code is amended to read as follows:

**R102.1 General.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. The code official shall be permitted to approve an alternative material, design or method of construction where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. The code official may allow lower energy conservation standards for nonstandard building materials, unique or limitations on design, special methods of construction, and geographical location. The code official may require construction plans, research reports, and tests prepared by a registered design professional in order to allow such lower standards.

**16.16B.R103.1 Subsection R103.1 deleted in its entirety and replaced.**

Subsection R103.1 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**R103.1 General.** When the requirements in this code apply to a building as specified in Section R101, then all plans, specifications, or other construction documents submitted for a building, electrical, or plumbing permit required by the jurisdiction shall comply with this code and shall be prepared, designed, approved, and observed by a registered design professional as required by Chapter 464 of the Hawaii Revised Statutes, as amended.

The registered design professional shall provide on the plans a statement certifying that the project substantially conforms to this code.

**Exception:** Any building, electrical, or plumbing work that is not required to be prepared, designed, approved, or observed by a licensed architect or engineer pursuant to Chapter 464 of the Hawaii Revised Statutes, as amended.

**16.16B.R103.3 Subsection R103.3 deleted in its entirety and replaced.**

Subsection R103.3 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**R103.3 Examination of documents.** Examination of documents shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R103.4 Subsection R103.4 deleted in its entirety and replaced.**

Subsection R103.4 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**R103.4 Amended construction documents.** Amended construction documents shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R103.5 Subsection R103.5 deleted in its entirety and replaced.**

Subsection R103.5 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**R103.5 Retention of construction documents.** Retention of construction documents shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R104 Section R104 deleted in its entirety and replaced.**

Section R104 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION R104**  
**INSPECTIONS**

**R104.1 General.** Inspections shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R106.1.1 Subsection R106.1.1 amended.** Subsection R106.1.1

of the International Energy Conservation Code is amended to read as follows:

**R106.1.1 Conflicts.** [Where] The code official shall make the final determination in the event conflicts occur between provisions of this code and referenced codes and standards[, the provisions of this code shall apply].

**16.16B.R106.1.2 Subsection R106.1.2 amended.** Subsection R106.1.2

of the International Energy Conservation Code is amended to read as follows:

**R106.1.2 Provisions in referenced codes and standards.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the code official shall determine which shall take precedence between the provisions of this code or [ , as applicable, shall take precedence over] the provisions in the referenced code or standard.

**16.16B.R107 Section R107 deleted in its entirety and replaced.**

Section R107 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION R107**  
**FEES**

**R107.1 General.** Fees shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R108 Section R108 deleted in its entirety and replaced.**

Section R108 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION R108**  
**STOP WORK ORDER**

**R108.1 General.** Stop work orders shall comply with the provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R109 Section R109 deleted in its entirety and replaced.**

Section R109 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**SECTION R109**  
**VARIANCES AND APPEALS**

**R109.1 General.** Variances and appeals shall comply with the variances and appeals provisions of Chapter 1 of the International Building Code, as amended in Chapter 16.26B, Maui County Code, or the current adopted International Building Code, as amended by the Maui County Code.

**16.16B.R201.3 Subsection R201.3 amended.** Subsection R201.3 of the

International Energy Conservation Code is amended to read as follows:

**R201.3 Terms defined in other codes.** Terms that are not defined in this code but are defined in the International Building Code[, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code] or the International Residential Code shall have the meanings ascribed to them in those codes.

**16.16B.R401.2 Subsection R401.2 amended.** Subsection R401.2 of the

International Energy Conservation Code is amended to read as follows:

**R401.2 Compliance.** Projects shall comply with one of the following:

1. Sections [R401] R401.3 through R404.
2. Section R405 and the provisions of Sections 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

**16.16B.R401.2.1 Subsection R401.2.1 amended.** Subsection R401.2.1

of the International Energy Conservation Code is amended to read as follows:

**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 [occupied space] dwelling unit is air conditioned at the time of initial construction.
2. The [occupied space] dwelling unit is not heated.
3. Solar, wind or other renewable energy source supplies not less than [80] 90 percent of the energy for service water heating.
4. Glazing in [conditioned space has a] dwelling units shall have a maximum solar heat gain coefficient [of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.] as specified in Table R401.2.1.

