

## ENERGY RATING CALCULATION PROCEDURES

## SECTION 401—ENERGY RATING CALCULATION PROCEDURES

**401.1 Determining the Energy Rating Index.** The *Energy Rating Index* for a *rated home* shall be determined in accordance with Sections 401.1.1 and 401.1.2. This standard shall not be used to calculate the *Energy Rating Index* for a whole building that contains more than one *dwelling unit* or *sleeping unit*.

**401.1.1 Calculating end use loads.** The normalized modified end use loads (*nMEUL*) for space heating and cooling and service hot water use shall each be determined in accordance with Equation 4-1.

**Equation 4-1**  $nMEUL = REUL \times (nEC_x / EC_r)$

where:

*nMEUL* = Normalized modified end use loads (for heating, cooling or hot water) as computed using an approved software rating tool.

*REUL* = Reference home end use loads (for heating, cooling or hot water) as computed using an approved software rating tool.

*nEC<sub>x</sub>* = Normalized energy consumption for the *rated home*'s end uses (for heating, including *auxiliary electric consumption*, cooling or hot water) as computed using an approved software rating tool.

*EC<sub>r</sub>* = Estimated energy consumption for the *reference home*'s end uses (for heating, including *auxiliary electric consumption*, cooling or hot water) as computed using an approved software rating tool.

and where:

**Equation 4-1a**  $nEC_x = EC_x \times (a \times EEC_x - b) \times (EEC_r / EEC_x)$

where:

*EC<sub>x</sub>* = Estimated energy consumption for the *rated home*'s end uses (for heating, including *auxiliary electric consumption*, cooling or hot water) as computed using an approved software rating tool.

*EEC<sub>x</sub>* = Equipment efficiency coefficient for the *rated home*'s equipment such that *EEC<sub>x</sub>* equals the energy consumption per unit load in like units as the load, and as derived from the manufacturer's equipment performance rating (*MEPR*) such that *EEC<sub>x</sub>* equals 1.0/*MEPR* for *AFUE*, *COP* or *EF* ratings, or such that *EEC<sub>x</sub>* equals 3.413/*MEPR* for *HSPF*, *EER* or *SEER* ratings.<sup>1,2</sup>

*EEC<sub>r</sub>* = Equipment efficiency coefficient for the *reference home*'s equipment, such that *EEC<sub>r</sub>* equals the energy consumption per unit load in like units as the load, and as derived from the manufacturer's equipment performance rating (*MEPR*) such that *EEC<sub>r</sub>* equals 1.0/*MEPR* for *AFUE*, *COP* or *EF* ratings or such that *EEC<sub>r</sub>* equals 3.413/*MEPR* for *HSPF*, *EER* or *SEER* ratings and where the coefficients *a* and *b* are as defined by Table 401.1.1.

TABLE 401.1.1—COEFFICIENTS *a* AND *b*

| FUEL TYPE AND END USE                  | <i>a</i> | <i>b</i> |
|----------------------------------------|----------|----------|
| Electric space heating                 | 2.2561   | 0        |
| Fossil fuel <sup>a</sup> space heating | 1.0943   | 0.4030   |
| Biomass space heating                  | 0.8850   | 0.4047   |
| Electric air conditioning              | 3.8090   | 0        |
| Electric water heating                 | 0.9200   | 0        |
| Fossil fuel <sup>a</sup> water heating | 1.1877   | 1.0130   |

a. Such as natural gas, liquid propane gas, fuel oil.

**401.1.1.1 Multiple pieces of equipment serving the same end use load.** When the *rated home* has multiple pieces of equipment serving the same end use load, the value of *nMEUL* for that end use shall be determined by summing the *nMEULs* for each individual system. For each piece of equipment in the *rated home*, the *reference home* shall be assigned a corresponding piece of equipment. *EC<sub>x</sub>*, *EEC<sub>x</sub>*, *a*, and *b* shall be determined separately for each piece of equipment in the *rated home*. *EC<sub>r</sub>*, *EEC<sub>r</sub>* shall be determined for each corresponding piece of equipment in the *reference home*. *REUL* for each piece of equipment shall be determined as the *reference home* end use load met by the corresponding equipment in the *reference home*. Fossil fuel back-up heating for heat pump equipment shall be considered separate equipment in this calculation.

