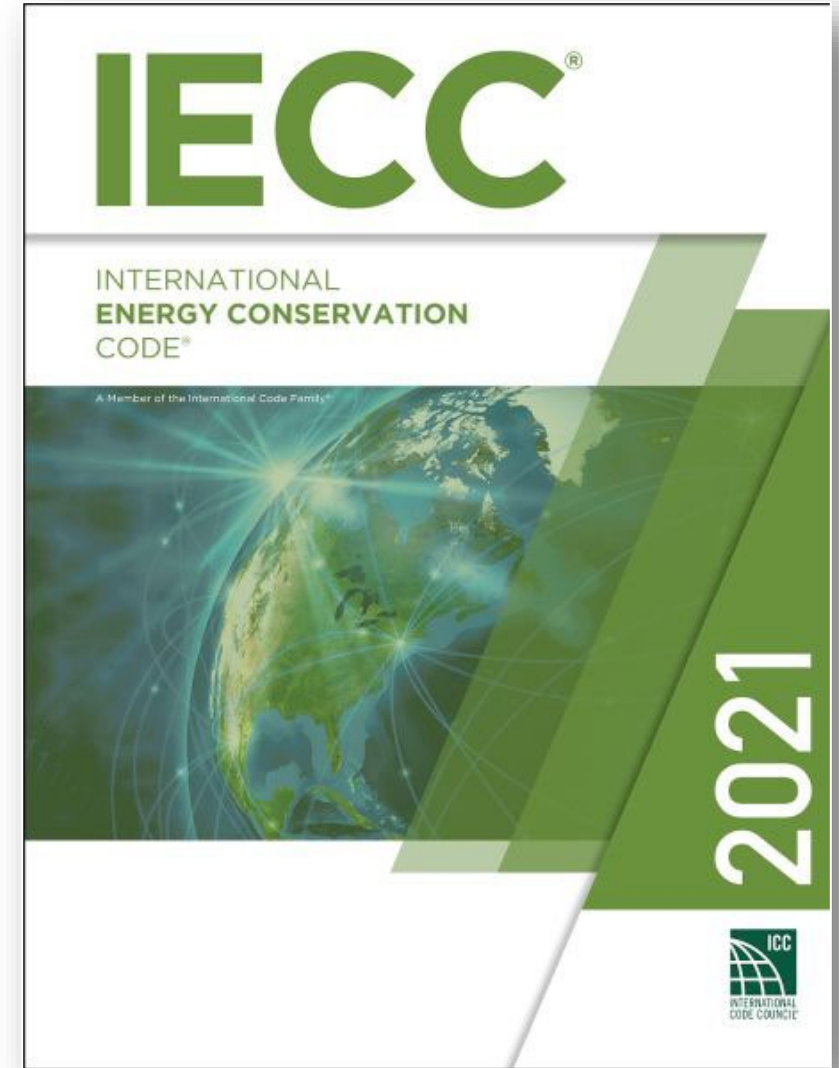




DPS | Montgomery County
Department of Permitting Services
YOUR PROJECT PARTNER

2021 IECC Residential Requirements





NEW CONSTRUCTION

2021 IECC RESIDENTIAL PROVISIONS WITH MONTGOMERY COUNTY AMENDMENTS



Definitions

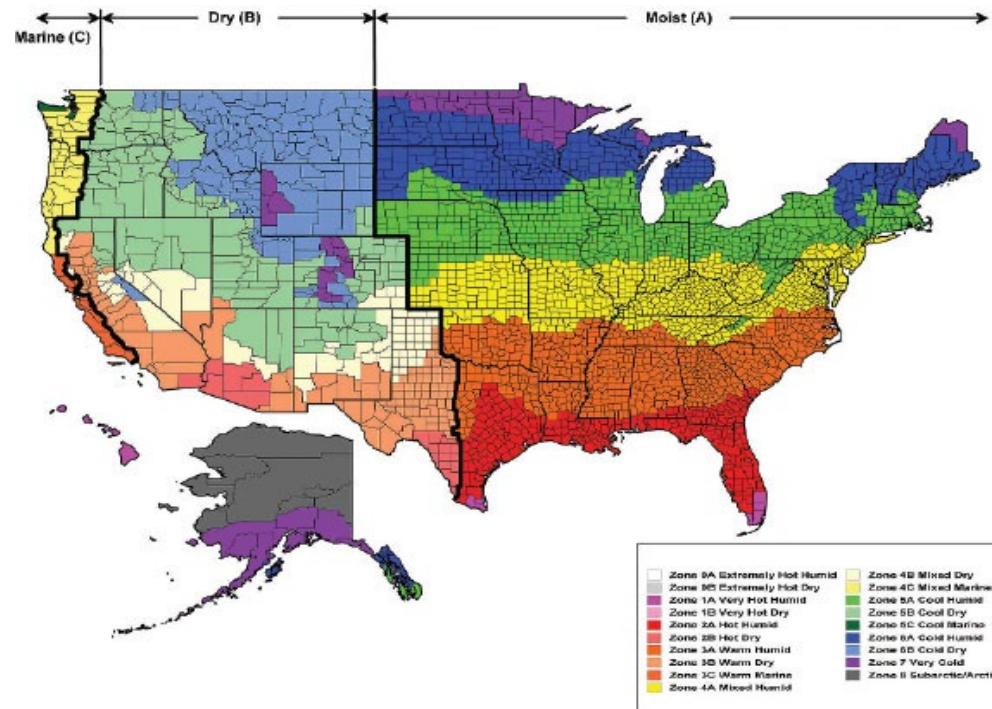
➤ Added

- All-electric building
- Appliance
- Combustion equipment
- Demand responsive control
- Equipment
- Fuel gas
- Fuel oil
- Mixed-fuel building
- Solar-ready zone

