



DOE Zero Energy Ready Home National Rater Checklist Version 1, Revision 9.0

The program requirements in this checklist must be verified based on as-built conditions for both Performance and Prescriptive path projects, unless noted otherwise. Project teams are strongly encouraged to also use this checklist during the project design phase. Raters are reminded that these checklist items must be completed in addition to the items required by Indoor airPLUS and the applicable ENERGY STAR Multifamily New Construction program version. Overlapping requirements are not repeated in this checklist. Raters are also reminded that under Version 1, Revision 9.0, all dwelling units in the building must be certified in order for each individual unit to earn certification.

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Home Address:	City:	State:	Permit Date:		
1. Partnership Status			Must Correct	Rater¹ Verified	Exception or Alternate Used ² (enter endnote #)
1.1 Rater has verified that builder is a registered DOE ZERH Builder Partner and identified the builder's Partner ID. ³					
1.2 Rater has verified and documented that their company has a ZERH partnership agreement using the ZERH Partner Locator . ⁴					
1.3 Rater(s) signing checklists attest that they are credentialed by a Home Certification Organization for ZERH (HCO for ZERH) or meet the credential requirements of a Multifamily Review Organization for the Zero Energy Ready Home program (MRO for ZERH).					
2. ENERGY STAR Multifamily New Construction Baseline					
2.1 Dwelling unit is certified under applicable ENERGY STAR Multifamily New Construction program version, based on location. ⁵					
<ul style="list-style-type: none"> ▪ Version 1.1 National or Version 1.2 National for projects in all states except Washington and Oregon. ▪ Version 1.2 Washington/Oregon or Version 1.2 National for projects in WA and OR 					
3. Building Envelope					
3.1 Dwelling unit windows meet high performance requirements based on climate zone. ⁶					
3.2 Dwelling unit ceiling, wall, floor, and slab insulation meets or exceeds 2015 IECC levels. ^{7, 8}					
4. Duct System					
4.1 All in-unit heating and cooling system distribution ducts are located within the dwelling unit's thermal and air barrier boundary. ⁹					
4.2 All in-unit heating and cooling system air-handling equipment is located within the dwelling unit's thermal and air barrier boundary.					
5. Water Heating Efficiency (comply with 5.1 or 5.2; mark the other line N/A)					
5.1 Hot water delivery systems meet efficient design requirements. ¹⁰					
5.2 Water heater and fixtures meet efficiency criteria. ¹¹					
6. Lighting & Appliances					
6.1 All builder-installed, in-unit refrigerators, dishwasher, and clothes washer are ENERGY STAR certified. ¹²					



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6.2 80% of builder-installed, in-unit lighting fixtures are LEDs or LED lamps (bulbs) in minimum of 80% of sockets.			
6.3 All builder-installed, in-unit bathroom ventilation fans are ENERGY STAR certified. ¹³			
7. Indoor Air Quality			
7.1 Certified under EPA Indoor airPLUS Version 1. ¹⁴			
8. Renewable Ready			
8.1 Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 1, Revision 9.0 are completed. ¹⁵			
9. Performance Path Efficiency Threshold (if using Prescriptive path, mark N/A)			
9.1 Dwelling unit's ERI value ≤ DOE ZERH Target Dwelling ERI.			
10. Prescriptive Path Eligibility (if using Performance path, mark N/A)			
10.1 The CFA of the dwelling unit is ≤ the CFA of the benchmark dwelling unit. ¹⁶			
10.2 The Prescriptive path Efficiency Specifications table (below) is complete, and all dwelling unit specifications are equal to or exceed the performance of the Target Dwelling Design (Table 2, National Program Requirements).			

Prescriptive Path Efficiency Specifications					
(if using Performance path, mark N/A here and do not complete this table) → _____					
Builder's ZERH Partner ID (found on ZERH Partner Locator webpage): _____					
Program Element	ZERH Prescriptive Specification			As-Built Specification	Specification does not apply ¹⁷
Climate Zone (2015 IECC)	Hot Climates (Zones 1–2)	Mixed Climates (Zones 3 – 4, except Marine)	Cold Climates (Zones 4 Marine and 5 – 8)	Project located in 2015 IECC Climate Zone: _____	
1. HVAC Equipment (in-dwelling, unless stated otherwise)					
Fossil Fuel Furnace	80% AFUE	90% AFUE	94% AFUE	_____% AFUE	
Heat Pump (heating)	8.2 HSPF	9.0 HSPF	10.0	____ HSPF	
Heat Pump (heating, where rated using HSPF2)	Target based on conversion table ¹⁸ : ____ HSPF2			____ HSPF2	
Heat Pump (cooling) or A/C	18 SEER	15 SEER	13 SEER	____ SEER	
Heat Pump (cooling) or A/C (where rated using SEER2)	Target based on conversion table ¹⁹ : ____ SEER2			____ SEER2	
Geothermal Heat Pump	ENERGY STAR EER and COP Criteria based on system type: ____ EER ____ COP			____ EER ____ COP	
Central HVAC Systems ²⁰	Heating target based on endnote: _____			_____	
	Cooling target based on endnote: _____			_____	



