# ENERGY STAR® Residential New Construction Programs

### **Historical Document**

This document is provided for reference because it has been superseded by a more recent Version or Revision. Please find current program documents on the <u>Program Requirements</u> webpage.

Use of older Versions and Revisions, such as this document, are typically limited to homes and buildings with a permit date (or, for manufactured homes, a production date) prior to a specified date. Consult the <a href="Implementation Timeline">Implementation Timeline</a> table to assess whether a home or apartment is still eligible to be certified using this document.

For questions or more information, contact us at <a href="mailto:energystar.gov">energystar.gov</a>.



This document provides instructions for determining the ENERGY STAR ERI Target, the highest ERI value that each rated home may achieve to earn the ENERGY STAR. Note that, in addition to meeting the ENERGY STAR ERI Target, homes shall also meet all Mandatory Requirements for All Certified Homes in Exhibit 2 of the National Program Requirements for ENERGY STAR Single-Family New Homes, Version 3.2.

An EPA-recognized Home Certification Organization's Approved Software Rating Tool shall automatically determine (i.e., without relying on a user-configured ENERGY STAR Reference Design) this target for each rated home. This shall be done by configuring the ENERGY STAR Reference Design Home in accordance with Exhibit 1, the Expanded ENERGY STAR Reference Design Definition, and calculating its associated ERI value. The ERI value shall be calculated using ANSI / RESNET / ICC Standard 301 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the Home Certification Organization (HCO) that the home is being certified under, with approved exceptions listed at <a href="https://www.energystar.gov/ERIExceptions">www.energystar.gov/ERIExceptions</a>. This value, rounded to the nearest whole number, shall equal the ENERGY STAR ERI Target.