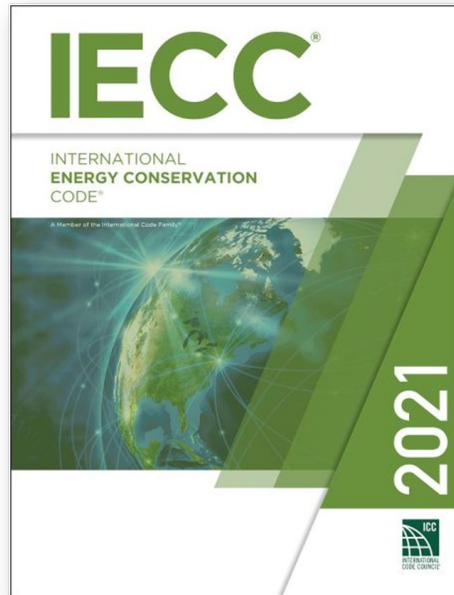


Climate Zones

➤ R301.3 Montgomery County remains as Climate Zone 4A



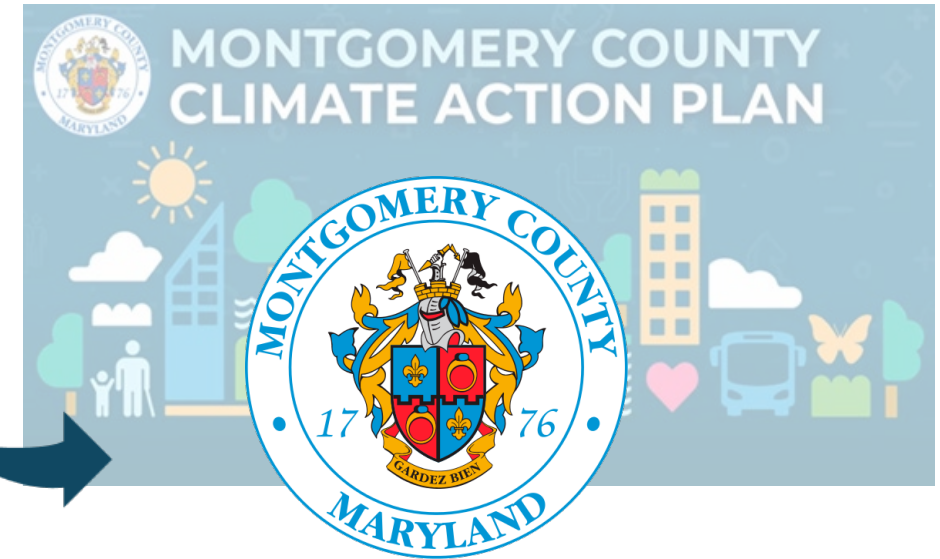
Energy Code Adoption



Model Code



**Maryland
Building
Performance
Standards**



**Montgomery
County
Amendments
Ex. Reg. 13-24**



Model Code Changes

Model IECC Changes – 2018 to 2021:

➤ Building Envelope

- Increased insulation requirements and reduced fenestration U-factors and solar heat gain coefficients.
- Revised air leakage requirements.

➤ Mechanical Systems

- Clarification on duct location and insulation requirements.
- Revised duct testing requirements
- Removed exception for duct testing in conditioned spaces.
- New mechanical ventilation system testing requirements.

➤ Electrical Power and Lighting Systems

- New exterior lighting requirements for limited residential buildings.
- New interior lighting controls requirements



Model Code Changes

Model IECC Changes – 2018 to 2021

New section requiring **at least one** enhanced energy efficiency package **from a list of 5 options**:

➤ **E** - R408.2.1 ENHANCED ENVELOPE OPTION

- The total building thermal envelope UA must be < 95% of the total UA resulting from U-factors in table R-402.1.2

➤ **HVAC** - R408.2.2 HVAC EQUIPMENT OPTION

All HVAC systems must meet or exceed:

- 95 AFUE gas furnace and 16 SEER air conditioner
- 10 HSPF/16 SEER air source heat pump
- 3.5 COP ground source heat pump

➤ **WH** - R408.2.3 WATER HEATING OPTION

Hot water systems must meet one of the following:

- 0.82 EF gas water heating
- 2.0 EF electric water heating
- 0.4 solar fraction solar water heating

➤ **DUCT** - R408.2.4: HVAC LOCATION OPTION

- 100% of ducts and air handlers must be within the building's thermal envelope

➤ **ASEV** - R408.2.5 AIR LEAKAGE Option

- Measured air leakage rate must be ≤ 3.0 ACH with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed



State Changes

Amendments added as required by State 2021 IECC:

➤ **R102.1.1 Above Code Program**

Compliance with the Silver Rating of the ICC/ASHRAE 700-2020 National Green Building Standard meets intent of the code

➤ **R402.1.3.1 R-value alternative.**

Maryland Alternative R-value with reduced R values (2018 values)

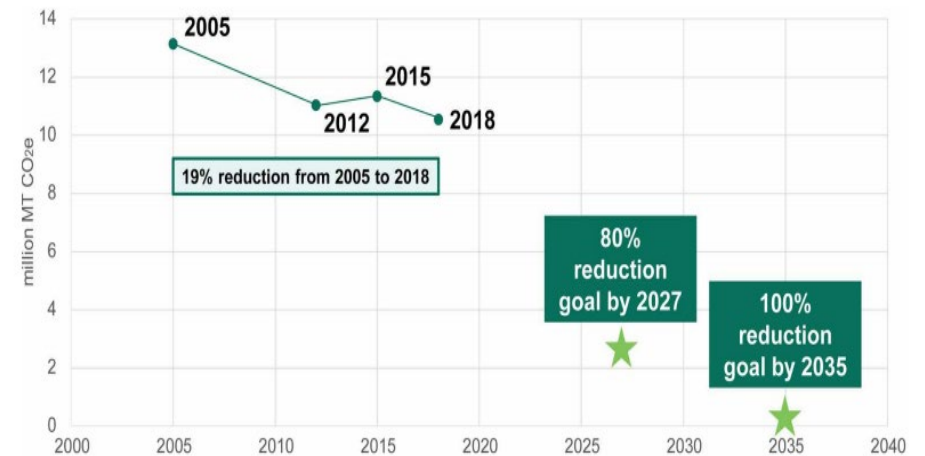
➤ **R401.2.5 Additional Efficiency Package Options**

Maryland Alternative Additional Energy Efficiency Package Option for prescriptive compliance path



Montgomery County Climate Action Plan

- The Climate Action Plan (CAP) published in 2021 outlines Montgomery County's strategic plan to cut greenhouse emissions to 80% by 2027 and 100% by 2035.
- “Comprehensive Building Decarbonization” legislation (Bill 13-22) ensures all-electric building standards become part of the County’s building codes.
- County’s Target
 - Require newly constructed buildings to be all- electric. All new and existing buildings must be electrified or use carbon-free energy sources by 2035.
- Recommended Actions
 - All new residential buildings to be net-zero energy starting with the 2030 code cycle.
 - All electric code for new construction



Source: Metropolitan Washington Council of Governments (MWCOG) Montgomery County GHG Inventory

Figure ES-1: Montgomery County GHG emissions reduction progress and goals



MOCO Code Changes

Amendments based on NBI recommendations to facilitate electrification (electric capable) and decarbonization as required by MOCO Climate Action Plan and Bill 13-22

- **R401.2.5 Additional energy efficiency. Modify and add language to encourage construction of all electric buildings:**
 - Prescriptive Compliance
 - All-electric building: **ONE** of the 5
 - Mixed-fuel building: **ONE** of E or ASEV + **TWO** of the HVAC, WH, DUCT
 - Total Building Performance Compliance
 - All-electric building: {**ONE** of the 5} or ≤ **95%** of energy cost
 - Mixed-fuel building: {**ONE** of E or ASEV + **TWO** of the HVAC, WH, DUCT} or ≤ **85%** of energy cost
 - Energy Rating Index Compliance ≤ 5% than specified values



MOCO Code Changes

Amendments based on NBI recommendations to facilitate electrification (electric capable) and decarbonization as required by MOCO Climate Action Plan and Bill 13-22

- **R403.5 Service hot water systems.** Add new section, Demand responsive water heating, for all-electric storage water heaters with tank capacity greater than 20 gallons to conserve energy.
- **R404 Electrical Power and Lighting Systems.** Add new sections R404.4-6,
Renewable energy infrastructure (capable vs. ready):
 - Solar-ready zone area
 - Energy-storage infrastructure
 - EV Charging station per Maryland public safety code required
- **Additional electric infrastructure**
 - (interconnection pathways: conduit and termination points) for
 - Combustion water heating, combustion space heating, combustion clothes dryer, combustion cooking, Other combustion equipment
- **R406.5 ERI-based Compliance.** Changed Table R406.5 Rating Index to encourage construction of all electric buildings.