1. (Normative Note) Where indicated, *MEPR* values shall be determined using *HSPF* and *SEER*. When only *HSPF2* and *SEER2* are available, *HSPF* and *SEER* shall be calculated in accordance with Section 404.1.4.1.

2. (Normative Note) Where indicated, *MEPR* values shall be calculated using *EF*. When only *UEF* is available, *EF* shall be calculated from the *UEF* using the *EF* calculator

**401.1.2 Calculating the Energy Rating Index.** The *Energy Rating Index* shall be determined in accordance with Equation 4-2.

**Equation 4-2**  $\text{Energy Rating Index} = PE_{\text{frac}} \times [TnML / (TRL \times IAF_{RH})] \times 100$

where:

$PE_{\text{frac}}$  = Purchased energy fraction.

$TnML = nMEUL_{HEAT} + nMEUL_{COOL} + nMEUL_{HW} + EC_{LA} + EC_{VENT} + EC_{DH}$ , in MBtu/y.

$TRL = REUL_{HEAT} + REUL_{COOL} + REUL_{HW} + REC_{LA} + REC_{VENT} + REC_{DH}$ , in MBtu/y.

$IAF_{RH}$  = Index adjustment factor of rated home in accordance with Equation 4-60.

and where:

$EC_{LA}$  = The *rated home* energy consumption for lighting, appliances and *MELs* as defined by Section 402.2.8.2, converted to MBtu/y, where MBtu/y = (kWh/y)/293 or (therms/y)/10, as appropriate.

$REC_{LA}$  = The *reference home* energy consumption for lighting, appliances and *MELs* as defined by Section 402.2.8.1, converted to MBtu/y, where MBtu/y = (kWh/y)/293 or (therms/y)/10, as appropriate.

$EC_{VENT}$  = The *rated home* energy consumption for *dwelling unit mechanical ventilation system* fans, converted to MBtu/y, where MBtu/y = (kWh/y)/293.

$REC_{VENT}$  = The *reference home* energy consumption for *dwelling unit mechanical ventilation system* fans, converted to MBtu/y, where MBtu/y = (kWh/y)/293.

$EC_{DH}$  = The *rated home* energy consumption for dehumidification, converted to MBtu/y, where MBtu/y = (kWh/y)/293.

$REC_{DH}$  = The *reference home* energy consumption for dehumidification, converted to MBtu/y, where MBtu/y = (kWh/y)/293.

and where:

$PE_{\text{frac}} = (TEU - OPP + BSL) / TEU$

$TEU$  = Total energy use of the *rated home* including all rated and nonrated energy features where all fossil fuel site energy uses ( $Btu_{\text{fossil}}$ ) are converted to equivalent electric energy use ( $kWh_{\text{eq}}$ ) in accordance with Equation 4-3.

$OPP$  = On-site power production as defined by Section 402.2.8.

$BSL$  = Battery storage losses, calculated as total annual energy based on the rated single charge-discharge cycle efficiency for the on-site battery storage.

**Equation 4-3**  $kWh_{\text{eq}} = (Btu_{\text{fossil}} \times 0.40) / 3,412$

## SECTION 402—ENERGY RATING REFERENCE HOME AND RATED HOME CONFIGURATION

**402.1 General requirements.** Except as specified elsewhere in Section 402, the *energy rating reference home* and the *rated home* shall be configured and analyzed in the *approved software rating tool* using identical methods and techniques.

**402.1.1 Modeling assumptions.** The assumptions specified in Appendix C shall apply to all simulation models. The *energy rating reference home* and the *rated home* shall be configured with at least one *bedroom*.