Revised 05/09/2022



**Exhibit 1: Expanded ENERGY STAR Reference Design Definition** 

| Climate Zone: 4   Climate Zone: 5   C2   C2   C2   C2   C2   C2   C2   | ilding      | EXHIBIT 1: EXPANGE   |                  |                  |               |             |                      | <u> </u>    |                                |            |  |  |
|--|-------------|--|------------------|------------------|---------------|-------------|----------------------|-------------|--------------------------------|------------|--|--|
| For masonny floor slabs, modeled with 90% of floor area covered by capret and 20% of floor directly exposed to room air Conditioning Types. Same as Rated Home; except.  |             |  |                  |                  | Reference I   | Design Def  | inition <sup>1</sup> |             |                                |            |  |  |
| Crawispaces shall be modeled as vented with net free vent aperture = 1sq. ft. per 150 sq. ft. of crawispace floor area   | dations: Co |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Gross Area: Same as Rated Home   Insulation: \$4 Choose appropriate insulation elver below:  | Co          | Conditioning Type: Same as Rated Home, except:   |                  |                  |               |             |                      |             |                                |            |  |  |
| Insulation. ** Cincose appropriate insulation level below.  * Basement Wall Assembly U-factor only applies to conditioned bsmt.*s; if applicable, insulation shall be located on interior side of Floor assembles above crawispace foundations shall be configured to meet the applicable floor assembly U-factor itseld in the component section for Floors Over Unconditioned Spaces and crawispace walls shall be uninsulated a shall be considered by the component section for Floors Over Unconditioned Spaces and crawispace walls shall be uninsulated a shall be uninsulated as the component section for Floors Over Unconditioned Spaces and crawispace walls shall be uninsulated as the component section for Floors of the Stab Insulation Revalues.  Stab Insulation Revalues:  Stab Insul |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Basement Wall Assembly U-factor only applies to conditioned bsmt.*s; if applicable, insulation shall be located on interior side to Floor assembles above crawbupsce foundations walls and the comproper size of the comp    |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Floor assemblies above crawispace foundations shall be configured to meet the applicable floor assembly U-factor listed in the component section for Floors Over Unconditioned Spaces and rarwispace walls shall be uninsulation R-value. The insulation floor surface less than 12' below grade shall be insulated to the Slab Insulation R-value. The insulation shall be decided to the slab insulation R-value of the stab floor the stab of the foundation wall and their vertically below-grade to the Slab Insulation R-value. The insulation R-value of the stab insulation R-value R-valu  | Ins         |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Component section for Floors Over Unconditioned Spaces and crawlspace walls shall be unisualated to the Slab Insulation R-value. The insulation shall downward from the top of the slab on the outside of the foundation wall and then vertically below-grade to the fiscible Insulation Climate Zone: **   Constitution Type: Wood frame Cli   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Slate floors with a floor surface less than 12' below grade shall be insulated to the Slab Insulation R-value. The insulation shall downward from the top of the slab on the outside of the foundation wall and then vertically below-grade to the Slab Insulation Climate Zone: \$  Slab Insulation R-Value: 0 0 0 10 10 10 10 10 10 10 10 10 Slab Insulation Depth (ft): 0 0 0 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Domain   |             | Slab floors with a floor surface less than 12" below grade shall be insulated to the Slab Insulation R-value. The insulation shall extend  |                  |                  |               |             |                      |             |                                |            |  |  |
| Slab Insulation R-Value: 0 0 0 10 10 10 10 10 10 10 10 10 10 10  |             |  | the outside of   | the foundati     | on wall and t | hen vertica | lly below-grade      | to the Slal | o Insulation [                 | Depth ⁵    |  |  |
| Slab Insulation Depth (ft):  |             |  |                  |                  |               |             |                      |             |                                | CZ 8       |  |  |
| Basement Wall Assembly U-Factor: 0.360 0.360 0.091 0.059 0.050 0.050 0.050 0.055   | _           |  |                  |                  |               |             |                      |             |                                | 10         |  |  |
| Construction Type: Wood frame   Construction Type: Wood frame   Cross Area: Same as Rated Home   Insulation: \$\frac{3}{16}\$ Climate Zone: \$\frac{1}{16}\$ CZ1 CZ2 CZ3 CZ4 CZ4 CZ 6.8 \$\frac{1}{16}\$ CZ7   Floor Assembly U-Factor: 0.064 0.064 0.047 0.047 0.033 0.033 0.028  |             |  | -                |                  |               | · ·         |                      |             | =                              | 4<br>0.050 |  |  |
| Corosa Area: Same as Rated Home   Insulation: 3** Climate Zone: *   C21   C22   C23   C24   C24   C24   C25   C2   |             |  | 0.300            | 0.300            | 0.091         | 0.058       | 0.030                | 0.030       | 0.030                          | 0.030      |  |  |
| Insulation: 1-4 Climate Zone: \$   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Floor Assembly U-Factor: 0.004 0.064 0.067 0.047 0.047 0.033 0.033 0.028   | <u> </u>    |  | CZ 1             | CZ 2             | CZ 3          | CZ 4        | CZ 4C & 5            | CZ 6        | CZ 7                           | CZ 8       |  |  |
| Interior and Exterior Construction Type: Wood frame   Gross Area: Same as Rated Home   Solar Absorptance = 0.90   Insulation: "Gilmate Zone: "   |             |  |                  |                  |               |             |                      |             |                                | 0.028      |  |  |
| Same as Rated Home   Solar Absorptions   Solar Absorption   Solar Solar Solar Solar   Solar Solar Solar Solar   Solar Solar Solar Solar   Solar Solar Solar Solar   Solar Solar Solar   Solar Solar Solar   Solar Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar Solar   Solar   Solar Solar   Solar   Solar   Solar Solar      | e-Grade Int |  |                  |                  |               | *****       |                      |             |                                | ****       |  |  |
| Emittance = 0.90   |             |  | <del></del>      |                  |               |             |                      |             |                                |            |  |  |
| Insulation: 3  | Sc          | olar Absorptance = 0.75  |                  |                  |               |             |                      |             |                                |            |  |  |
| Mail Assembly U-Factor:   0.084   0.084   0.060   0.045   0.045   0.045   0.045   0.045  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Thermally Isolated   Sunrooms:   Area: Same as Rated Home   Opaque   \$1/2-Lite   >1/2-Lite   C2 1-3   | Ins         | sulation: 3 Climate Zone: 6  | CZ 1             | CZ 2             | CZ 3          | CZ 4        | CZ 4C & 5            | CZ 6        | CZ 7                           | CZ 8       |  |  |
| Solated   Sourcoms:   Sourco   |             | Wall Assembly U-Factor:  | 0.084            | 0.084            | 0.060         | 0.045       | 0.045                | 0.045       | 0.045                          | 0.045      |  |  |
| Doors  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Area: Same as Rated Home   Orientation: Same as Rated Home   O.17  |             | one  |                  |                  |               |             |                      |             |                                |            |  |  |
| Directation: Same as Rated Home  |             | Detections   |                  |                  |               |             |                      |             |                                |            |  |  |
| Door Type: U-Value:  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| U-value  |             |  | Onagua           |                  | < 1/2 Lita    |             | > 1/2 Lito C7 1 2 6  |             | > 1/2-Lite CZ 4-8 <sup>6</sup> |            |  |  |