Energy Code – All-electric Buildings

Compliance Paths Options



Additional Energy Efficiency – R408

Prescriptive - R401-R404



ONE of (E, ASEV, HVAC, WH, DUCT)

Prescriptive - R401-R404

Maryland Alternative R-value



ONE of (E, ASEV, HVAC, WH, DUCT)



Maryland Alternative Additional Energy Efficiency

Total Building Performance - R405



ONE of (E, ASEV, HVAC, WH, DUCT)

Or

≤ 95% of annual energy cost

Energy Rating Index (ERI) - R406



≤ 5% than specified amended values
in Table R406.5



Energy Code – Mixed-Fuel Buildings

Compliance Paths Options

Prescriptive - R401-R404



ONE of (E or ASEV) + TWO of (HVAC, WH, DUCT)

Prescriptive - R401-R404
Maryland Alternative R-value



ONE of (E or ASEV) + TWO of (HVAC, WH, DUCT)
+
Maryland Alternative Additional Energy Efficiency

Total Building Performance - R405



ONE of (E or ASEV) + TWO of (VAC, WH, DUCT)
or
≤ 85% of energy cost

Energy Rating Index (ERI) - R406



≤ 5% than specified amended values
in Table R406.5



Energy Efficiency Certificate

R401.3 Certificate

- Requirements for the certificate are expanded to include the code edition, compliance path and information related to photovoltaic systems and Energy Rating Index scores, if applicable.

Energy Efficiency Certificate					
Code edition		<input type="text"/>			
Compliance path		<input type="text"/>			
Insulation Rating		R-Value		R-Value	
Ceiling/Roof		R-		R-	
Walls	Frame	R-		Mass	R-
	Basement	R-		Crawl space	R-
Floors	Over unconditioned space	R-		Slab edge	R-
Ducts	Attic	R-		Other	R-
Air Leakage Test Results					
Envelope testing		ACH	<input type="text"/> Pa.	Duct testing	<input type="text"/> cfm/100 ft ²
Fenestration Rating		NFRC U-Factor		NFRC SHGC	
Window		U-			
Opaque door		U-			
Skylight		U-			
Weighted average		U-			
Equipment Performance		Type	Efficiency	Size	
Heating system				AFUE	
Cooling system				SEER	
Water heater				EF	
Indicate if the following have been installed (an efficiency shall not be listed)					
<input type="checkbox"/> electric furnace		<input type="checkbox"/> gas-fire unvented room heater		<input type="checkbox"/> baseboard electric heater	
Additional Energy Efficiency (check one)					
<input type="checkbox"/> Proposed design had an annual energy cost \leq 95% of that of the reference design					
<input type="checkbox"/> Energy Rating Index score is at least 5% less than ERI target					
<input type="checkbox"/> Additional efficiency package option is installed (specify option)					
<input type="text"/>					
Photovoltaic Panel System			Energy Rating Index Score		
Array capacity	<input type="text"/>		with PV	<input type="text"/>	
Inverter efficiency	<input type="text"/>		without PV	<input type="text"/>	
Panel tilt	<input type="text"/>				
Orientation	<input type="text"/>				
Designer/builder	<input type="text"/>		Date	<input type="text"/>	
This Certificate is to be posted in accordance with Section R401.3 of the International Energy Conservation Code.					

Building Thermal Envelope

➤ **TABLE R402.1.2** Reduced fenestration *U*-factors and solar heat gain coefficients (SHGCs)

CODE CYCLE	CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC	CEILING <i>U</i> -FACTOR	WOOD FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
2018 IECC	4	0.32	0.55	0.4	0.026	0.06	0.098	0.047	0.059	0.065
2021 IECC	4	0.3	0.55	0.4	0.024	0.045	0.098	0.047	0.059	0.065

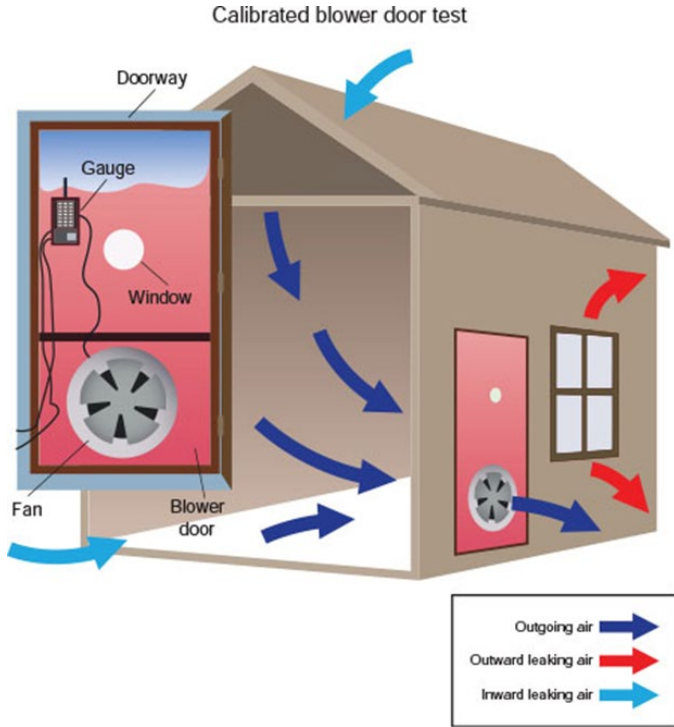
➤ **TABLE R402.1.3 R-Values** Increased insulation requirements

CODE CYCLE	CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	CRAWL SPACE WALL R-VALUE
2018 IECC	4	0.32	0.55	0.4	R-49	R-20 or 13+5	R-8/13	R-19	R-10ci or R-13	R-10ci or R-13
2021 IECC	4	0.3	0.55	0.4	R-60	R-30 or R-20+R-5ci or R-13+ R-10ci or R-0+R-20ci	R-8/13	R-19	R-10ci or R-13	R-10ci or R-13



Air Sealing and Leakage

IECC Edition	Climate Zone	Checklist (Table R402.1.4)	Blower Door Test	Target for all compliance Paths	Prescriptive Target
2018	1 and 2	Mandatory	Mandatory	5 ACH50	N/A
	3 to 8			3 ACH50	
2021	0 to 2	Mandatory	Mandatory	5 ACH50	5 ACH50
	3 to 8			3-5 ACH50	3 ACH50



