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 www.energystar.gov/ERIExceptions. This value, rounded to the nearest whole number, shall equal the ENERGY STAR ERI Target.
### Building Component

#### expanded Energy Star Reference Design Definition

**Foundations:**
- Construction Type & Structural Mass: Same as Rated Home, except:
  - For masonry floor slabs, modeled with 80% of floor area covered by carpet and 20% of floor directly exposed to room air
  - Crawspaces shall be modeled as vented with net free vent aperture = 1sq. ft. per 150 sq. ft. of crawspace floor area

**Conditioning Type:**
- Same as Rated Home, except:
  - Crawspaces shall be modeled as vented with net free vent aperture = 1sq. ft. per 150 sq. ft. of crawspace floor area

**Gross Area:** Same as Rated Home 2

**Insulation:**
- Choose appropriate insulation level below:
  - Basement Wall Assembly U-factor only applies to conditioned bsmt.; if applicable, insulation shall be located on interior side of walls
  - Floor assemblies above crawspace foundations shall be configured to meet the applicable floor assembly U-factor listed in the building component section for Floors Over Unconditioned Spaces and crawspace walls shall be uninsulated

**Slab Insulation R-value:**
- Slab floors with a floor surface less than 12" below grade shall be insulated to the Slab Insulation R-value. The insulation shall extend downward from the top of the slab on the outside of the foundation wall and then vertically below-grade to the Slab Insulation Depth 5

**Climate Zone:**
- Slab Insulation Depth (ft):
- Basement Wall Assembly U-Factor:

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>CZ 1</th>
<th>CZ 2</th>
<th>CZ 3</th>
<th>CZ 4</th>
<th>CZ 4C &amp; 5</th>
<th>CZ 6</th>
<th>CZ 7</th>
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<tbody>
<tr>
<td>Slab Insulation R-Value:</td>
<td>0.360</td>
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<td>0.091</td>
<td>0.059</td>
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<td>Slab Insulation Depth (ft):</td>
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<td>Basement Wall Assembly U-Factor:</td>
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<td>0.060</td>
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**Floors Over Unconditioned Spaces:**
- Construction Type: Wood frame
- Gross Area: Same as Rated Home

**Insulation:**
- Choose appropriate insulation level below:

**Above-Grade Walls:**
- Interior and Exterior Construction Type: Wood frame
- Gross Area: Same as Rated Home
- Solar Absorptance = 0.75
- Emittance = 0.90

**Thermally Isolated Sunrooms:**
- None

**Doors:**
- Area: Same as Rated Home
- Orientation: Same as Rated Home

**Glazing:**
- Total Area: (except in homes with conditioned basements and attached homes)
  - 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

**Skylights:**
- None

**Ceilings:**
- Construction Type: Wood frame
- Gross Area: Same as Rated Home

**Attics:**
- Construction Type: Ventilated with aperture = 1sq. ft. per 300 sq. ft. ceiling area

**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:**
- 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 are present in the Rated Home; otherwise, Quantity = 0
- Clothes Washer: Efficieny equal to "Std 2018-Present" Standard Clothes Washer Model
- Clothes 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 the lighting, refrigerator, dishwasher, and ceiling fans specified in this Section.

Revised 03/10/2022
Exhibit 1: Expanded ENERGY STAR Reference Design Definition (Continued)

<table>
<thead>
<tr>
<th>Heating Systems:</th>
<th>Heating capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in 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.</th>
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</thead>
<tbody>
<tr>
<td>Fuel Type:</td>
<td>Same as Rated Home, except Reference Design shall be configured with gas where Rated Home has non-electric equipment.</td>
</tr>
<tr>
<td>System Type:</td>
<td>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.</td>
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For non-electric warm furnaces and non-electric boilers, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Energy Rating Reference Home in ANSI / RESNET / ICC Std. 301.
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.

4.5. 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.

6. 2021 IECC Climate Zone designations, as defined and illustrated in Section R301 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.

5.7. Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.

6.8. 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
- \( FA \) = \((\text{Gross above-grade thermal boundary wall area}) ÷ \text{(Gross above-grade thermal boundary wall area + 0.5 x Gross below-grade thermal boundary wall area)}\)
- \( F = 1 - 0.44 \times (\text{Gross common wall area}) ÷ (\text{Gross above-grade thermal boundary wall area + Gross common wall area})\)

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.

7.9. 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.

8.10. 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.

9.11. For a Rated Home without a cooling system, the ENERGY STAR Reference Design Home shall be configured with a 13 SEER electric air conditioner.

10.12. 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.