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Whole-Dwelling Mechanical Ventilation System	2.8 cfm/W (% SRE n/a)	1.2 cfm/W; heat exchange with 60% SRE	_____ cfm/W	
			_____ %SRE	
2. Infiltration				
Dwelling Unit Infiltration	3.0 ACH50		_____ ACH50	
3. Windows (if dwelling unit's window area to floor area ratio is $\leq 15\%$, mark all items in this section N/A)				
Window to floor area percentage: _____ %				
SHGC	Target value from Table 2 (NPRs): _____ SHGC		SHGC: _____	
	Adjusted target value (see endnote) ²¹ : _____ SHGC			
U-Value	Target U-value from Table 2 (NPRs): _____		U-value: _____	
	Adjusted target U-value (see endnote) ²¹ : _____			
4. Domestic Water Heating (in-dwelling, unless stated otherwise)				
Gas/propane systems	≤ 55 gallons: EF = 0.67		EF = _____	
	> 55 gallons: EF = 0.77		EF = _____	
Electric Systems	EF = 1.50		EF = _____	
Central Water Heating Systems	Meet applicable requirements of ESMFNC Version 1.1 National Rater Field Checklist Item 11.1 (Domestic Hot Water, Prescriptive Path). Target based on above requirement: _____ E _t		_____ E _t	

Inspection Signoffs		
Rater Name: _____ Rater Company Name: _____	Rater Pre-Drywall Inspection ²² Date(s): _____	Rater Initials: _____
Rater Name: _____ Rater Company Name: _____	Rater Final Inspection Date(s): _____	Rater Initials: _____

Endnotes

¹ The Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a DOE-recognized Home Certification Organization for ZERH (HCO for ZERH).

² If an exception for a program requirement or an alternate compliance method is used, enter the number of the corresponding endnote from this document that lists the exception or alternate.



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³ The DOE ZERH Partner ID number for the builder must be entered in the energy rating software used for ZERH certification for Performance path projects.

⁴ Raters are only required to document the partnership status of their company once, for the first home that the Rater certifies for them.

⁵ Sampling of those requirements for ENERGY STAR Multifamily New Construction (ESMFNC) and Indoor airPLUS certification is allowed only to the extent permitted by their respective program requirements and allowances for sampling. Sampling of these ZERH program requirements may be allowed if the Multifamily Review Organization (MRO) for ZERH or Home Certification Organization (HCO) for ZERH overseeing the project's certification has a sampling protocol approved by DOE as part of the MRO/HCO for ZERH approval process.

⁶ Windows shall meet the product criteria listed in this table.

Window Specs Required for DOE Zero Energy Ready Home Projects	Hot Climates IECC CZ 1-2		Mixed Climates IECC CZ 3-4 except Marine		Cold Climates IECC CZ 5-8 and 4 Marine	
	U-factor	SHGC	U-factor	SHGC	U-factor	SHGC
	≤ 0.40	≤ 0.25	[CZ 3] ≤ 0.30 [CZ 4] ≤ 0.30	[CZ 3] ≤ 0.25 [CZ 4] ≤ 0.40	≤ 0.30 = 0.31 = 0.32	Any ≥ 0.35 ≥ 0.40

The following exceptions apply:

- An area-weighted average of windows shall be permitted to satisfy the U-factor requirements.
- An area-weighted average of windows ≥ 50% glazed shall be permitted to satisfy the SHGC requirements.
- 15 square feet of windows per dwelling unit shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above.
- Windows utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft³×°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.

⁷ Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2015 International Residential Code (IRC).

⁸ Insulation levels in a dwelling unit shall meet or exceed the component insulation requirements in the 2015 International Energy Conservation Code (IECC) – Table R402.1.2. The following exceptions apply:

- Steel-frame ceilings, walls, and floors shall meet the insulation requirements of the 2015 IECC – Table 402.2.6.
- For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used.
- For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 sq. ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used.