| SHGC: N/A  |             |  |                  |                  |               |             |                      |             | 0.30                           |            |  |  |
| Glazing: 7 Total Area: (except in homes with conditioned basements and attached homes 8)   |             |  |                  |                  |               |             |                      |             | 0.40                           |            |  |  |
| **Same as Rated Home, where Rated Home glazing area is less than 15% of conditioned floor area: OR 15% of the conditioned floor area, where the Rated Home glazing area is 15% or more of the conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area. The conditioned floor area or 15% of the conditioned floor area. The condition of the conditioned floor area. The conditioned floor area. The condition of the conditioned floor area. The condition of the cond |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Orientation: Equally distributed to North, East, South, and West   Interior Shade Coefficient: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301  |             | • Same as Rated Home, where Rated Home glazing area is less than 15% of conditioned floor area; <u>OR</u>  |                  |                  |               |             |                      |             |                                |            |  |  |
| Interior Shade Coefficient: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Climate Zone: 6  |             |  |                  |                  | as defined by | y ANSI / RE | SNET / ICC S         | td. 301     |                                |            |  |  |
| U-Value:   0.40   0.40   0.30   0.30   0.27   0.27   0.27   0.27     SHGC:   0.25   0.25   0.25   0.25   0.40   0.40   0.40   0.40     Skylights:   None   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Skylights:   None   Skylights:   None   Skylights:   None   Skylights:   Skylight   | CI          | imate Zone: 6  | CZ 1             | CZ 2             | CZ 3          | CZ 4        | CZ 4C & 5            | CZ 6        | CZ 7                           | CZ 8       |  |  |
| Skylights: None   Construction Type: Wood frame   Gross Area: Same as Rated Home   Insulation: 3   Climate Zone: 6   CZ 1   CZ 2   CZ 3   CZ 4   CZ 4 C & 5   CZ 6   CZ 7  | U-          | -Value:  | 0.40             | 0.40             | 0.30          | 0.30        | 0.27                 | 0.27        | 0.27                           | 0.27       |  |  |
| Ceilings:    Construction Type: Wood frame   Gross Area: Same as Rated Home  | SH          | HGC:   | 0.25             | 0.25             | 0.25          | 0.40        | 0.40                 | 0.40        | 0.40                           | 0.40       |  |  |
| Gross Area: Same as Rated Home  Insulation: 3 Climate Zone: 6 CZ 1 CZ 2 CZ 3 CZ 4 CZ 4 CZ 4 CZ 6 CZ 7  Ceiling Assembly U-Factor: 0.035 0.026 0.026 0.024 0.024 0.024 0.024 0.024  Attics: Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area Radiant Barrier: None  Roofs: Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Refrigerator: 450 kWh per year  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Moot otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  | hts: No     | one  |                  |                  |               |             |                      |             |                                |            |  |  |
| Insulation: <sup>3</sup> Climate Zone: <sup>6</sup> CZ 1 CZ 2 CZ 3 CZ 4 CZ 4C & 5 CZ 6 CZ 7  Ceiling Assembly U-Factor: 0.035 0.026 0.026 0.024 0.024 0.024 0.024 0.024  Attics: Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area Radiant Barrier: None  Roofs: Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains: Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Ceiling Assembly U-Factor: 0.035 0.026 0.026 0.024 0.024 0.024 0.024 0.024  Attics: Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area Radiant Barrier: None  Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains: Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Attics:  Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area Radiant Barrier: None  Roofs:  Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Refrigerator: 450 kWh per year  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  | Ins         |  |                  |                  |               |             |                      |             |                                | CZ 8       |  |  |
| Radiant Barrier: None  Roofs:  Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Refrigerator: 450 kWh per year  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quantity washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Moon otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               | 0.024       | 0.024                | 0.024       | 0.024                          | 0.024      |  |  |
| Roofs:  Construction Type: Composition shingle on wood sheathing Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains: Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  | Isq. ft. per 300 | ) sq. ft. ceilir | ig area       |             |                      |             |                                |            |  |  |
| Gross Area: Same as Rated Home Solar Absorptance = 0.92 Emittance = 0.90  Internal Mass: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains: Internal Gains: Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Solar Absorptance = 0.92  Emittance = 0.90  Internal Mass:  Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Internal Gains:  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  | wood sneathir    | ıg               |               |             |                      |             |                                |            |  |  |
| Internal Mass:  Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Internal Gains:  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Internal Mass:  Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.  Lighting, Appliances, & Internal Gains:  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Lighting; Fraction of qualifying Tier II fixtures to all fixtures in qualifying light fixture locations 100% for interior, exterior, and garage Refrigerator: 450 kWh per year  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Appliances, & Refrigerator: 450 kWh per year  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Modotherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Internal Gains:  Dishwasher: Capacity: Same as Rated Home, or Standard capacity if no dishwasher in the Rated Home For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| For Standard capacity: LER = 270, GHWC = \$22.23, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208 Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| For Compact capacity: LER = 203, GHWC = \$14.20, Elec\$ = \$0.12, Gas\$ = \$1.09, LCY = 208  Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quan Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Mod otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   | Fo          |  |                  |                  |               |             |                      |             |                                |            |  |  |
| otherwise, same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   | Ce          | Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise, Quantity = 0  |                  |                  |               |             |                      |             |                                |            |  |  |
|  |             | Clothes Washer: If clothes washer present in the Rated Home, efficiency equal to "Std 2018-Present" Standard Clothes Washer Model;   |                  |                  |               |             |                      |             |                                |            |  |  |
| Utothes Dryer: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301.   |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
|  |             |  |                  |                  |               |             |                      |             |                                |            |  |  |
| Internal Gains: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for adjustments for t refrigerator, dishwasher, and ceiling fans specified in this Section.   |             | Internal Gains: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for adjustments for the lighting refrigerator, dishwasher, and ceiling fans specified in this Section |                  |                  |               |             |                      |             |                                |            |  |  |