Duct Testing

R403.3.5 Duct Testing

- Ducts in conditioned spaces are no longer exempt from duct testing requirements and a duct testing standard is specified.
- Pressure tested in accordance with **ANSI/RESNET/ICC 380** or **ASTM E1554** to determine air leakage.
- **Methods:**
 - 1. Rough-in test
 - 2. Post-construction test

Rough-in Test

- 4.0 cfm/100ft² of conditioned floor area where the air handler is installed at the time of the test
- 3.0 cfm/100ft² where air handler not installed

Postconstruction

- 4.0 cfm/100ft² of conditioned floor area

Test for ducts within thermal envelope

- 8.0 cfm/100ft² of conditioned floor area
- All ducts and air handlers entirely within building thermal envelope

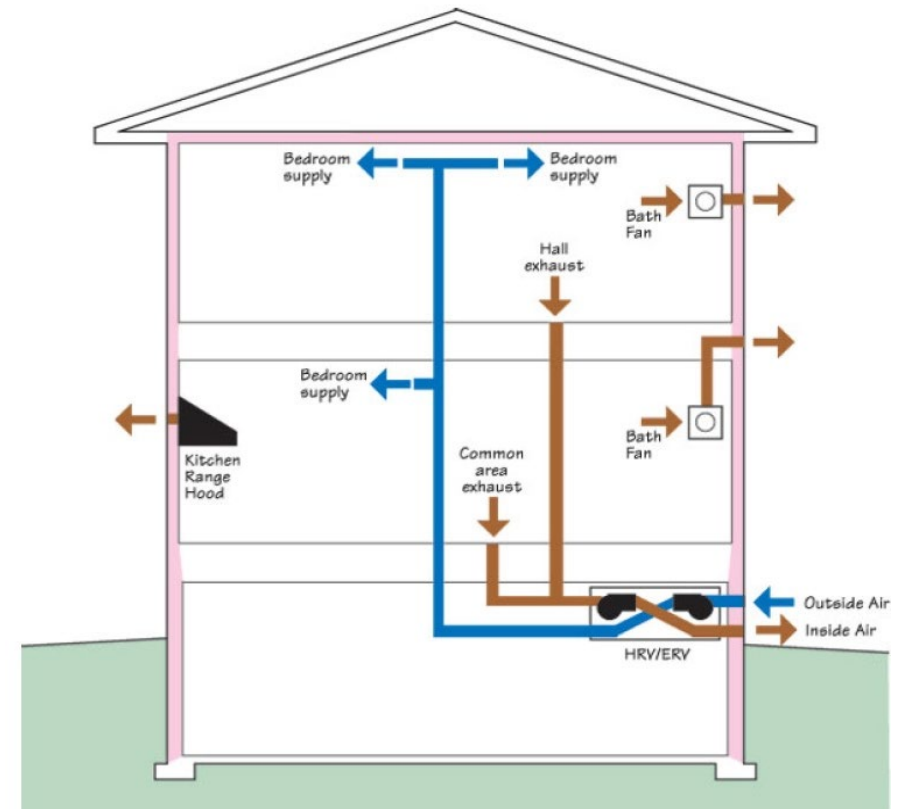
Fan Efficacy

R403.6.2 Fan Efficacy

Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table R403.6.2

R403.6.3 Whole-dwelling mechanical ventilation

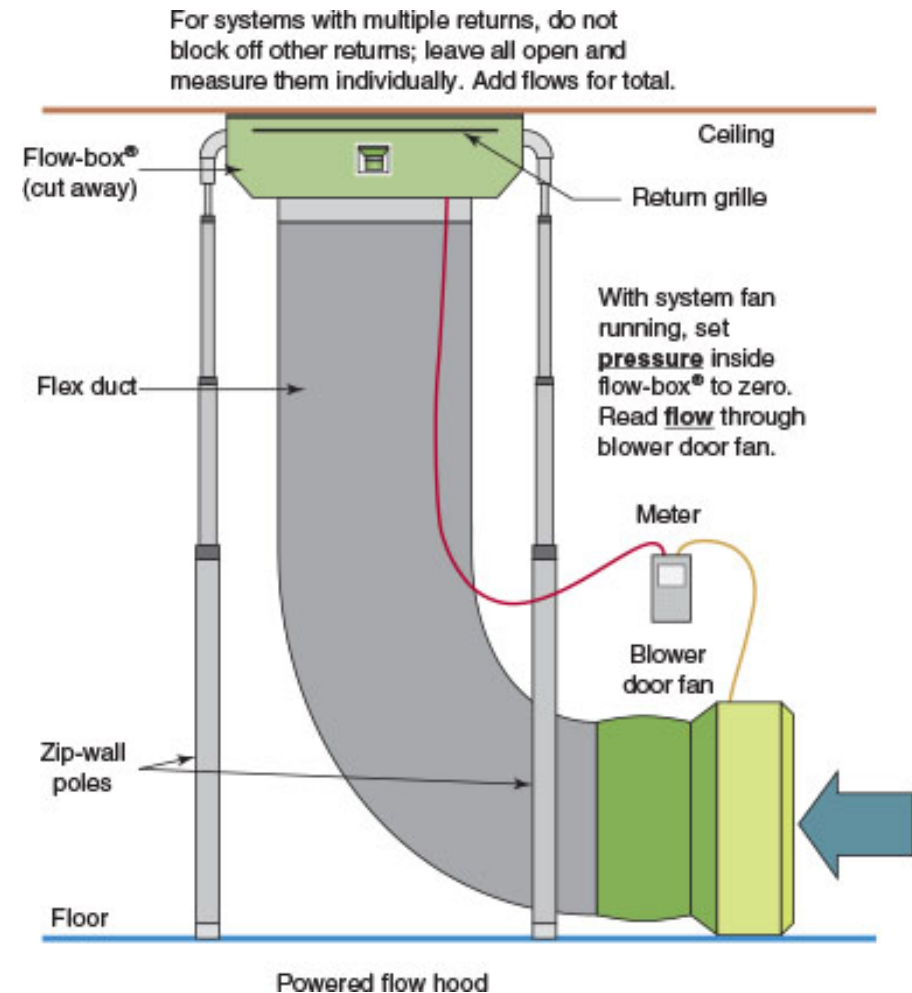
WHOLE-DWELLING MECHANICAL VENTILATION SYSTEM FAN EFFICACY		
FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV ERV	Any	1.2 cfm/watt
In-line supply or exhaust fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
Other exhaust fan	≥ 90	3.5 cfm/watt
Air-handler that is integrated to tested and <i>listed</i> HVAC equipment	Any	1.2 cfm/watt



Mechanical Ventilation System Testing

R403.6.3 Mechanical Ventilation System Testing

- **Exception:** Kitchen range hoods that are ducted to the outside with 6" or larger duct and one or less 90° elbow or equivalent in the duct run are exempt from this requirement to test air flow