Table R401.2.1. Window SHGC Requirements



<u>Projection factor of overhang from base of average window sill*</u>	<u>SHGC</u>
<u>&lt; .30</u>	<u>.25</u>
<u>.30 - .49</u>	<u>.40</u>
<u>≥ .50</u>	<u>N/A</u>

**\*Exception:** North-facing windows with pf > .20 are exempt from the SHGC requirement.

5. Skylights in dwelling units shall have a maximum U-factor as specified in Table R402.1.2.

[5.]6. Permanently installed lighting is in accordance with Section R404.

[6.]7. [The exterior roof surface complies with one of the options in Table C402.3 or the roof/ceiling has insulation with an R-value of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.] 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.

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

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

[7. Roof surfaces have a minimum slope of ¼ inch per foot of run. The finished roof does not have water accumulation areas.]

8. 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.

9. Bedrooms with exterior walls facing two or more different directions shall have operable fenestration [on exterior walls facing two directions.] to provide for cross-ventilation if the room layout permits.

10. Interior doors to bedrooms are capable of being secured in the open position.

11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as a bedroom.
12. Jalousie windows shall have an air infiltration rate of no more than 1.2 cfm per square foot (6.1 L/s/m<sup>2</sup>).
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. Blower door test is optional.

**16.16B.R401.3 Subsection R401.3 amended.** Subsection R401.3 of the

International Energy Conservation Code is amended to read as follows:

**R401.3 Certificate (Mandatory).** [A] When required by the code official, a permanent certificate shall be completed by the builder or registered design professional and posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

**16.16B.R402.1 Subsection R402.1 amended.** Subsection R402.1 of the

International Energy Conservation Code is amended to read as follows:

**R402.1 General (Prescriptive).** The building thermal envelope shall meet the requirements of Sections R402.1.1 through R402.1.5.

**Exception:** The following low-energy buildings, or portions thereof, separated from the remainder of the building by building thermal envelope assemblies complying with this section shall be exempt from the building thermal envelope provisions of Section R402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft<sup>2</sup> (10.7 W/m<sup>2</sup>) or 1.0 watt/ft<sup>2</sup> of floor area for space-conditioning purposes.
2. [Those that do not contain conditioned space.] Unconditioned space that does not contain habitable space.
3. Greenhouses, towers, walls, and similar uses.

**16.16B.R402 Table R402.1.2 deleted in its entirety and replaced.**

Table R402.1.2 of the International Energy Conservation Code is deleted in its entirety and replaced with the following:

**TABLE R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>**

<u>CLIMATE ZONE</u>	<u>FENESTRATION U-FACTOR<sup>b</sup></u>	<u>SKYLIGHT U-FACTOR<sup>b</sup></u>	<u>GLAZED FENESTRATION SHGC<sup>b, c</sup></u>	<u>CEILING R-VALUE<sup>d</sup></u>	<u>WOOD FRAME WALL R-VALUE<sup>d</sup></u>	<u>MASS WALL R-VALUE<sup>e</sup></u>	<u>FLOOR R-VALUE</u>	<u>BASEMENT WALL R-VALUE</u>	<u>SLAB R-VALUE &amp; DEPTH</u>	<u>CRAWL SPACE WALL R-VALUE</u>
1	NR	.75	.25	30	13	3/4	0	0	0	0

For SI: 1 foot= 304.8 mm

- a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.
- b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements where the SHGC for such skylights does not exceed 0.30.
- c. Fenestration on North facing and well shaded walls are exempt.
- d. Subsection R402.2 allows use of Section R407.
- e. The second R-value applies when more than half the insulation is on the interior of the mass wall. Concrete, concrete masonry unit, and similar mass walls greater than or equal to 6 inches in thickness are exempt from the 3/4 R-value requirement.

**16.16B.R402.2 Subsection R402.2 amended.** Subsection R402.2 of the

International Energy Conservation Code is amended to read as follows:

**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.

**16.16B.R402.3.2 Subsection R402.3.2 amended.** Subsection R402.3.2

of the International Energy Conservation Code is amended to read as follows:

**R402.3.2 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.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table R402.1.2 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 2.4, and the dynamic glazing is automatically controlled to modulate the amount of solar gain into the space in multiple steps. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

**Exception:** Dynamic glazing is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table R402.1.2.

**16.16B.R402.4.1.2 Subsection R402.4.1.2 amended.** Subsection

R402.4.1.2 of the International Energy Conservation Code is amended to read as follows:

**R402.4.1.2 Testing.** The building or dwelling unit [shall] may be tested and verified as having an air leakage rate not exceeding five air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. Testing shall be conducted in accordance with ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). [Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.] Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed[,] beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

**16.16B.R403.5.5 Subsection R403.5.5 added.** Subsection R403.5 of the International Energy Conservation Code is amended by adding a new Subsection R403.5.5 to read as follows:

**R403.5.5 Solar water heating.** Solar water heating systems are required for new single-family residential construction pursuant to Section 196-6.5 of the Hawaii Revised Statutes.