**Exhibit 1: Expanded ENERGY STAR Reference Design Definition (Continued)** 

| Heating<br>Systems:   |  |  |   |   |   |   |  |   |  |  |
|---|--|--|---|---|---|---|--|---|--|--|
| Systems:  | Heating capacity shall be selected in a  |  |   |   |   |   |  |   | _  |  |
| Systems:  | accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure. For  |  |   |   |   |   |  |   |  |  |
|   | forced-air HVAC systems, degraded capacity from other-than-Grade I installation shall be accounted for using same methodology applied to   |  |   |   |   |   |  |   |  |  |
|   | Energy Rating Reference Home.  |  |   |   |   |   |  |   |  |  |
|   | Fuel Type: Same as Rated Home, except Reference Design shall be configured with gas where Rated Home has non-electric equipment 9  |  |   |   |   |   |  |   |  |  |
|   | Installation Quality: For forced-air HVAC systems, Grade II -20% blower fan airflow deviation, Grade II 0.52 W / CFM blower fan efficiency,  |  |   |   |   |   |  |   |  |  |
|   | and, for air-source heat pumps, Grade III refrigerant undercharge.   |  |   |   |   |   |  |   |  |  |
|   | System Type: Same as Rated Home, except Reference Design shall be configured with air-source heat pump where Rated Home has air-source or ground-source heat pump, electric strip heat, or electric baseboard heat; efficiency selected from below. 10   |  |   |   |   |   |  |   |  |  |
|   |  |  |   |   |   |   |  |   |  |  |
|   | Climate Zone: 6  | CZ 1   | CZ 2  | CZ 3  | CZ 4  | CZ 4C & 5   | CZ 6   | CZ 7  | CZ 8   |  |
|   | Gas Furnace AFUE:  | 80   | 80  | 80  | 90  | 95  | 95   | 95  | 95   |  |
|   | Gas Boiler AFUE:   | 80   | 80  | 80  | 90  | 95  | 95   | 95  | 95   |  |
|   | Air-Source Heat Pump HSPF:   | 9.2  | 9.2   | 9.2   | 9.2   | 9.2   | 9.2  | 9.2   | 9.2  |  |
|   | Air-Source Heat Pump Backup:   | Electric   | Electric  | Electric  | Electric  | Electric  | Electric   | Electric  | Electric   |  |
|   | For non-electric warm furnaces and n   |  |   |   |   | II be determine   | d in accorda   | nce with the  |  |  |
| 0 1:  | methodology for the Energy Rating Re   |  |   |   |   | la a dia a a a di a a   | C I I .  |   |  |  |
| Cooling   | Cooling capacity shall be selected in a  |  |   |   |   |   |  |   | <b></b>  |  |
| Systems:  | accordance with ACCA Manual J, Eig forced-air HVAC systems, degraded of  | nin Edition, AS  | HRAE Hand   | ibook oi Fun  | idamentais, (   | or an equivalen   | ii computatio  | n procedure.  | FOI  |  |
|   |  | apacity from of  | mer-man-Gr  | ade i installa  | ation shall be  | accounted for   | using same   | methodology   | applied to   |  |
|   | Energy Rating Reference Home.  | t D-f  | Danieus alas  | II ha aaafia  |   | ls and Data d I   |  |   | .:   |  |
| 1   | Fuel Type: Same as Rated Home, exc   |  |   |   |   |   |  |   |  |  |
|   | Installation Quality: For forced-air HVAC systems, Grade II -20% blower fan airflow deviation, Grade II 0.52 W / CFM blower fan efficiency,  |  |   |   |   |   |  |   |  |  |
|   | and, for AC's & air-source heat pumps, Grade III refrigerant undercharge.  |  |   |   |   |   |  |   |  |  |
|   | System Type: Same as Rated Home, except Reference Design shall be configured with air-source heat pump where Rated Home has air-<br>source or ground-source heat pump, electric strip heat, or electric baseboard heat; efficiency selected from below. <sup>11</sup>  |  |   |   |   |   |  |   |  |  |
|   |  |  |   |   |   |   |  |   |  |  |
|   | Climate Zone: 6  | CZ 1   | CZ 2  | CZ 3  | CZ 4  | CZ 4C & 5   | CZ 6   | CZ 7  | CZ 8   |  |
|   |  |  |   |   |   |   |  |   |  |  |
|   | AC SEER:   | 16   | 16  | 16  | 16  | 14  | 14   | 14  | 14   |  |
|   | AC SEER:<br>Air-Source Heat Pump SEER:   | 16<br>16   | 16<br>16  | 16<br>16  | 16<br>16  | 14<br>16  | 16   | 14<br>16  | 14<br>16   |  |
| Service   | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener  | 16<br>16<br>gy Rating Refe   | 16<br>16<br>erence Home   | 16<br>16<br>e, as defined   | 16<br>16<br>1 by ANSI / F   | 14<br>16<br>RESNET / ICC :  | 16<br>Std. 301, exc  | 14<br>16<br>cept for reduc  | 14<br>16   |  |
| Service<br>Water  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo  | 16<br>16<br>gy Rating Refe<br>thes washer as   | 16<br>16<br>erence Home<br>specified in   | 16<br>16<br>e, as defined<br>the Lighting   | 16<br>16<br>by ANSI / F<br>g, Appliances  | 14<br>16<br>RESNET / ICC :<br>s, & Internal Ga  | 16<br>Std. 301, exc<br>ins Section.  | 14<br>16<br>cept for reduc  | 14<br>16   |  |
| Water<br>Heating  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy I   | 16<br>16<br>rgy Rating Refe<br>thes washer as<br>Rating Referen  | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as  | 16<br>16<br>e, as defined<br>the Lighting<br>defined by   | 16<br>16<br>by ANSI / F<br>J, Appliances<br>ANSI / RESI   | 14<br>16<br>RESNET / ICC 3<br>5, & Internal Ga<br>NET / ICC Std.  | 16<br>Std. 301, exc<br>ins Section.<br>301.  | 14<br>16<br>cept for reduc  | 14<br>16<br>ed use   |  |