Electrical Power and Lighting Systems

R404.2 Interior lighting controls

- Dimmer, occupant sensor, automatic daylight sensor or other control
 - Exception: Bathrooms, Hallways, Exterior Safety and security lighting

R404.3 Exterior lighting controls

- Where total permanently installed exterior lighting power is greater than 30 watts
 - Manual on/off switch that permits automatic shut-off actions
 - Automatic shut-off when daylight is present to satisfy the needs
 - Automatic shut-off must be able to return automatic controls to normal operation within 24 hours



Construction Documents



1. Energy Compliance Path
2. Insulation materials and their R-values
3. Fenestration U-factors and SHGC
4. Area-weighted U-factors and SHGC calculations (If applicable)
5. Mechanical system design criteria ACCA Form, slide #27
6. Fuel sources, mechanical and service water heating system and equipment types, sized and efficiencies
7. Equipment and system controls
8. Duct sealing, duct and pipe insulation, and location
9. Air sealing details depicted to verify compliance with Table R402.4.1.1
10. Building thermal envelope depicted
11. Documentation for mechanical ventilation, type of ventilation, CFM, and efficiency R403.6
12. Solar-ready, Energy-storage systems details
13. Additional electrification details: infrastructure (interconnection pathways: conduits, electrical service panel)



HVAC Form

A completed HVAC System Design Form must be provided with each building permit application

- ACCA Manuals
 - Manual J Load Calculations
 - Manual S Sizing
 - Manual D Duct Distribution

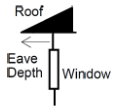
Residential Plans Examiner Review Form for HVAC System Design (Loads, Equipment, Ducts)

2425 Reedie Drive, 7th Floor, Wheaton, MD 20902
 Phone: 311 in Montgomery County or (240)777-0311
<http://www.montgomerycountymd.gov/permittingservices>

Contractor _____	REQUIRED ATTACHMENTS	ATTACHED
Mechanical License # _____	Manual J1 Form (and supporting worksheets):	Yes <input type="checkbox"/>
Building Plan # _____	or MJ1AE Form (and supporting worksheets):	Yes <input type="checkbox"/>
Home Address (Street or Lot#, Block, Subdivision) _____	OEM performance data (heating, cooling, blower):	Yes <input type="checkbox"/>
	Manual D Friction Rate Worksheet:	Yes <input type="checkbox"/>
	Manual S Equipment Selection form:	Yes <input type="checkbox"/>
	Duct distribution system sketch:	Yes <input type="checkbox"/>

HVAC LOAD CALCULATION (IRC M1401.3)

<p>Design Conditions</p> <p>Winter Design Conditions</p> <p>Outdoor temperature _____ 19 °F</p> <p>Indoor temperature _____ 72 °F</p> <p>Total heat loss _____ Btu</p> <p>Summer Design Conditions</p> <p>Outdoor temperature _____ 89 °F</p> <p>Indoor temperature _____ 75 °F</p> <p>Grains difference _____ Δ Gr @ _____ % Rh</p> <p>Sensible heat gain _____ Btu</p> <p>Latent heat gain _____ Btu</p> <p>Total heat gain _____ Btu</p>	<p>Building Construction Information</p> <p>Orientation (Front door faces) _____ North, East, West, South, Northeast, Northwest, Southeast, Southwest</p> <p>Number of bedrooms _____</p> <p>Conditioned floor area _____ Sq Ft</p> <p>Number of occupants _____</p> <p>Windows</p> <p>Eave overhang depth _____ Ft</p> <p>Internal shade _____ Blinds, drapes, etc.</p> <p>Number of skylights _____</p>
--	--



HVAC EQUIPMENT SELECTION (IRC M1401.3)

<p>Heating Equipment Data</p> <p>Equipment type _____ Furnace, Heat pump, Boiler, etc.</p> <p>Model _____</p> <p>Heating output capacity _____ Btu Heat pumps - capacity at winter design outdoor conditions</p> <p>Auxiliary heat output capacity _____ Btu</p>	<p>Cooling Equipment Data</p> <p>Equipment type _____ Air Conditioner, Heat pump, etc.</p> <p>Model _____</p> <p>Sensible cooling capacity _____ Btu</p> <p>Latent cooling capacity _____ Btu</p> <p>Total cooling capacity _____ Btu</p>	<p>Blower Data</p> <p>Heating CFM _____ CFM</p> <p>Cooling CFM _____ CFM</p>
---	---	---

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow _____ CFM	Longest supply duct: _____ Ft	Duct Materials Used (circle)
External Static Pressure (ESP) _____ IWC	Longest return duct: _____ Ft	Trunk Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)
Component Pressure Losses (CPL) _____ IWC	Total Effective Length (TEL) _____ Ft	Branch Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)
Available Static Pressure (ASP) _____ IWC	Friction Rate: _____ IWC	
ASP = ESP - CPL Friction Rate = (ASP × 100) ÷ TEL		

I declare the load calculation, equipment selection, and duct system design were rigorously performed based on the building plan listed above, I understand the claims made on these forms will be subject to review and verification.

Contractor's Printed Name _____ Date _____

Contractor's Signature _____

Reserved for use by County, Town, Municipality, or Authority having jurisdiction.

Construction Documents

Compliance Path Requirements								
Compliance Path		Permit Application			Inspections			
					Air Leakage Testing	Duct Testing	Mechanical Ventilation Testing	Final Compliance Report
Prescriptive	Prescriptive Options R401 through R404	Energy Efficiency Selection Form	N/A	HVAC Form	3 ACH Third-Party R402.4.1.2	Third-Party R403.3.5	Third-Party R403.6.3	N/A
	Total UA Alternative R402.1.5		REScheck or similar calculation R402.1.5					
	MD Prescriptive R-Value Alternative R402.1.3	Energy Efficiency Selection Form	N/A	HVAC Form	3 ACH Third-Party R402.4.1.2	Third-Party R403.3.5	Third-Party R403.6.3	N/A
Total Building Performance R405		Energy Efficiency Selection Form	Third-Party Compliance Documentation R405.3.2.1	HVAC Form	3 ACH Third-Party R402.4.1.2	Third-Party R403.3.5	Third-Party R403.6.3	Third-Party Compliance Report R405.3.2.2
ERI R406		Energy Efficiency Selection Form	Third-Party Compliance Documentation R405.3.2.2	HVAC Form	5 ACH Third-Party R402.4.1.3	Third-Party R403.3.5	Third-Party R403.6.3	Third-Party R406.3.2.2
Above Code Program	NGBS ICC-700—Silver Rating or Better R102.1.1	Third-Party Documentation/Checklists			Third-Party	Third-Party	Third-Party	Third-Party Compliance Report



All-electric Building Selection Form

Prescriptive Compliance Option R402.1.2

Table R402.1.2 Maximum Assembly U-Factors and Fenestration Requirements (2021 IECC)									
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	0.024	0.045	0.098	0.047	0.059	0.065

Must select at least one feature from Table 1

Prescriptive R-Value Alternative R402.1.3

Table R402.1.3 Insulation minimum R-values and Fenestration Requirements by Component (2021 IECC)										
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 & 5ci or 13 & 10ci or 0 & 20 ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13

Must select at least one feature from Table 1

Total UA Alternative R402.1.5

Must select at least one feature from Table 1 REScheck or similar report

MD Prescriptive R-Value Alternative R402.1.3.1

Table R402.1.3 Insulation minimum R-values and Fenestration Requirements by Component (2021 IECC)										
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 & 5ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13

Must select one feature from Table 1 Must select features from Table 2

Total Building Performance R405

Select one option from Table 3

Energy Rating Index Compliance Alternative R406

Energy Rating Index Value must be less than or equal to the appropriate value indicated in Table R406.5 Additional compliance report required.