**16.16B.R404.2 Subsection R404.2 added.** Section R404 of the International Energy Conservation Code is amended by adding a new Subsection R404.2 to read as follows:

**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 a bedroom.

**16.16B.R404.3 Subsection R404.3 added.** Section R404 of the International Energy Conservation Code is amended by adding a new Subsection R404.3 to read as follows:

**R404.3 Electrical vehicle charger power.** An electrical rough-in for a future electrical vehicle may be installed in a garage/carport area.

**16.16B.R405 Table R405.5.2(1) amended.** Table R405.5.2(1) of the International Energy Conservation Code is amended to read as follows:

**TABLE R405.5.2(1)  
SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame.	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Basement and crawl space walls	Type: same as proposed	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table R402.1.4, with insulation layer on interior side of walls	As proposed
Above-grade floors	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
Ceilings	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
Roofs	Type: composition shingle on wood sheathing	As proposed
	Gross area: same as proposed	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Attics	Type: vented with aperture = 1 ft <sup>2</sup> per 300 ft <sup>2</sup> ceiling area	As proposed
Foundations	Type: same as proposed	As proposed
	Foundation wall area above and below grade and soil characteristics: same as proposed	As proposed
Opaque doors	Area: 40 ft <sup>2</sup>	As proposed
	Orientation: North	As proposed
	U-factor: same as fenestration from Table R402.1.4	As proposed
	Total area <sup>(a) d</sup> =	
Vertical fenestration other than opaque doors	(a)The proposed glazing area, where the proposed glazing area is less than 15 percent of the conditioned floor area	As proposed
	(b)15 percent of the conditioned floor area, where the proposed glazing area is 15 percent or more of the conditioned floor area	
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: as specified in Table R402.1.4	As proposed

	SHGC: as specified in Table R402.1.2 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: $0.92 - (0.21 \times \text{SHGC})$ for the standard reference design	$0.92 - (0.21 \times \text{SHGC as proposed})$
	External shading: none	As proposed
Skylights	None	As proposed
Thermally isolated sunrooms	None	As proposed
Air exchange rate	Air leakage rate of 5 air changes per hour in climate zones 1 and 2, and 3 air changes per hour in climate zones 3 through 8 at a pressure of 0.2 inches w.g. (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: $CFA$ = conditioned floor area $N_{br}$ = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design.  For tested residences, the measured air exchange rate <sup>a</sup> .  The mechanical ventilation rate <sup>b</sup> shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $\text{kWh/yr} = 0.03942 \times CFA + 29.565 \times (N_{br} + 1)$ where: $CFA$ = conditioned floor area $N_{br}$ = number of bedrooms	As proposed
Internal gains	$\text{IGain} = 17,900 + 23.8 \times CFA + 4104 \times N_{br}$ (Btu/day per dwelling unit)	Same as standard reference design.
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element <sup>c</sup> but not integral to the building envelope or structure.
Structural mass	For masonry floor slabs, 80 percent of floor area covered by R-2 carpet and pad, and 20 percent of floor directly exposed to room air.	As proposed
	For masonry basement walls, as proposed, but with insulation required by Table R402.1.4 located on the interior side of the walls	As proposed
	For other walls, for ceilings, floors, and interior walls, wood frame construction	As proposed
Heating systems <sup>[d, e]</sup>	[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 IECC-Commercial Provisions.] Fuel type: same as proposed design.	[As proposed]
	<u>Efficiencies:</u> <u>Electric: Air-source heat pump with prevailing federal minimum standards.</u>	<u>As proposed</u>
		<u>As proposed</u>