| Water   | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exceptions.  | 16<br>16<br>gy Rating Refe<br>thes washer as<br>Rating Reference<br>cept Reference   | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha  | 16<br>16<br>e, as defined<br>the Lighting<br>s defined by<br>Il be configu  | 16<br>16<br>1 by ANSI / R<br>g, Appliances<br>ANSI / RESI<br>red with gas   | 14<br>16<br>RESNET / ICC 3<br>5, & Internal Ga<br>NET / ICC Std.<br>where Rated H   | 16<br>Std. 301, exc<br>ins Section.<br>301.<br>Home has no                               | 14<br>16<br>cept for reduce   | 14<br>16<br>ed use   |  |
| Water<br>Heating  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha   | 16<br>16<br>gy Rating Refe<br>thes washer as<br>Rating Reference<br>cept Reference<br>s non-electric v   | 16 16 erence Home s specified in ce Home, as Design sha vater heater  | 16<br>16<br>a, as defined<br>the Lighting<br>defined by<br>ll be configu<br>Reference   | 16<br>16<br>1 by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall                                    | 14<br>16<br>RESNET / ICC 3<br>s, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured                                | 16 Std. 301, excins Section. 301. Home has nowith a tankle                               | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water   | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater                       |  |
| Water<br>Heating  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exceptions.  | 16<br>16<br>gy Rating Refe<br>thes washer as<br>Rating Reference<br>cept Reference<br>s non-electric v   | 16 16 erence Home s specified in ce Home, as Design sha vater heater  | 16<br>16<br>a, as defined<br>the Lighting<br>defined by<br>ll be configu<br>Reference   | 16<br>16<br>1 by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall                                    | 14<br>16<br>RESNET / ICC 3<br>s, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured                                | 16 Std. 301, excins Section. 301. Home has nowith a tankle                               | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water   | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater                       |  |
| Water<br>Heating  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to   | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H  | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 g                 | 16 16 e, as defined the Lighting defined by ll be configured, Reference deference Desgallon tank s                                    | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha  | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H  | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 g                 | 16 16 e, as defined the Lighting defined by ll be configured, Reference deference Desgallon tank s                                    | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to   | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H  | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 g                 | 16 16 e, as defined the Lighting defined by ll be configured, Reference deference Desgallon tank s                                    | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:  | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 per Duct Insulation: None  | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric was electric wate that of Rated H er 100 sq. ft. of   | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 g                 | 16 16 e, as defined the Lighting defined by ll be configured, Reference deference Desgallon tank s                                    | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:<br>Thermal<br>Distribution                                       | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pouct Insulation: None Duct Surface Area: Same as Rated H  | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric was electric wate that of Rated H er 100 sq. ft. of   | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 of<br>conditioned | 16<br>16<br>e, as defined<br>the Lighting<br>defined by<br>Il be configu<br>Reference<br>ofference Des<br>gallon tank s<br>floor area | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:<br>Thermal<br>Distribution<br>Systems:                           | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pc Duct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shall   | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric was electric wate that of Rated H er 100 sq. ft. of   | 16<br>16<br>erence Home<br>s specified in<br>ce Home, as<br>Design sha<br>vater heater,<br>er heater, Re<br>lome, or 60 of<br>conditioned | 16<br>16<br>e, as defined<br>the Lighting<br>defined by<br>Il be configu<br>Reference<br>ofference Des<br>gallon tank s<br>floor area | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RES<br>red with gas<br>Design shall<br>sign shall be                   | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with                  | 16 Std. 301, excins Section. 301. Home has nowith a tankler an electric                  | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump w                              | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater        |  |
