**REPI-122-21**

**IECC®: TABLE R405.4.2(1)**

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**2021 International Energy Conservation Code**

**Revise as follows:**

**R401.2.5 Additional energy efficiency.** This section establishes additional requirements applicable to all compliance approaches to achieve additional energy efficiency.

1. For buildings complying with Section R401.2.1, one of the additional efficiency package options shall be installed according to Section R408.2.

~~2. For buildings complying with Section R401.2.2, the building shall meet one of the following:~~

~~2.1. One of the additional efficiency package options in Section R408.2 shall be installed without including such measures in the proposed design under Section R405; or~~

~~2.2. The proposed design of the building under Section R405.3 shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design.~~

~~3.~~ 2. For buildings complying with the Energy Rating Index alternative Section R401.2.3, the Energy Rating Index value shall be at least 5 percent less than the Energy Rating Index target specified in Table R406.5.

The option selected for compliance shall be identified in the certificate required by Section R401.3.

**Revise as follows:**

**R405.2 Performance-based compliance**. Compliance based on total building performance requires that a proposed design meets all of the following:

1. The requirements of the sections indicated within Table R405.2.

2. The proposed total building thermal envelope UA, which is the sum of *U*-factor times assembly area, shall be less ~~greater~~ than or equal to the building thermal envelope UA using the prescriptive *U*-factors from Table R402.1.2 multiplied by 1.15 in accordance with Equation 4-1. ~~levels of efficiency and solar heat gain coefficients in Table R402.1.1 or R402.1.3 of the 2009 International Energy Conservation Code.~~  The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.

UAProposed design ≤1.15 x UAPrescriptive reference design (Equation 4-1)

~~3. The proposed total building thermal envelope UA, which is the sum of U-factor times the assembly area shall be less than or equal to the UA of the building thermal envelope using the prescriptive U-factors from Table R402.1.4 multiplied by 1.15 in accordance with Equation 4-x1.~~

~~Equation 4-1: UAproposed design <=1.15 x UAprescriptive reference design.~~

3. For buildings without a fuel burning appliance, ~~An~~ the annual energy cost of the *proposed design* that is less than or equal to 85% of the annual energy cost of the *standard reference design*. For buildings with a fuel burning appliance, the annual energy cost of the *proposed design* that is less than or equal to 80% of the annual energy cost of the *standard reference design*.

Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration’s State Energy Data System Prices and Expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

**TABLE R405.4.2(1) (TABLE N1105.4.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

**Portions of table not shown remain unchanged.**

|  |  |  |
| --- | --- | --- |
| **Building Component**  | **Standard Reference Design**  | **Proposed Design**  |
| Heating Systems d, e, j, k  | ~~For other than electric heating without a heat pump: as proposed. 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.~~ ~~Capacity: sized in accordance with Section R403.7.~~  | ~~As proposed~~   |
| Fuel Type/Capacity: Same as proposed design  | As proposed  |
| Product class: Same as proposed design  | As proposed  |
| Efficiencies:  | As proposed  |
|    Heat pump: Complying with 10 CFR §430.32 ~~(2021)~~  | As proposed  |
|    Non-electric furnaces: Complying with 10 CFR §430.32 ~~(2021)~~  | As proposed  |
|    Non-electric boilers: Complying with 10 CFR §430.32 ~~(2021)~~  | As proposed  |
| CoolingSystems d, f, k | ~~As proposed.~~~~Capacity: sized in accordance with Section R403.7.~~ | ~~As proposed~~ |
| Fuel Type: ElectricCapacity: Same as proposed design | As proposed  |
| Efficiencies: Complying with 10 CFR §430.32 ~~(2021)~~ | As proposed  |
| Service waterHeating d, g, k | ~~As proposed.~~Use, in units of gal/day = 25.5 + (8.5 × *Nbr*)where: *N* *br*= number of bedrooms. | ~~As proposed~~Use, in units of gal/day = 25.5 + (8.5 × *Nbr)* × (1 – *HWDS*)where:*Nbr* = number of bedrooms.*HWDS* = factor for the compactness of the hot water distribution system. |
| Fuel Type: Same as proposed design  | As proposed |
| Rated Storage Volume: Same as proposed design  | As proposed |
| Draw Pattern: Same as proposed design  | As proposed |
| Efficiencies: Uniform Energy Factor complying with 10 CFR §430.32 ~~(2021)~~  | As proposed |
| Tank Temperature: 120° F (48.9° C) | Same as standard reference design |
|  |  |
| Thermal distribution system | Duct insulation: in accordance with Section R403.3.1.Duct location: ~~same as proposed design~~