	<p><u>Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards.</u></p> <p><u>Nonelectric boilers: natural gas boiler with prevailing federal minimum standards.</u></p> <p>Capacity: sized in accordance with Section R403.7.</p>	<p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems <sup>[d, f]</sup>	<p>[As proposed]</p> <p><u>Fuel type: Electric</u></p> <p><u>Efficiency: in accordance with prevailing federal minimum standards.</u></p> <p>Capacity: sized in accordance with Section R403.7.</p>	<p>[As proposed]</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Service water heating <sup>[d, e, f, g]</sup>	<p>[As proposed]</p> <p><u>Fuel type: same as proposed design.</u></p> <p><u>Efficiency: in accordance with federal minimum standards.</u></p> <p>Use: same as proposed design</p>	<p>[As proposed]</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p>gal/day = 30 + (10 x <math>N_{br}</math>)</p>
[Thermal distribution systems]	<p>[Duct insulation: From Section R403.2.1]</p> <p>A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. [For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area at a pressure of differential of 0.1 inches w.g. (25 Pa).]</p>	<p>[As tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.]</p>
[Thermostat]	<p>[Type: Manual, cooling temperature setpoint = 75° F; Heating temperature setpoint = 72° F]</p>	<p>[Same as standard reference]</p>

For SI: 1 square foot = 0.93 m<sup>2</sup>, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 gallon (US) = 3.785 L, °C = (°F-32)/1.8, 1 degree = 0.79 rad.

a. Where required by the code official, testing shall be conducted by an approved party. Hourly calculations as specified in the ASHRAE Handbook of Fundamentals, or the equivalent shall be used to determine the energy loads resulting from infiltration.

b. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals, page 26.24 and the “Whole-house Ventilation” provisions of 2001 ASHRAE Handbook of Fundamentals, page 26.19 for intermittent mechanical ventilation.

c. Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

[d. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

e. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.



f. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

g. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.]

[h.] d. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$$AF = A_s \times FA \times F$$

where:

$AF$  = Total glazing area

$A_s$  = Standard reference design total glazing area.

$FA$  = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).

$F$  = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

$L$  and  $CFA$  are in the same units.

**16.16B.R407 Section R407 added.** Chapter 4[RE] of the International

Energy Conservation Code is amended by adding a new Section R407 to read as

follows:

**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 Sections 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 R407.1  
POINTS OPTION**

<u>WALLS</u>		<u>STANDARD HOME POINTS</u>	<u>TROPICAL HOME POINTS</u>
<b>Wood framed</b>			
	<u>R-13 Cavity Wall Insulation</u>	<u>0</u>	<u>1</u>
	<u>R-13 Wall Insulation + high reflectance walls<sup>4</sup></u>	<u>1</u>	<u>2</u>
	<u>R-13 Wall Insulation + 90% high efficacy lighting and Energy Star Appliances<sup>5</sup></u>	<u>1</u>	<u>2</u>
	<u>R-13 Wall Insulation + exterior shading wpf=0.3<sup>6</sup></u>	<u>1</u>	<u>2</u>
	<u>R-19 Roof Insulation</u>	<u>-1</u>	<u>0</u>
	<u>R-19 Roof Insulation + Cool roof membrane<sup>1</sup> or Radiant Barrier<sup>3</sup></u>	<u>0</u>	<u>1</u>
	<u>R-19 Roof Insulation + Attic Venting<sup>2</sup></u>	<u>0</u>	<u>1</u>
	<u>R-30 Roof Insulation</u>	<u>0</u>	<u>1</u>
	<u>Ductless Air Conditioner<sup>7</sup></u>	<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>
	<u>No air conditioning installed</u>	<u>Not Applicable</u>	<u>2</u>
	<u>House floor area ≤ 1,000 ft<sup>2</sup></u>	<u>1</u>	<u>1</u>
	<u>House floor area ≥ 2,500 ft<sup>2</sup></u>	<u>-1</u>	<u>-1</u>
	<u>Energy Star Fans<sup>8</sup></u>	<u>1</u>	<u>1</u>
	<u>Install 1 kW or greater of solar electric</u>	<u>1</u>	<u>1</u>
<b>Steel framed</b>			
	<u>R-13 + R-3 Wall Insulation</u>	<u>0</u>	<u>1</u>
	<u>R-13 Cavity Wall Insulation + R-0</u>	<u>-1</u>	<u>0</u>
	<u>R-13 Wall Insulation + high reflectance walls<sup>4</sup></u>	<u>0</u>	<u>1</u>
	<u>R-13 Wall Insulation + 90% high efficacy lighting and Energy Star Appliances<sup>5</sup></u>	<u>1</u>	<u>2</u>