| Water<br>Heating<br>Systems:<br>Thermal<br>Distribution                                       | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pouct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable  | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in o   | 16 16 erence Home s specified in ce Home, as Design sha vater heater, er heater, Re lome, or 60 of conditioned                            | 16 16 e, as defined the Lighting defined by ll be configured, Reference Designation tanks floor area                                  | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RESI<br>red with gas<br>Design shall<br>sign shall be<br>size if Rated | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with<br>Home uses tar | 16 Std. 301, exc ins Section. 301. dome has no with a tankle an electric kless electri   | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heate                    | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>rr. |  |
| Water<br>Heating<br>Systems:<br>Thermal<br>Distribution<br>Systems:                           | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pouct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Energy  | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in o   | 16 16 erence Home s specified in ce Home, as Design sha vater heater, er heater, Re lome, or 60 of conditioned                            | 16 16 e, as defined the Lighting defined by ll be configured, Reference Designation tanks floor area                                  | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RESI<br>red with gas<br>Design shall<br>sign shall be<br>size if Rated | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with<br>Home uses tar | 16 Std. 301, exc ins Section. 301. dome has no with a tankle an electric kless electri   | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heate                    | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>rr. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:                            | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pouct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Energes Seed of the Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Energes Seed of the Supply and Return Setpoints: Same as Energes Seed of the Supply and Return Setpoints: Same as Energes Seed of the Supply and Return Setpoints: Same as Energes Seed of the Supply and Return Setpoints: Same as Energes Seed of the Supply Seed of | 16 16 rgy Rating Refethes washer as Rating Reference cept Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in o   | 16 16 erence Home s specified in ce Home, as Design sha vater heater, er heater, Re lome, or 60 of conditioned                            | 16 16 e, as defined the Lighting defined by ll be configured, Reference Designation tanks floor area                                  | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RESI<br>red with gas<br>Design shall<br>sign shall be<br>size if Rated | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with<br>Home uses tar | 16 Std. 301, exc ins Section. 301. dome has no with a tankle an electric kless electri   | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heate                    | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>rr. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:  Infiltration &            | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy I Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pc Duct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Ene RESNET / ICC Std. 301 Infiltration Rate: 3 ACH50  | 16 16 rgy Rating Refethes washer as Rating Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in o  | 16 16 erence Home s specified in ce Home, as Design sha vater heater, er heater, Re ome, or 60 of conditioned conditioned                 | 16 16 e, as defined the Lighting defined by ll be configured, Reference Designation tanks floor area                                  | 16<br>16<br>d by ANSI / F<br>g, Appliances<br>ANSI / RESI<br>red with gas<br>Design shall<br>sign shall be<br>size if Rated | 14<br>16<br>RESNET / ICC 5, & Internal Ga<br>NET / ICC Std.<br>where Rated I<br>be configured<br>configured with<br>Home uses tar | 16 Std. 301, exc ins Section. 301. dome has no with a tankle an electric kless electri   | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heate                    | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>rr. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:  Infiltration & Mechanical | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy I Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pc Duct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Ene RESNET / ICC Std. 301 Infiltration Rate: 3 ACH50 Mechanical ventilation system without  | 16 16 rgy Rating Refethes washer as Rating Reference sept Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in of rgy Rating Reference   | 16 16 erence Home s specified in ce Home, as Design sha vater heater, Re lome, or 60 of conditioned conditioned                           | 16 16 e, as defined the Lighting defined by ll be configured, Reference Designation tanks floor area                                  | 16 16 16 18 by ANSI / Fig. Appliances ANSI / RESI red with gas Design shall sign shall be size if Rated                     | 14 16 RESNET / ICC S. & Internal Ga NET / ICC Std. where Rated I be configured with Home uses tar                                 | 16 Std. 301, exc ins Section. 