Table 1	
<input type="checkbox"/> Option 1	Enhanced Envelope Performance.
<input type="checkbox"/> Option 2	More Efficient HVAC Equipment Performance. Greater than or equal to 10 HSPF/16 SEER air source heat pump.
<input type="checkbox"/> Option 3	More Efficient HVAC Equipment Performance. Greater than or equal to 3.5 COP ground source heat pump.
<input type="checkbox"/> Option 4	Reduced energy use in service water-heating. Greater than or equal to 2.0 EF electric service water-heating system.
<input type="checkbox"/> Option 5	Reduced energy use in service water-heating. Greater than or equal to 0.4 solar fraction solar water-heating system.
<input type="checkbox"/> Option 6	More efficient duct thermal distribution system option. 100% of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.
<input type="checkbox"/> Option 7	More efficient duct thermal distribution system option. 100% of duct thermal distribution system located in conditioned space as defined by Section R403.3.2.
<input type="checkbox"/> Option 8	Improved air sealing and Efficient Ventilation system option.

Table 3 Select Only 1 Option - R405	
<input type="checkbox"/> Option 1	One of the additional efficiency package options in Table 1 shall be selected without including such measures in the proposed design under Section R405.
<input type="checkbox"/> Option 2	The proposed design of the building under Section R405.3 shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design.

Table 2 MD Alternative Additional Packages Must select one or more options to meet or exceed 6%. R402.1.3.1		
<input type="checkbox"/> 1	≥ 2.5% reduction in total UA	1%
<input type="checkbox"/> 2	≥ 5% reduction in total UA	2%
<input type="checkbox"/> 3	> 7.5% reduction in total UA	2%
<input type="checkbox"/> 4	0.22 U-factor windows	3%
<input type="checkbox"/> 5	High performance cooling system (Greater than or equal to 18 SEER and 14 EER air conditioner)	3%
<input type="checkbox"/> 6	High performance cooling system (Greater than or equal to 16 SEER and 12 EER air conditioner)	3%
<input type="checkbox"/> 7	High performance gas furnace (Greater than or equal to 96 AFUE natural gas furnace)	5%
<input type="checkbox"/> 8	High performance gas furnace (Greater than or equal to 92 AFUE natural gas furnace)	4%
<input type="checkbox"/> 9	High performance heat pump system (Greater than or equal to 10 HSPF/16 SEER air source heat pump.)	6%
<input type="checkbox"/> 10	High performance heat pump system (Greater than or equal to 9 HSPF/16 SEER air source heat pump.)	5%
<input type="checkbox"/> 11	Ground source heat pump (Greater than or equal to 3.5 COP ground source heat pump.)	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.)	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%
<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.)	12%
<input type="checkbox"/> 22	1 ACH50 air leakage rate with ERV or HRV installed. (Less than or equal to 1.0 ACH50, with either an ERV or HRV installed.)	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 5.0 (01/23/2016), 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 Measures.	11%



Mixed-Fuel Building Selection Form

Prescriptive Compliance Option R402.1.2

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	0.024	0.045	0.098	0.047	0.059	0.065

Must select Additional Energy Features of Table 1

Prescriptive R-Value Alternative R402.1.3

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 & 5ci or 13 & 10ci or 0 & 20 ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13

Must select Additional Energy Features of Table 1

Total UA Alternative R402.1.5

Must select Additional Energy Feature(s) of Table 1 Additional compliance report required.

MD Prescriptive R-Value Alternative R402.1.3.1

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 & 5ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13

Must select Additional Energy Features from Table 1 Must select Additional Energy Features from Table 2

Total Building Performance R405

Mixed-Fuel must select option from Table 3

Energy Rating Index Compliance Alternative R406

Energy Rating Index Value must be less than or equal to the appropriate value indicated in Table R406.5

Additional compliance report required.

Group A	<input type="checkbox"/> Option 1	Enhanced Envelope Performance.
	<input type="checkbox"/> Option 2	Improved air sealing and Efficient Ventilation System option.
	<input type="checkbox"/> Option 3	More Efficient HVAC Equipment Performance. Greater than or equal to 96 AFUE natural gas furnace and 18 SEER air conditioner.
Group B	<input type="checkbox"/> Option 1	More Efficient HVAC Equipment Performance. Greater than or equal to 10 HSPF/18 SEER air source heat pump.
	<input type="checkbox"/> Option 2	More Efficient HVAC Equipment Performance. Greater than or equal to 3.6 COP ground source heat pump.
	<input type="checkbox"/> Option 3	Reduced energy use in service water-heating. Greater than or equal to 0.82 EF fossil fuel service water-heating system.
	<input type="checkbox"/> Option 4	Reduced energy use in service water-heating. Greater than or equal to 2.0 EF electric service water-heating system.
	<input type="checkbox"/> Option 5	Reduced energy use in service water-heating. Greater than or equal to 0.4 solar fraction solar water-heating system.
	<input type="checkbox"/> Option 6	More efficient duct thermal distribution system option. 100% of ducts and air handlers located entirely within the building thermal envelope.
<input type="checkbox"/> Option 7	More efficient duct thermal distribution system option. 100% of ducts, thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.	
<input type="checkbox"/> Option 8	More efficient duct thermal distribution system option. 100% of duct thermal distribution system located in conditioned space as defined by Section R403.3.2.	
<input type="checkbox"/> Option 9	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: <ul style="list-style-type: none"> 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. 	
<input type="checkbox"/> Option 10	2 ACH50 air leakage rate with bIV or HRV installed. (Less than or equal to 2.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed.)	
<input type="checkbox"/> Option 11	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.)	
<input type="checkbox"/> Option 12	1.5 ACH50 air leakage rate with bIV or HRV installed. (Less than or equal to 1.5 ACH50, with either an bIV or HRV installed.)	
<input type="checkbox"/> Option 13	1 ACH50 air leakage rate with bIV or HRV installed. (Less than or equal to 1.0 ACH50, with either an bIV or HRV installed.)	
<input type="checkbox"/> Option 14	Energy Efficient Appliances (Minimum 2 appliances not to exceed 1 form each type with follow which: <ul style="list-style-type: none"> - Gas Refrigerator - Energy Star Program Requirements, Product Specification for Consumer Refrigerators, 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 (05/03/2017) and Clothes Washer - Energy Star Program Requirements, Product Specification for Clothes Washers, Version 5.1 (02/05/2016) 	
<input type="checkbox"/> Option 15	Renewable Energy Measures.	