**402.2 Residence specifications.** The *energy rating reference home* and *rated home* shall be configured and analyzed in the *approved software rating tool* as specified by Table 402.2(1).

**TABLE 402.2(1)—SPECIFICATIONS FOR THE ENERGY RATING REFERENCE AND RATED HOMES**

| BUILDING COMPONENT                                                                                           | ENERGY RATING REFERENCE HOME   | RATED HOME                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Above-grade walls separating conditioned space volume from outdoor environment or unconditioned space volume | Type: Wood frame               | Same as rated home                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                              | Gross area: Same as rated home | Same as rated home                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                              | U-factor: From Table 402.2(2)  | Same as rated home                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                              | Solar absorptance = 0.75       | Values from Table 402.2(3) shall be used to determine solar absorptance, except where test data are provided for wall surface in accordance with ASTM C1549 or ASTM E903 using the ASTM G197 air-mass 1.5 sun-facing global vertical solar spectral irradiance for the measurement of solar reflectance. <sup>3</sup> The solar absorptance value is obtained by subtracting the measured solar reflectance value from the number one (solar absorptance = 1 – solar reflectance). |
|                                                                                                              | Emittance = 0.90               | Same as rated home                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

3. (Normative Note) Solar reflectance is permitted to be measured in accordance with the CRRC-1, *Product Rating Program Manual*, Appendix 8, “Standard Test Method for Determining the Directional-Hemispherical Solar Reflectance of Materials Using a Directional-Hemispherical Portable Reflectometer” with the ASTM G197 air-mass 1.5 sun-facing global vertical solar spectral irradiance.

**TABLE 402.2(1)—SPECIFICATIONS FOR THE ENERGY RATING REFERENCE AND RATED HOMES—continued**

| BUILDING COMPONENT                                                                                                                                             | ENERGY RATING REFERENCE HOME                                                                                                 | RATED HOME                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Above-grade walls separating conditioned space volume from unrated heated space, multifamily buffer boundary or nonfreezing space                              | Type: Wood frame                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>U</i> -factor: 0.292 for IECC Climate Zones 1 and 2, 0.089 for IECC Climate Zones 3–8                                     | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Solar absorptance = 0.75                                                                                                     | Values from Table 402.2(3) shall be used to determine solar absorptance, except where test data are provided for wall surface in accordance with ANSI/CRRC S100.                                                                                                                                                                                                       |
|                                                                                                                                                                | Emittance = 0.90                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Conditioned basement walls                                                                                                                                     | Type: Same as rated home                                                                                                     | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>R</i> -value: From Table 402.2(2) with the insulation layer on the interior side of walls                                 | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Floors over unconditioned space volume, nonfreezing space, unrated heated space or multifamily buffer boundary                                                 | Type: Wood frame                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>U</i> -factor: From Table 402.2(2)                                                                                        | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Floors over outdoor environment                                                                                                                                | Type: Wood frame                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>U</i> -factor: From Table 402.2(2)                                                                                        | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Ceilings above conditioned space volume and below an attic, unconditioned space volume, nonfreezing space, unrated heated space or multifamily buffer boundary | Type: Wood frame                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home ceiling area                                                                                  | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>U</i> -factor: From Table 402.2(2)                                                                                        | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Roofs                                                                                                                                                          | Material: Composition shingle on wood sheathing                                                                              | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Solar absorptance = 0.75                                                                                                     | Values from Table 402.2(4) shall be used to determine solar absorptance, except where test data are provided for roof surface in accordance with ANSI/CRRC S100 for the measurement of solar reflectance. The solar absorptance value is obtained by subtracting the measured solar reflectance value from the number one (solar absorptance = 1 – solar reflectance). |
|                                                                                                                                                                | Emittance = 0.90                                                                                                             | Emittance values provided by the roofing manufacturer in accordance with ANSI/CRRC S100 shall be used when available. In cases where the appropriate data are not known, same as the reference home.                                                                                                                                                                   |
|                                                                                                                                                                | Predominant shape: <sup>4</sup> Same as rated home                                                                           | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Attics                                                                                                                                                         | Type: Vented with aperture = 1ft <sup>2</sup> per 300 ft <sup>2</sup> ceiling area                                           | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Attic roof assemblies shall be uninsulated, while the ceiling below the attic shall be insulated according to Table 402.2(2) | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
| Foundations                                                                                                                                                    | Type: Same as rated home                                                                                                     | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | Gross area: Same as rated home                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                | <i>U</i> -factor/ <i>R</i> -value: From Table 402.2(2)                                                                       | Same as rated home                                                                                                                                                                                                                                                                                                                                                     |