<u>R-13 Wall Insulation + exterior shading wpf=0.3<sup>6</sup></u>	<u>0</u>	<u>1</u>
<u>R-30 Roof Insulation</u>	<u>-1</u>	<u>0</u>
<u>R-19 Roof Insulation</u>	<u>-1</u>	<u>0</u>
<u>R-19 + Cool roof membrane<sup>1</sup> or Radiant Barrier<sup>3</sup></u>	<u>0</u>	<u>1</u>
<u>R-19 Roof Insulation + Attic Venting<sup>2</sup></u>	<u>0</u>	<u>1</u>
<u>Ductless Air Conditioner<sup>7</sup></u>	<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>
<u>No air conditioning installed</u>	<u>Not Applicable</u>	<u>2</u>
<u>House floor area ≤ 1,000 ft<sup>2</sup></u>	<u>1</u>	<u>1</u>
<u>House floor area ≥ 2,500 ft<sup>2</sup></u>	<u>-1</u>	<u>-1</u>
<u>Energy Star Fans<sup>7</sup></u>	<u>1</u>	<u>1</u>
<u>Install 1 kW or greater of solar electric</u>	<u>1</u>	<u>1</u>

<sup>1</sup>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.

<sup>2</sup>One cfm/ft<sup>2</sup> attic venting.

<sup>3</sup>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.

<sup>4</sup>Walls with covering with a reflectance of ≥ 0.64.

<sup>5</sup>Energy Star rated appliances include refrigerators, dishwashers, and clothes washers and must be installed for the Certificate of Occupancy.

<sup>6</sup>The wall projection factor is the horizontal distance from the surface of the wall to the furthest extremity of the overhang divided by the vertical distance from the first floor level to the underside of the overhang.

<sup>7</sup>All air conditioning systems in the house must be ductless to qualify for this credit.

<sup>8</sup>Install ceiling fans in all bedrooms and the largest space that is not used as a bedroom.

**16.16B.R501.4 Subsection R501.4 amended.** Subsection R501.4 of the

International Energy Conservation Code is amended to read as follows:

**R501.4 Compliance.** Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions and regulations for alterations, repairs, additions and changes of occupancy or relocation, [respectively, in the International Residential Code, International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code,

International Private Sewage Disposal Code and NFPA 70.] as adopted by the authorities having jurisdiction.

**16.16B.R503.1.1 Subsection R503.1.1 amended.** Subsection R503.1.1

of the International Energy Conservation Code is amended to read as follows:

**R503.1.1 Building envelope.** Building envelope assemblies that are part of the alteration shall comply with Section R402.1.2 or R402.1.4, Sections R402.2.1 through R402.2.13, R402.3.1, R402.3.2, R402.4.3 and R402.4.4

**Exception:** The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. [Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.] Roof replacement of uninsulated roofs that include at least one of the following:
  - a. Energy Star compliant roof covering.
  - b. Radiant barrier.
  - c. Attic ventilation via solar attic fans, ridge ventilation, or gable ventilation.
6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing or fenestration assembly to be replaced.”

SECTION 4. If any provision of this ordinance shall for any reason be held invalid or unconstitutional by a court of competent jurisdiction, such judgment shall not affect the validity of the remaining portions.

SECTION 5. Work performed under a permit issued before the effective date of this ordinance and which is inspected on or after the effective date shall


be approved if it meets the requirements of either this code or the code being replaced by this ordinance.

SECTION 6. This ordinance shall apply to all applications for permits to be issued pursuant to Chapters 16.18B, 16.20B, and 16.26B, Maui County Code, that are deemed complete by the Department of Public Works on or after the effective date of this ordinance. An application accepted before the effective date shall be approvable if it meets the requirements of either this chapter or the code being replaced by this ordinance.

SECTION 7. Material to be repealed is bracketed. New material is underscored. In printing this bill, the County Clerk need not include the brackets, the bracketed material, or the underscoring.

SECTION 8. This ordinance shall take effect 90 days after its approval, but nothing in this ordinance shall be construed to prohibit any person from complying with the provisions of this chapter and any amendments thereto adopted prior to enactment of this ordinance.

APPROVED AS TO FORM AND  
LEGALITY:

  
\_\_\_\_\_  
DAVID A. GALAZIN  
Department of the Corporation Counsel  
County of Maui  
2019-0096/2018-0475  
EACP-12 2019-02-08 Ordinance (IECC)