<input type="checkbox"/> Option 1	One of the additional efficiency package options in Group A of Table 1 & Any two from Group B of Table 1 shall be selected without including such measures in the proposed design under Section R406
<input type="checkbox"/> Option 2	The proposed design of the Mixed-fuel building under Section R405.2 shall have an annual energy cost that is less than or equal to 35 percent of the annual energy cost of the standard reference design.

<input type="checkbox"/> 1	2.25% reduction in total UA	1%
<input type="checkbox"/> 2	2.5% reduction in total UA	2%
<input type="checkbox"/> 3	> 7.5% reduction in total UA	2%
<input type="checkbox"/> 4	0.22 U-factor windows	3%
<input type="checkbox"/> 5	High performance cooling system (Greater than or equal to 18 SEER and 14 bblt air conditioner)	3%
<input type="checkbox"/> 6	High performance cooling system (Greater than or equal to 18 SEER and 12 bblt air conditioner)	3%
<input type="checkbox"/> 7	High performance gas furnace (Greater than or equal to 96 AFUE natural gas furnace)	5%
<input type="checkbox"/> 8	High performance gas furnace (Greater than or equal to 92 AFUE natural gas furnace)	4%
<input type="checkbox"/> 9	High performance heat pump system (Greater than or equal to 10 HSPF/18 SEER air source heat pump.)	6%
<input type="checkbox"/> 10	High performance heat pump system (Greater than or equal to 9 HSPF/16 SEER air source heat pump.)	5%
<input type="checkbox"/> 11	Ground source heat pump (Greater than or equal to 3.5 COP) ground source heat pump.)	6%
<input type="checkbox"/> 12	Fossil fuel service water heating system (Greater than or equal to 0.82 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 2.0 UEF electric service water -heating system.)	6%
<input type="checkbox"/> 14	High performance heat pump water heating system. (Greater than or equal to 3.2 UEF electric service water-heating system.)	6%
<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 ductwork 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: <ul style="list-style-type: none"> 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 bIV or HRV installed. (Less than or equal to 2.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed.)	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%
<input type="checkbox"/> 21	1.5 ACH50 air leakage rate with bIV or HRV installed. (Less than or equal to 1.5 ACH50, with either an bIV or HRV installed.)	12%
<input type="checkbox"/> 22	1 ACH50 air leakage rate with bIV or HRV installed. (Less than or equal to 1.0 ACH50, with either an bIV or HRV installed.)	14%
<input type="checkbox"/> 23	Energy Efficient Appliances (Minimum 2 appliances not to exceed 1 form each type with follow which: <ul style="list-style-type: none"> - Gas Refrigerator - Energy Star Program Requirements, Product Specification for Consumer Refrigerators, 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 (05/03/2017) and Clothes Washer - Energy Star Program Requirements, Product Specification for Clothes Washers, Version 5.1 (02/05/2016) 	7%
<input type="checkbox"/> 24	Renewable Energy Measures.	11%



Selection Form Example

All Electric Prescriptive Path

Prescriptive R-Value Alternative R402.1.3

Table R402.1.3 Insulation minimum R-values and Fenestration Requirements by Component (2021 IECC)

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 & 5ci or 13 & 10ci or 0 & 20 ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13

Must select Additional Energy Features of Table 1



Additional Energy Feature

Table 1

<input type="checkbox"/> Option 1	Enhanced Envelope Performance.
<input type="checkbox"/> Option 2	More Efficient HVAC Equipment Performance. Greater than or equal to 10 HSPF/16 SEER air source heat pump.
<input type="checkbox"/> Option 3	More Efficient HVAC Equipment Performance. Greater than or equal to 3.5 COP ground source heat pump.
<input checked="" type="checkbox"/> Option 4	Reduced energy use in service water-heating. Greater than or equal to 2.0 EF electric service water-heating system.
<input type="checkbox"/> Option 5	Reduced energy use in service water-heating. Greater than or equal to 0.4 solar fraction solar water-heating system.
<input type="checkbox"/> Option 6	More efficient duct thermal distribution system option. 100% of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.
<input type="checkbox"/> Option 7	More efficient duct thermal distribution system option. 100% of duct thermal distribution system located in conditioned space as defined by Section R403.3.2.
<input type="checkbox"/> Option 8	Improved air sealing and Efficient Ventilation System option.



Selection Form Example

Mixed-Fuel Maryland R Alternative

MD Prescriptive R-Value Alternative R402.1.3.1

Table R402.1.3 Insulation minimum R-values and Fenestration Requirements by Component (2021 IECC)										
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 15 & 3ci	8/13	19	10 ci or 13	10 ci, 4ft	10ci or 13
Must elect Additional Energy Features from Table 1					Must select Additional Energy Features from Table 2					



Additional Energy Features

Table 1		
Select one from Group A and two from Group B		
Group A	<input type="checkbox"/> Option 1	Enhanced Envelope Performance.
	<input checked="" type="checkbox"/> Option 2	Improved air sealing and Efficient Ventilation System option.
	<input type="checkbox"/> Option 3	More Efficient HVAC Equipment Performance. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner.
Group B	<input type="checkbox"/> Option 4	More Efficient HVAC Equipment Performance. Greater than or equal to 10 HSPF/16 SEER air source heat pump.
	<input type="checkbox"/> Option 5	More Efficient HVAC Equipment Performance. Greater than or equal to 3.5 COP ground source heat pump.
	<input type="checkbox"/> Option 6	Reduced energy use in service water-heating. Greater than or equal to 0.82 EF fossil fuel service water-heating system.
	<input type="checkbox"/> Option 7	Reduced energy use in service water-heating. Greater than or equal to 2.0 EF electric service water-heating system.
	<input type="checkbox"/> Option 8	Reduced energy use in service water-heating. Greater than or equal to 0.4 solar fraction solar water-heating system.
	<input checked="" type="checkbox"/> Option 9	More efficient duct thermal distribution system option. 100% of ducts and air handlers located entirely within the building thermal envelope.
	<input type="checkbox"/> Option 10	More efficient duct thermal distribution system option. 100% of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.
	<input type="checkbox"/> Option 11	More efficient duct thermal distribution system option. 100% of duct thermal distribution system located in conditioned space as defined by Section R403.3.2.