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- d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows: An assembly with a U-factor equal to or less than specified in Table 402.1.4 of the 2015 IECC complies. A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.4 also complies. The insulation levels of the dwelling unit's fenestration, ceilings, walls, floors, and slabs can be traded off using the UA approach under both the Prescriptive and Performance paths. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.

⁹ Exceptions and alternative compliance paths to locating 100% of forced-air distribution ducts for in-dwelling heating/cooling systems within dwelling unit's thermal and air barrier boundary are:

- a. Up to 10' of total duct length is permitted to be outside of the dwelling unit's thermal and air barrier boundary.
- b. Ducts are located in an unvented attic, regardless of whether this space is conditioned with a supply register
- c. Ducts are located in a vented attic with all of the following characteristics:
 - i. In Moist climates (Zones 1A, 2A, 3A, 4A, 5A, 6A and 7A per 2015 IECC Figure R301.1) and Marine climates (all "C" Zones per 2015 IECC Figure R301.1), minimum R-8 duct insulation with an additional minimum 1.5" of closed-cell spray foam insulation encapsulating the ducts; duct leakage to outdoors ≤ 3 CFM25 per 100 ft² of conditioned floor area (in addition to meeting *total* duct leakage requirements from the ENERGY STAR HVAC Report/Checklist); and ductwork buried under at least 2" of blown-in insulation.
 - ii. In Dry climates (all "B" Zones per 2015 IECC Figure R301.1), minimum R-8 duct insulation; duct leakage to outdoors ≤ 3 CFM25 per 100 ft² of conditioned floor area (in addition to meeting *total* duct leakage requirements from the ENERGY STAR HVAC Report/Checklist); and ductwork buried under at least 3.5" of blown-in insulation.

Note that in either of these designs the HVAC equipment must still be located within the home's thermal and air barrier boundary.

- d. Systems which meet the criteria for "Ducts Located in Conditioned Space" as defined by the 2018 IECC Section R403.3.7 or 2021 IECC Section R403.3.2.
- e. Jump ducts which do not directly deliver conditioned air from the HVAC unit may be located in attics if all joints, including boot-to-drywall, are fully air sealed with mastic or foam, and the jump duct is fully buried under the attic insulation.
- f. Ducts are located within an unvented crawl space.
- g. Ducts are located in a basement which is within the home's thermal boundary.
- h. Ductless HVAC system is used.

This provision does not apply to equipment or ductwork that only provides ventilation.

¹⁰ Hot water delivery systems for a water heater serving an individual dwelling unit meet the following efficiency requirements:

To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. In the case of on-demand recirculation systems, the 0.5 gallon (1.9 liter) storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop, to the fixture itself. To verify that the system stores no more than 0.5 gallons (1.9 liters), verifiers shall 1) calculate the stored volume using the piping or tubing inside diameter and the length of the piping/tubing, **or** 2) perform the field verification



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described below. System options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and on-demand recirculation systems. The following requirements apply to recirculation systems:

- a. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater.
- b. Recirculation systems which operate based on “adaptive” scheduling, meaning that they “learn” the hot water demand profile in the dwelling unit and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
- c. Recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

Field Verification: No more than 0.6 gallons (2.3 liters) of water shall be collected from the hot water fixture before hot water is delivered. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field verify that the system meets the 0.6 gallon (2.3 liter) limit, verifiers shall first initiate operation of on-demand recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 0.6 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 0.6 gallons (approximately 24 seconds for a lavatory faucet), the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F. Under the DOE Zero Energy Ready Home program, the approved verifier may confirm compliance with these requirements.

These provisions do not apply to buildings with central hot water delivery systems. These project types must instead satisfy the applicable efficiency criteria for domestic hot water systems in the next endnote (parts b and c).

