



DIVISION OF PLANNING AND PERMITTING FREDERICK COUNTY, MARYLAND

Department of Permits and Inspections

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2021 IECC Residential Energy Efficiency Code for New Construction

All new residential one- and two-family dwellings must comply with the residential provisions of the 2021 IECC unless the building is considered a "Low Energy Building" as defined in Section R402.1

Applicants must select one compliance path option from Page 1 along with selecting applicable additional energy features from tables on Page 2. Additional compliance documentation must be submitted with this form for the Total UA Alternative, Total Building Performance or Energy Rating Index Compliance Alternative path options.

Prescriptive Compliance Option - R402.1

Table R 402.1.2 MAXIMUM ASSEMBLY U-FACTORS AND FENESTRATION REQUIREMENTS

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling U-Factor	Wood Frame Wall U-Factor	Mass Wall U-Factor	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
4 Except Marine	0.30	0.55	0.40	.024	0.045	0.098	0.047	0.059	0.065

Must Select Additional Energy Feature from Table 1. Choose from Page 2.

Prescriptive R-Value Alternative - R402.1.3

Table R 402.1.3 Insulation Minimum R-Values and Fenestration Requirements by Components

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling R-value	Wood Frame Wall R-value	Mass Wall R-value	Floor R-value	Basement Wall R-value	Slab R-value & Depth	Crawl Space Wall R-value
4 Except Marine	0.30	0.55	0.40	60	30 or 20+5 or 13+10 or 0+20	8/13	19	10/13	10, 4ft	10/13

Must Select Additional Energy Feature from Table 1. Choose from Page 2.

MD Prescriptive R-Value Alternative - R402.1.3.1

Table R 402.1.3.1 MD Alternative Insulation Min. R-Values and Fenestration Req. by Components

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling R-value	Wood Frame Wall R-value	Mass Wall R-value	Floor R-value	Basement Wall R-value	Slab R-value & Depth	Crawl Space Wall R-value
4 Except Marine	0.30	0.55	0.40	49	20 or 13+5	8/13	19	10/13	10, 4ft	10/13

Must Select Additional Energy Feature(s) to equal or exceed 6% from Table R408.3 or Table 2. Choose from Page 3.

Total UA Alternative R402.1.5

Select Additional Energy Feature from Table 1.

Additional compliance report required.

Total Building Performance R405

Must Select option from Table 3.

Additional compliance report required.

Energy Rating Index Compliance
Alternative R406

Energy Rating Index Value must be 5% less than the Energy Rating Index Target

Additional compliance report required.

NGBS ICC-700 Silver Rating or Better

Proof of registration with Home Innovation Research Labs required.

Explanations and recommendations:

- prescriptive options 1 & 2 must choose item from Table 1
- option 3 (preferred) must choose selections from Table 2
- total UA alternative (not recommended) ---- total building performance – required REScheck report (recommended)
- energy rating index – requires licensed energy efficiency performance evaluation report (recommended)
- ICC 700 – LEED or similar rating method (not recommended)

Table R 408.2 - Additional Efficiency Package Options For New Construction

Choose one:



1. Enhanced envelope performance option

The total building thermal envelope UA, the sum of the U-factor times the assembly area, shall be less than or equal to 95 percent of the total UA resulting from multiplying the U-factors in Table R402.1.2 by the same assembly area as in the proposed building. The UA calculation shall be performed in accordance with Section R402.1.5. The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table R402.1.2.



2. More efficient HVAC equipment performance option

Heating and cooling equipment shall meet one of the following efficiencies:

1. Greater than or equal to 95AFUE natural gas furnace and 16 SEER air conditioner.
2. Greater than or equal to 10 HSPF/16 SEER air source heat pump.
3. Greater than or equal to 3.54 COP ground source heat pump.

For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.



3. Reduced energy use in service water-heating option

The hot water system shall meet one of the following efficiencies:

1. Greater than or equal to .82 EF fossil fuel service water-heating system.
2. Greater than or equal to 2.0 EF electric service water-heating system.
3. Greater than or equal to 0.4 solar water-heating system.



4. More efficient duct thermal distribution system option

The thermal distribution system shall meet one of the following efficiencies:

1. 100 percent of ducts and air handlers located entirely within the *building thermal envelope*.
2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the *building thermal envelope*.
3. 100 percent of duct thermal distribution system located in *conditioned space* as defined by section R403.3.2.



5. Improved air sealing and efficient ventilation system option

The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt (0.03 m³/min/watt) and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).