301. Home has no with a tankle n an electric kless electri | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heater<br>c water heater | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>ir. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:  Infiltration &            | AC SEER:  Air-Source Heat Pump SEER:  Use (Gallons per Day): Same as Ener resulting from the dishwasher and cloom Tank Temperature: Same as Energy I Fuel Type: Same as Rated Home, excessive System Type: Where Rated Home has with 0.90 UEF. Where Rated Home has with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pout Insulation: None  Duct Surface Area: Same as Rated Home Supply and Return Duct Locations shart Type: Programmable  Temperature Setpoints: Same as Ener RESNET / ICC Std. 301  Infiltration Rate: 3 ACH50  Mechanical ventilation system without Rate: CFM = 0.01 * CFA + 7.5 * (Nbresteep)  | 16 16 rgy Rating Refethes washer as Rating Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in of rgy Rating Reference that recovery + 1), where CF.  | 16 16 erence Home, as specified in ce Home, as Design sha vater heater, Relome, or 60 conditioned conditioned  A = Condition              | 16 16 16 e, as defined the Lighting defined by ll be configured by ll be configured. Reference Designation tanks of floor area space. | 16 16 16 19 ANSI / Fig. Appliances ANSI / RESI red with gas Design shall sign shall be size if Rated  offsets for a parea   | 14 16 RESNET / ICC St., & Internal Ga NET / ICC Std. where Rated I be configured with Home uses tar programmable to               | 16 Std. 301, exc ins Section. 301. Home has no with a tankle n an electric kless electri | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heater<br>c water heater | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>ir. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:  Infiltration & Mechanical | AC SEER: Air-Source Heat Pump SEER: Use (Gallons per Day): Same as Ener resulting from the dishwasher and clo Tank Temperature: Same as Energy I Fuel Type: Same as Rated Home, exc System Type: Where Rated Home ha with 0.90 UEF. Where Rated Home ha with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pc Duct Insulation: None Duct Surface Area: Same as Rated H Supply and Return Duct Locations shartype: Programmable Temperature Setpoints: Same as Ene RESNET / ICC Std. 301 Infiltration Rate: 3 ACH50 Mechanical ventilation system without  | 16 16 rgy Rating Refethes washer as Rating Reference s non-electric wate that of Rated H er 100 sq. ft. of ome all be 100% in of rgy Rating Reference that recovery + 1), where CF.  | 16 16 erence Home, as specified in ce Home, as Design sha vater heater, Relome, or 60 conditioned conditioned  A = Condition              | 16 16 16 e, as defined the Lighting defined by ll be configured by ll be configured. Reference Designation tanks of floor area space. | 16 16 16 19 ANSI / Fig. Appliances ANSI / RESI red with gas Design shall sign shall be size if Rated  offsets for a parea   | 14 16 RESNET / ICC St., & Internal Ga NET / ICC Std. where Rated I be configured with Home uses tar programmable to               | 16 Std. 301, exc ins Section. 301. Home has no with a tankle n an electric kless electri | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heater<br>c water heater | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>ir. |  |
| Water Heating Systems:  Thermal Distribution Systems:  Thermostat:  Infiltration & Mechanical | AC SEER:  Air-Source Heat Pump SEER:  Use (Gallons per Day): Same as Ener resulting from the dishwasher and cloom Tank Temperature: Same as Energy I Fuel Type: Same as Rated Home, excessive System Type: Where Rated Home has with 0.90 UEF. Where Rated Home has with 2.20 UEF and tank size equal to Duct Leakage to Outside: 0 CFM25 pout Insulation: None  Duct Surface Area: Same as Rated Home Supply and Return Duct Locations shart Type: Programmable  Temperature Setpoints: Same as Ener RESNET / ICC Std. 301  Infiltration Rate: 3 ACH50  Mechanical ventilation system without Rate: CFM = 0.01 * CFA + 7.5 * (Nbresteep)  | 16 16 rgy Rating Refethes washer as Rating References non-electric water that of Rated Her 100 sq. ft. of the come all be 100% in our gy Rating References Rating References non-electric water for the company of the c | 16 16 erence Home, as specified in ce Home, as Design sha vater heater, Relome, or 60 conditioned conditioned  A = Condition              | 16 16 16 e, as defined the Lighting defined by ll be configured by ll be configured. Reference Designation tanks of floor area space. | 16 16 16 19 ANSI / Fig. Appliances ANSI / RESI red with gas Design shall sign shall be size if Rated  offsets for a parea   | 14 16 RESNET / ICC St., & Internal Ga NET / ICC Std. where Rated I be configured with Home uses tar programmable to               | 16 Std. 301, exc ins Section. 301. Home has no with a tankle n an electric kless electri | 14<br>16<br>cept for reduce<br>12<br>on-electric equess gas water<br>heat pump water heater<br>c water heater | 14<br>16<br>ed use<br>uipment <sup>9</sup><br>heater<br>ater heater<br>ir. |  |