¹¹ Systems meet the following requirements:

- a. Individual (in-unit) water heaters serving a single dwelling unit meet the following efficiency criteria:
 - i. Gas water heaters, if present, shall have an Energy Factor ≥ 0.90 or a Uniform Energy Factor ≥ 0.87
 - ii. Electric water heaters, if present, shall have an Energy Factor ≥ 2.2 or a Uniform Energy Factor ≥ 2.2
 - iii. Solar water heating systems, if present, shall have a minimum solar fraction, as follows:

2021 IECC Climate Zone	1, 2	3, 4A, 4B	4C, 5, 6	7, 8
Minimum Solar Fraction (SF)	0.80	0.64	0.47	0.28

- The solar water heating system’s Solar Fraction (SF) must be documented by an OG-300 certification. Alternatively, projects may find an equivalent system in the [OG-300 directory](#) which contains the same OG-100 elements as the chosen system and meets or exceeds the minimum required solar fraction. In this situation, documentation of the OG-100 elements and the comparable OG-300 system must be provided. All systems must be made up of OG-100 tested components.
 - When a solar water heating system meeting these specifications is used, gas and electric water heaters used for backup are exempt from the Uniform Energy Factor (in the two prior sub-items) requirements of 0.87 and 2.2, respectively.
- b. All in-unit showerheads and bathroom sink faucets shall be WaterSense labeled. WaterSense labelling of products may be verified in one of two ways:
 - i. A cut sheet for the installed product indicates that it is WaterSense labeled and field verification shows that the installed product is the one described on the cut sheet.
 - ii. The installed product can be found in the most recent WaterSense Product Search tool (<https://lookforwatersense.epa.gov/products/>) and field verification shows that the installed product matches the product described in the search tool.



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- c. The hot water distribution system shall store no more than 1.8 gallons between the hot water source and the furthest fixture. The hot water source is either the water heater or the point where the branch feeding the furthest fixture branches off the recirculation loop, if present. This shall be verified by either:
 - i. A calculation using the piping or tubing interior diameter and the system length based on plans, or
 - ii. A field verification test, using the protocol described in the previous endnote, which demonstrates a minimum temperature rise of 10 °F by the time 2.0 gallons of water is delivered to the furthest hot water fixture.

¹² For products in categories which are not covered by ENERGY STAR product criteria these products are exempt.

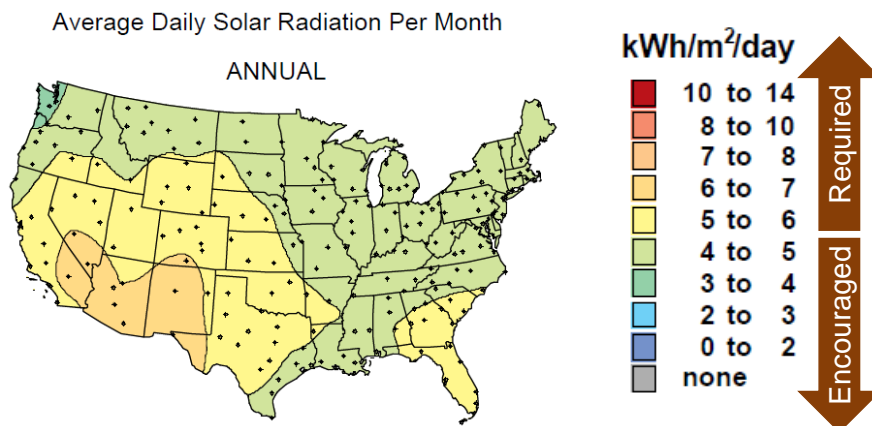
¹³ ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

¹⁴ Buildings permitted on or before 12/31/2024 must certify under the Indoor airPLUS Version 1 program requirements. For buildings permitted after 12/31/2024, DOE will consider a revision to these program requirements that specifies if an updated version of Indoor airPLUS must be used. See the Indoor airPLUS program site for information on program updates: <https://www.epa.gov/indoorairplus/indoor-airplus-program-documents>

¹⁵ DOE Zero Energy Ready Home requires that the provisions of the Version 1 Rev 9.0 PV-Ready Checklist are completed based on the requirements and allowances in this endnote. For multifamily buildings, the PV-Ready provisions may be applied to the electric service for the building’s common space instead of being applied to dwelling units.

The PV-Ready Checklist only applies when all of the following conditions (a through d) below are satisfied. Dwelling units or buildings for which the PV-Ready Checklist does not apply based on these criteria may still qualify for DOE Zero Energy Ready Home certification if all other program requirements are satisfied.

- a. The building does not already include a PV system. This could include installed community solar systems which contribute some amount of offset to the building’s electrical usage. In order for a community solar system to be recognized as providing renewable energy to the building there must be a legally binding agreement in place for the provision of this energy to the building with a duration ≥ 15 years and written to survive a full or partial transfer of ownership of the property. Documentation of this agreement must be retained by the rater.
- b. Location, based on zip code, has at least 5 kWh/m²/day average daily solar radiation based on annual solar insolation using this online tool: <https://pvwatts.nrel.gov/>. Users should enter the project location zip code, use the System Info default settings, and then proceed to the “Results” tab on the tool to see the Average Annual Solar Radiation value in kWh/m²/day.