2021 IECC Residential Energy Efficiency Code for New Construction - Table 2

Table R - 408.3 Additional Energy Features - Selections Must Meet or Exceed 6%

	Energy Feature	Percentage Increase for Climate Zone 4
<input type="checkbox"/> 1	$\geq 2.5\%$ reduction in total UA ⁵	1%
<input type="checkbox"/> 2	$\geq 5\%$ reduction in total UA ⁵	2%
<input type="checkbox"/> 3	$> 7.5\%$ reduction in total UA ⁵	2%
<input type="checkbox"/> 4	0.22 U-factor windows ⁵	3%
<input type="checkbox"/> 5	High performance cooling system (Greater than or equal to 18 SEER and 14 EER air conditioner) ²	3%
<input type="checkbox"/> 6	High performance cooling system (Greater than or equal to 16 SEER and 12 EER air conditioner) ²	3%
<input type="checkbox"/> 7	High performance gas furnace (Greater than or equal to 96 AFUE natural gas furnace) ²	5%
<input type="checkbox"/> 8	High performance gas furnace (Greater than or equal to 92 AFUE natural gas furnace) ²	4%
<input type="checkbox"/> 9	High performance heat pump system (Greater than or equal to 10 HSPF/18 SEER air source heat pump.) ²	6%
<input type="checkbox"/> 10	High performance heat pump system (Greater than or equal to 9 HSPF/16 SEER air source heat pump.) ²	5%
<input type="checkbox"/> 11	Ground source heat pump (Greater than or equal to 3.5 COP ground source heat pump.) ²	6%
<input type="checkbox"/> 12	Fossil fuel service water heating system (Greater than or equal to 82 EF fossil fuel service water-heating system.)	3%
<input type="checkbox"/> 13	High performance heat pump water heating system option (Greater than or equal to 2.9 UEF electric service water-heating system.)	8%
<input type="checkbox"/> 14	High performance heat pump water heating system. (Greater than or equal to 3.2 UEF electric service water-heating system.)	8%
<input type="checkbox"/> 15	Solar hot water heating system (Greater than or equal to 0.4 solar fraction solar water-heating system.)	6%
<input type="checkbox"/> 16	More efficient HVAC distribution system. (100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.)	10%
<input type="checkbox"/> 17	100% of ducts in conditioned space. (100 percent of duct thermal distribution system located in conditioned space as defined by Section R403.3.2.)	12%
<input type="checkbox"/> 18	Reduced total duct leakage. (When ducts are located outside conditioned space, the total leakage of the ducts, measured in accordance with R403.3.5, shall be in accordance with one of the following: a. Where air handler is installed at the time of testing, 2.0 cubic feet per minute per 100 square feet of conditioned floor area. b. Where air handler is not installed at the time of testing, 1.75 cubic feet per minute per 100 square feet of conditioned floor area.)	1%
<input type="checkbox"/> 19	2 ACH50 air leakage rate with ERV or HRV installed. (Less than or equal to 2.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed.) ³	10%
<input type="checkbox"/> 20	2 ACH50 air leakage rate with balanced ventilation. (Less than or equal to 2.0 ACH50, with balanced ventilation as defined in Section 202 of the 2021 International Mechanical Code.) ⁴	4%
<input type="checkbox"/> 21	1.5 ACH50 air leakage rate with ERV or HRV installed. (Less than or equal to 1.5 ACH50, with either an ERV or HRV installed.) ⁴	12%
<input type="checkbox"/> 22	1 ACH50 air leakage rate with ERV or HRV installed. (Less than equal to 1.0 ACH50, with either an ERV or HRV installed.) ⁴	14%
<input type="checkbox"/> 23	Energy Efficient Appliances (Minimum 3 appliances not to exceed 1 form each type with follow efficiencies. Refrigerator - Energy Star Program Requirements, Product Specification for Consumer Refrigeration Products, Version 5.1 (08/05/2021), Dishwasher - Energy Star Program Requirements for Residential Dishwashers, Version 6.0 (01/29/2016), Clothes Dryer - Energy Star Program Requirements, Product Specification for Clothes Dryers, Version 1.1 (05/05/2017) and Clothes Washer - Energy Star Program Requirements, Product Specification for Clothes Washers, Version 8.1 (02/05/2018)	7%
<input type="checkbox"/> 24	Renewable Energy Measure. ⁴	11%
	1. Energy efficiency percentage increases as established by PNNL. 2. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load. Increases to minimum efficiency requirements are limited to one selection. 3. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt (0.03 m ³ /min/watt) and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/ Moisture Transfer (LRMT). 4. Renewable energy resources shall be permanently installed that have the capacity to produce a minimum of 1.0 watt of on-site renewable energy per square foot of conditioned floor area. The installed capacity shall be in addition to any onsite renewable energy required by Section R404.4. To qualify for this option, one of the following forms of documentation shall be provided to the code official: a. Substantiation that the RECs associated with the on-site renewable energy are owned by, or retired on behalf of, the homeowner. b. A contract that conveys to the homeowner the RECs associated with the on-site renewable energy or conveys to the homeowner an equivalent quantity of RECs associated with other renewable energy. 5. Reduction in total UA from lines 1, 2 or 3 and higher performance windows from line 4 are limited to a single selection.	