#### Footnotes:

- 1. Any parameter not specified in this exhibit shall be identical to the value entered for the Rated Home.
- 2. "Same as Rated Home" indicates that the parameter shall be identical to the value entered for the Rated Home.
- 3. Slab insulation R-values represent nominal insulation levels; and assembly U-factors for foundations, floors, walls, and ceilings represent the overall assembly, inclusive of sheathing materials, cavity insulation, installation quality, framing, and interior finishes.
- 4. If software allows the user to specify the thermal boundary location independent of the conditioned space boundary in the basement of the rated home, then the thermal boundary of the ENERGY STAR Reference Design shall be aligned with this boundary. For example, if the thermal boundary is located at the walls, then the wall insulation shall be configured as if it was a conditioned basement. If the thermal boundary is located at the floor above the basement, then the floor insulation shall be configured as if it was a floor over an unconditioned space.
- 5. Note that, for the purposes of the ENERGY STAR Reference Design, the slab insulation R-value and depth shall be modeled even in jurisdictions designated by a code official as having Very Heavy Termite Infestation for the purpose of determining the ENERGY STAR ERI Target. This is in contrast to the total UA limit in Item 3.1 of the National Rater Design Review Checklist, which shall be calculated by replacing the code-required slab insulation R-value and depth with the slab insulation R-value and depth specified in the Rated Home for such jurisdictions.
- 2021 IECC Climate Zone designations, as defined and illustrated in <u>Section R301</u> of the code, shall be used to configure the ENERGY STAR Reference Design Home in Version 3.2. Note that some locations have shifted to a different Climate Zone in the 2021 IECC compared to prior editions.
- Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.
- 8. When determining the ENERGY STAR ERI Target for homes with conditioned basements and for attached homes, the following formula shall be used to determine total window area of the ENERGY STAR Reference Design:

 $AG = 0.15 \times CFA \times FA \times F$ 

#### Where:

- AG = Total glazing area
- CFA = Total conditioned floor area
- FA = (Gross above-grade thermal boundary wall area) / (Gross above-grade thermal boundary wall area + 0.5 x Gross below-grade thermal boundary wall area)
- F = 1 0.44 x (Gross common wall area) / (Gross above-grade thermal boundary wall area + Gross common wall area)

#### And where:

- Thermal boundary wall is any wall that separates Conditioned Space from Unconditioned Space, outdoor environment, or the surrounding soil;
- Above-grade thermal boundary wall is any portion of a thermal boundary wall not in contact with soil;
- Below-grade thermal boundary wall is any portion of a thermal boundary wall in soil contact; and
- Common wall is the total wall area of walls adjacent to another conditioned living unit, not including foundation walls.
- 9. Fuel type(s) shall be same as Rated Home, including any dual-fuel equipment where applicable. For a Rated Home with multiple heating, cooling, or water heating systems using different fuel types, the applicable system capacities and fuel types shall be weighted in accordance with the loads distribution (as calculated by accepted engineering practice for that equipment and fuel type) of the multiple systems.
- 10. For a Rated Home without a heating system, the ENERGY STAR Reference Design Home shall be configured with a 78% AFUE gas furnace system, unless the Rated home has no access to natural gas or fossil fuel delivery. In such cases, the ENERGY STAR Reference Design Home shall be configured with a 7.7 HSPF air-source heat pump.
- 11. For a Rated Home without a cooling system, the ENERGY STAR Reference Design Home shall be configured with a 13 SEER electric air conditioner.
- 12. That is to say, representative of standard-flow plumbing fixtures, reference or "Std 2018-Present" Standard Clothes Washer Model gallons per day, standard distribution system water use effectiveness, a hot water piping ratio of 1.0, no pipe insulation, and no drainwater heater recovery.

Revised 05/09/2022