4. (Informative Note) Roof shape is not a minimum rated feature. It is included here to make explicit that whatever roof shape is used in the rated home shall also be used in the reference home. Examples of roof shapes include flat, sloped/shed, hip and gable.

TABLE 402.2(1)—SPECIFICATIONS FOR THE ENERGY RATING REFERENCE AND RATED HOMES—continued

| BUILDING COMPONENT          | ENERGY RATING REFERENCE HOME                                                                                                                                                                                                                                                                          | RATED HOME                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crawl spaces                | Type: Vented with net free vent aperture = 1ft <sup>2</sup> per 150 ft <sup>2</sup> of crawl space floor area<br>Crawl space walls shall be uninsulated, while the floor above the crawl space shall be insulated according to Table 402.2(2) as a floor over unconditioned space volume <sup>a</sup> | Same as the rated home, but not less net free ventilation area than the reference home unless an approved ground cover in accordance with IRC Section R408.3.1, Item 1 is used, in which case, the same net free ventilation area as the rated home down to a minimum net free vent area of 1 ft <sup>2</sup> per 1,500 ft <sup>2</sup> of crawl space floor area |
|                             | U-factor: From Table 402.2(2) for floors over unconditioned space volume or outdoor environment unconditioned space volume or outdoor environment                                                                                                                                                     | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
| Doors                       | Area: 40 ft <sup>2</sup> for one- and two-family dwellings and townhouses; 20 ft <sup>2</sup> for all others                                                                                                                                                                                          | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | Orientation:<br>For exterior doors: North in the Northern Hemisphere and south in the Southern Hemisphere<br><br>For all other doors: In adiabatic wall                                                                                                                                               | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | U-factor: Same as opaque door from Table 402.2(2)                                                                                                                                                                                                                                                     | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
| Glazing <sup>b</sup>        | Total area <sup>c</sup> = 18% of CFA                                                                                                                                                                                                                                                                  | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | Orientation: Equally distributed to four cardinal compass orientations (N, E, S and W)                                                                                                                                                                                                                | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | U-factor: From Table 402.2(2)                                                                                                                                                                                                                                                                         | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | SHGC: From Table 402.2(2)                                                                                                                                                                                                                                                                             | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
|                             | Interior shade coefficient: $0.92 - (0.21 \times \text{SHGC of the energy rating reference home})$                                                                                                                                                                                                    | $0.92 - (0.21 \times \text{SHGC of the rated home})$                                                                                                                                                                                                                                                                                                              |
|                             | External shading: none                                                                                                                                                                                                                                                                                | Same as rated home <sup>d</sup>                                                                                                                                                                                                                                                                                                                                   |
|                             | Operable window area: <sup>5</sup> 67% of total window area or 0% for dwelling units where no operable glazing is present in the rated home                                                                                                                                                           | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
| Skylights                   | None                                                                                                                                                                                                                                                                                                  | Same as rated home                                                                                                                                                                                                                                                                                                                                                |
| Thermally isolated sunrooms | None                                                                                                                                                                                                                                                                                                  | Same as rated home                                                                                                                                                                                                                                                                                                                                                |

5. (Informative Note) Operable window area is the total area of all windows that are operable.