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- c. Location does not have significant natural shading (e.g., trees, tall buildings on the south-facing roof).
- d. Building as designed has the minimum free roof area within +/- 45° of true south as noted in the table below.

Conditioned Floor Area of Dwelling Unit (ft ²)	Minimum Roof Area within +/- 45° of True South for PV-Ready Checklist to Apply (ft ²)
≤ 2000	110
≤ 4000	220
≤ 6000	330
>6000	440

¹⁶ The average-size dwelling unit for a specific number of bedrooms is termed “Benchmark Dwelling Unit”. The conditioned floor area for a Benchmark Dwelling Unit (CFA Benchmark Dwelling Unit) is determined by selecting the appropriate value from the table below. For dwelling units with more than 8 bedrooms, the CFA Benchmark Dwelling Unit shall be determined by multiplying 600 sq. ft. times the total number of bedrooms and adding 400 sq. ft.

Example 10-Bedroom Dwelling Unit: Benchmark Dwelling Unit = (600 sq. ft. x 10) + 400 sq. ft. = 6,400 sq. ft.

Bedrooms in Dwelling Unit to be Built	0	1	2	3	4	5	6	7
Conditioned Floor Area Benchmark Dwelling Unit (ft ²)	1,000	1,000	1,600	2,200	2,800	3,400	4,000	4,600

¹⁷ Mark N/A for items that are not applicable to the as-built dwelling (i.e., a dwelling using only heat pumps for heating and cooling would mark AFUE as N/A).

¹⁸ Where equipment is rated in HSPF2, the following table shall be used to determine the required efficiency specification. The first row shows the efficiency listed in Exhibit 2 of the National Program Requirements, and below are rows for the converted metric by equipment type.

Efficiency as listed in Exhibit 2	HSPF		
		8.2	9.0
Equipment Type	HSPF2		
Ductless System	7.3	8.0	8.9
Ducted Split System	6.9	7.6	8.4
Ducted Single Packaged System	6.8	7.5	8.3

¹⁹ Where equipment is rated in SEER2, the following table shall be used to determine the required efficiency specification. The first row shows the efficiency listed in Exhibit 2 of the National Program Requirements, and below are rows for the converted metric by equipment type.

Efficiency as listed in Exhibit 2	SEER		
		13.0	15.0
Equipment Type	SEER2		
Ductless System	13.0	15.0	18.0
Ducted Split System	12.4	14.3	17.1
Ducted Single Packaged System	12.4	14.3	17.1



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²⁰ For dwelling units served by central systems, the central system must meet the applicable requirements of ESMFNC Version 1.1's Exhibit X (see ESMFNC Rater Field Checklist).

Exceptions:

1. Hot water boilers ($\geq 300,000$ Btu/h) must be $\geq 90\%$ E_t
2. Where Exhibit X lists the Minimum Efficiency as "See Reference Design," the project must instead meet applicable efficiency specification found in ZERH V1 Rev 9.0 Exhibit 2.

²¹ All decorative glass and skylight window areas count toward the dwelling unit's total window area to above-grade conditioned floor area (WFA) ratio. For homes using the Prescriptive path that have a WFA ratio $> 15\%$, the following additional requirements apply:

- a. In Climate Zones 1, 2, and 3, an improved window SHGC is required and is determined by:

$$\text{Improved SHGC} = [0.15 / \text{WFA}] \times [\text{Target SHGC}]$$

Where the Target SHGC is the maximum allowable SHGC in Exhibit 2 of the National Program Requirements for the Climate Zone where the dwelling unit will be built.

- b. In Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required and is determined by:

$$\text{Improved U-Value} = [0.15 / \text{WFA}] \times [\text{Target U-Value}]$$

Where the Target U-Value is the maximum allowable U-Value in Exhibit 2 of the National Program Requirements for the Climate Zone where the dwelling unit will be built.

Dwelling units following the Prescriptive path may apply the same exceptions available for compliance with the mandatory window requirements to these U and SHGC requirements.

²² Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection. If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Additional information is available in the ENERGY STAR Technical Bulletin: Pre-Drywall Inspection Is Always Required. Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.