|  |  |  |  |
| --- | --- | --- | --- |
| **Foundation Type** | **Slab on grade** | **Unconditioned crawlspace** | **Basement or conditioned crawlspace** |
| Duct location (supply and return) | One-story building: 100% in unconditioned atticAll other: 75% in unconditioned attic and 25% inside *conditioned space* | One-story building: 100% in unconditioned crawlspaceAll other: 75% in unconditioned crawlspace and 25% inside *conditioned space* | 50% inside *conditioned* *space*50% unconditioned attic |

Duct system leakage to outside:For duct systems serving > 1,000ft2 of *conditioned floor area*, the duct leakage to outside rate shall be 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of *conditioned floor area.* For duct systems serving ≤ 1,000ft2 of *conditioned floor area*, the duct leakage to outside rate shall be 40 cfm (1132.7 L/min). | Duct insulation: as proposed.Duct location: as proposed.Duct System Leakage to Outside:The measured total duct system leakage rate shall be entered into the software as the duct system leakage to outside rate. **Exceptions:**1. When duct system leakage to outside is tested in accordance ANSI/ RESNET/ICC 380 or ASTM E1554, the measured value shall be permitted to be entered.
2. When total duct system leakage is measured without the air handler installed, the simulation value shall be 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of *conditioned floor area.*
 |
| ~~For all systems other than tested duct systems, a~~ For hydronic systems and ductless systems, a~~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~~.**~~Exception:~~** ~~For nonducted heating and cooling systems that do not have a fan, the standard reference design thermal distribution system efficiency (DSE) shall be 1~~.~~For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft~~~~2~~ ~~(9.29 m~~~~2~~~~) of~~ *~~conditioned floor area~~* ~~at a pressure of differential of 0.1 inch w.g. (25 Pa).~~ | ~~As tested or, where not tested,~~ For hydronic systems and ductless systems, DSE shall be as specified in Table R405.4.2(2). |

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

Fuel Type: Same as the predominant heating fuel type

Rated Storage Volume: 40 Gallons

Draw Pattern: Medium

Efficiency: Uniform Energy Factor complying with 10 CFR §430.32

j. For a proposed design with electric resistance heating, a split system heat pump complying with 10 CFR §430.32 ~~(2021)~~ shall be assumed in the standard reference design.

k. For heating systems, cooling systems, or water heating systems not included in Table R405.4.2(1), the standard reference design shall be the same as proposed design.

**TABLE R405.4.2(2)**

**DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR**

**PROPOSED DESIGNSa**

|  |  |  |
| --- | --- | --- |
| **DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION** | **FORCED AIR** **SYSTEMS** | **HYDRONIC** **SYSTEMSb** |
| Distribution system components located in unconditioned space | NA | 0.95 |
| ~~Untested d~~Distribution system components entirely located in conditioned space c | ~~0.88~~  NA | 1 |
| “Ductless” systemsd | 1 | NA |

**Add new standard(s) as follows:**

**CHAPTER 6 [RE] REFERENCED STANDARDS**

**DOE**

10 CFR, Part 430—2021: Energy Conservation Program for Consumer Products: Energy and Water Conservation Standards and their compliance dates.