TABLE 402.2(1)—SPECIFICATIONS FOR THE ENERGY RATING REFERENCE AND RATED HOMES—continued

| BUILDING COMPONENT                                    | ENERGY RATING REFERENCE HOME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RATED HOME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air exchange rate                                     | Specific leakage area (SLA) <sup>e</sup> = 0.00036 assuming no energy recovery, supplemented as necessary with balanced mechanical ventilation to achieve the required dwelling unit total air exchange rate ( $Q_{tot}$ ) <sup>f, g</sup>                                                                                                                                                                                                                                                                                                                                                                                                            | <p>In accordance with ANSI/RESNET/ICC 380, obtain airtightness test results for:</p> <ul style="list-style-type: none"> <li>• Building enclosure (for detached dwelling units)</li> <li>• Compartmentalization boundary (for attached dwelling units)</li> </ul> <p>For attached dwelling units with airtightness test results <math>\leq 0.30</math> CFM<sub>50</sub> per ft<sup>2</sup> of compartmentalization boundary, the test results shall be multiplied by reduction factor <math>A_{ext}^h</math> to determine the infiltration rate. For attached dwelling units with airtightness test results <math>&gt; 0.30</math> CFM<sub>50</sub> per ft<sup>2</sup> of compartmentalization boundary, the test results shall be modeled as the infiltration rate.</p> <p>For residences without dwelling unit mechanical ventilation systems<sup>i</sup> or without measured airflow, or where <math>A_{ext}^h &lt; 0.5</math> and the mechanical ventilation system is solely an exhaust system, the infiltration rate<sup>i</sup> shall be determined by the airtightness test results described above, but not less than 0.30 ACH (at 4 Pa). Where the resulting dwelling unit total air exchange rate is less than <math>Q_{tot} = 0.03 \times CFA + 7.5 \times (Nbr + 1)</math> cfm, a supplemental balanced ventilation system shall be added to the rated home to meet <math>Q_{tot}^{dd}</math>.</p> <p>For residences with dwelling unit mechanical ventilation systems, the total air exchange rate shall be the infiltration rate<sup>i</sup> as determined above, in combination<sup>g</sup> with the time-averaged dwelling unit mechanical ventilation system rate<sup>j, dd</sup> which shall be the value measured in accordance with ANSI/RESNET/ICC 380. The dwelling unit total air exchange rate shall be no less than <math>Q_{tot} = 0.03 \times CFA + 7.5 \times (Nbr + 1)</math> cfm. To ensure the total air exchange rate is sufficient, if needed, the dwelling unit mechanical ventilation system run-time operation shall first be increased, if possible, followed by increasing the airflow rate as needed. Supply and exhaust ventilation shall increase proportionally to the rated home's entered value(s) or, if no mechanical ventilation system was specified, a balanced ventilation system shall be modeled.</p> |
| Dwelling unit mechanical ventilation system fan power | <p>None, except where a mechanical ventilation system is installed in the rated home, in which case:</p> <p>Where rated home does not have energy recovery: <math>0.35 \text{ W/cfm} \times fan_{cfm\_sup} + 0.35 \text{ W/cfm} \times fan_{cfm\_exh}</math>.</p> <p>Where rated home has energy recovery: <math>0.50 \text{ W/cfm} \times fan_{cfm\_sup} + 0.50 \text{ W/cfm} \times fan_{cfm\_exh}</math>.</p> <p>And where <math>fan_{cfm\_sup}</math> and <math>fan_{cfm\_exh}</math> are the respective minimum continuous supply and exhaust dwelling unit mechanical ventilation system fan flow rates for the rated home.<sup>k, dd</sup></p> | <p>Same as rated home<sup>l, m, dd</sup> except when the dwelling unit mechanical ventilation system airflow rate has been increased to meet the total air exchange rate, in which case:</p> <p>Where only the run time has been increased, the fan energy shall be proportionally increased to maintain the rated home fan Wh/cfm.</p> <p>Where airflow rate has been increased, the fan power shall be proportionally increased to maintain the rated home specific fan power in W/cfm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Internal gain                                         | As specified in Section 402.2.8.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Same as energy rating reference home, except as provided by Section 402.2.8.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Internal mass                                         | An internal mass for furniture and contents of 8 psf of floor area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Same as energy rating reference home, plus any additional mass specifically designed as a thermal storage element <sup>n</sup> but not integral to the building envelope or structure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**TABLE 402.2(1)—SPECIFICATIONS FOR THE ENERGY RATING REFERENCE AND RATED HOMES—continued**

| BUILDING COMPONENT                                  | ENERGY RATING REFERENCE HOME                                                                                                                                                                              | RATED HOME                                                                                                           |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Structural mass                                     | For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air                                                                                   | Same as rated home                                                                                                   |
|                                                     | For masonry basement walls, same as rated home but with insulation required by Table 402.2(2) located on the interior side of the walls                                                                   | Same as rated home                                                                                                   |
|                                                     | For other walls, for ceilings, floors and interior walls, wood frame construction                                                                                                                         | Same as rated home                                                                                                   |
| Heating systems <sup>o, p</sup>                     | Fuel type: Same as rated home                                                                                                                                                                             | Same as rated home <sup>p</sup>                                                                                      |
|                                                     | Efficiencies:<br>Electric: Air source heat pump in accordance with Table 402.2(1b)                                                                                                                        | Same as rated home                                                                                                   |
|                                                     | Nonelectric furnaces: Natural gas furnace in accordance with Table 402.2(1b)                                                                                                                              | Same as rated home                                                                                                   |
|                                                     | Nonelectric boilers: Natural gas boiler in accordance with Table 402.2(1b)                                                                                                                                | Same as rated home                                                                                                   |
|                                                     | Capacity: Sized in accordance with Section 404.1.3.1                                                                                                                                                      | Same as rated home except not smaller than the rated home heating load <sup>q</sup>                                  |
|                                                     | Installation quality grade of forced-air HVAC system with furnace or heat pump: Configured in accordance with Section 402.2.4.1 and modeled in accordance with Section 402.2.4.2                          | Same as rated home, configured in accordance with Section 402.2.4.1 and modeled in accordance with Section 402.2.4.2 |
| Cooling systems <sup>o, r</sup>                     | Fuel type: Electric                                                                                                                                                                                       | Same as rated home <sup>r</sup>                                                                                      |
|                                                     | Efficiency: In accordance with Table 402.2(1b)                                                                                                                                                            | Same as rated home                                                                                                   |
|                                                     | Capacity: Sized in accordance with Section 404.1.3.1                                                                                                                                                      | Same as rated home except not smaller than the rated home sensible cooling load <sup>q</sup>                         |
|                                                     | Installation quality grade of forced-air HVAC system with air conditioner or heat pump: Configured in accordance with Section 402.2.4.1 and modeled in accordance with Section 402.2.4.2                  | Same as rated home, configured in accordance with Section 402.2.4.1 and modeled in accordance with Section 402.2.4.2 |
| Service water heating systems <sup>o, s, t, u</sup> | Fuel type: Same as rated home                                                                                                                                                                             | Same as rated home <sup>s</sup>                                                                                      |
|                                                     | Efficiencies:<br>Electric: $EF = 0.97 - (0.00132 \times \text{store gal})$<br>Fossil fuel: $EF = 0.67 - (0.0019 \times \text{store gal})$                                                                 | Same as rated home                                                                                                   |
|                                                     | Use (gal/day): Determined in accordance with Section 402.2.8.1.4                                                                                                                                          | Determined in accordance with Section 402.2.7.2.11                                                                   |
|                                                     | Tank temperature: 125°F                                                                                                                                                                                   | Same as energy rating reference home                                                                                 |
|                                                     | Location:<br>IECC Climate Zones 1–3: Attached garage if present, otherwise conditioned space volume<br><br>IECC Climate Zones: 4–8: Unconditioned basement if present, otherwise conditioned space volume | Same as rated home                                                                                                   |