Selection Form Example

Mixed-Fuel Maryland R Alternative: Select Options to meet or exceed 6 %

Option	Description	Percentage
<input type="checkbox"/> 1	≥ 2.6% reduction in total UA	1%
<input type="checkbox"/> 2	≥ 5% reduction in total UA	2%
<input type="checkbox"/> 3	> 7.6% reduction in total UA	2%
<input checked="" type="checkbox"/> 4	0.22 U-factor windows	3%
<input type="checkbox"/> 5	High performance cooling system (Greater than or equal to 18 SEER and 14 EER air conditioner)	3%
<input type="checkbox"/> 6	High performance cooling system (Greater than or equal to 16 SEER and 12 EER air conditioner)	3%
<input type="checkbox"/> 7	High performance gas furnace (Greater than or equal to 98 AFUE natural gas furnace)	5%
<input type="checkbox"/> 8	High performance gas furnace (Greater than or equal to 92 AFUE natural gas furnace)	4%
<input type="checkbox"/> 9	High performance heat pump system (Greater than or equal to 10 HSPF/18 SEER air source heat pump.)	8%
<input type="checkbox"/> 10	High performance heat pump system (Greater than or equal to 8 HSPF/16 SEER air source heat pump.)	6%
<input type="checkbox"/> 11	Ground source heat pump (Greater than or equal to 3.6 COP ground source heat pump.)	8%
<input checked="" 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 2.8 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.)	8%

<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 R403.3.6, 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.)	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%
<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.)	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.)	14%
<input type="checkbox"/> 23	Energy Efficient Appliances (Minimum 3 appliances not to exceed 1 from each type with follow efficiencies: Refrigerator - Energy Star Program Requirements, Product Specification for Consumer Refrigeration Products, Version 6.1 (03/05/2021), Dishwasher - Energy Star Program Requirements for Residential Dishwashers, Version 6.0 (01/28/2018), Clothes Dryer - Energy Star Program Requirements, Product Specification for Clothes Dryers, Version 1.1 (05/06/2017) and Clothes Washer - Energy Star Program Requirements, Product Specification for Clothes Washers, Version 3.1 (02/06/2013)	7%
<input type="checkbox"/> 24	Renewable Energy Measure.	11%



EXISTING BUILDINGS

2021 IECC CHAPTER 5



Existing Residential Buildings

- **R502** - Additions
- **R503** - Alterations
- **R504** - Repairs
- **R505** – Change of Use
- Chapter 5 provisions requires the application of certain parts of Chapter 4 to maintain, if not improve, the conservation of energy by the renovated or altered building.

R502.2 – Change in space conditioning

- Any nonconditioned space that is altered to become conditioned space shall be required to comply with Chapter 5
- Existing assemblies modified as part of the project shall comply with the R503 Alterations
- Untouched portions of the existing building are not required to be updated to current code



R502.2 – Change in space conditioning

- **Exception 1:** When using R405 Total Building Performance for the addition alone, the addition is allowed 110% of the annual energy cost determined by Section R405.2
- **Exception 2:** If the addition plus existing building's Total UA per R402.1.5 is less than the existing building total UA before the addition, the addition is compliant as the overall building performance is improved
- **Exception 3:** When using R405 Total Building Performance, if the addition plus existing building energy cost budget is less than the existing building before the addition, the addition is compliant, as the overall building performance is improved.



R502.3 – Additions - Prescriptive Compliance

- See Exemption 2 in R502.2
- **R502.3.1 Building envelope**
 - R402.1 – Thermal envelope requirements & exceptions for low-energy buildings (<1W/sf space conditioning), unconditioned spaces, and log homes.
 - Maryland Alternative R-value + Additional Energy Features
 - R402.2 – Prescriptive requirements for specific assemblies (walls, foundations, roofs, floors, sunrooms, etc.)
 - R402.3.1 through R402.3.5 – Fenestration requirements
 - R402.4 – Air sealing requirements
 - Additions are exempt from air leakage testing but must still perform air sealing work detailed in R402.4.1



R502.3 – Additions - Prescriptive Compliance

- **R502.3.2 Heating and cooling systems:** HVAC ducts newly installed as part of an addition shall comply with Section R403
 - Exception: Where ducts from an existing heating and cooling system are extended to an addition TESTING not required
- Any other mechanical components of addition must meet applicable R403 requirements
 - System sizing, efficiency, ventilation, controls, etc.



R 502.3 – Additions - Prescriptive Compliance

- **R502.3.3 Service hot water systems:** New service hot water system that are part of the addition shall comply with R403.5
 - If circulation is employed, must have demand-based flow controls
 - If heat trace used to maintain hot water temperature, must meet UL515 or IEEE 515.1
 - Pipes must be insulated to at least R-3



R502.3 – Additions - Prescriptive Compliance

- **R502.3.4 Lighting:** New lighting systems that are part of the addition shall comply Section R404.1
 - All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy lighting sources
- **R404.2: Interior Lighting Controls**
 - Permanently installed lighting fixtures must have dimmers, occupant sensors, or built-in controls. Exclusions include bathrooms, hallways, exterior fixtures, and safety or security lighting
- **R404.3: Exterior Lighting Controls**
 - Exterior lighting over 30 watts must:
 - Be controlled by a manual on/off switch
 - Automatically shut off when daylight satisfies lighting needs
 - Not allow overrides unless they return to automatic control within 24 hours



R503 – Alterations

- **Alteration:** any construction, retrofit or renovation to an existing structure other than repair or addition

- **R503.1.1 Building envelope: Envelope alterations** need to comply with all sections of R402 except for air leakage testing. Specific requirements that refer to the whole building have been excluded, since alterations usually only impact parts of buildings.

- **Exceptions:**
 - Storm windows installed over existing fenestration

 - Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation

 - Construction where the existing roof, wall or floor cavity is not exposed

 - Roof recover (adding a new covering over an existing covering)

 - Roofs without cavity insulation and with sheathing or insulation exposed during alteration shall have insulation added above or below the sheathing

 - Surface-applied window films



R503 – Alterations

- **R503.1.3 Heating and cooling systems:** Newly installed HVAC ducts must comply with R403 (new construction).
 - Includes all subsections of R403
 - Insulation
 - Installation and air sealing
 - Leakage testing
 - Alterations of existing systems must follow R503.1 which requires that, because of the alteration, the existing building is not less conforming to the provisions of this code than the existing building prior to the alteration



R503 – Alterations

- **R503.1.3 Service hot water systems:** Service water-heating systems and equipment that are altered must comply with Section R403.5 to meet the energy code - all subsections
 - Circulation system controls (if installed)
 - Pipe insulation



R503 – Alterations

- **R503.1.4 Lighting:** Alterations to lighting systems shall comply with section R404.1
 - Exception: Alterations that replace <10% of the luminaires in a space or increase the installed interior lighting power
 - Permanent lighting must be high-efficacy



R504 – Repairs

- **Repair:** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.
- The following are defined as repairs that may be confused with alterations, so code calls them out:
 - Glass-only replacements in an existing sash and frame
 - Roof repairs
 - Repairs where only the bulb, the ballast, or both within the existing luminaires are replaced, provided that the replacement does not increase the installed interior lighting power



R505 – Change of Occupancy or Use

- **Change of Use:** Any space that is converted to a dwelling unit or portion thereof from another use or occupancy.
 - shall comply with this code.
 - Converting a garage into dwelling space
 - Converting unconditioned basement into living space
 - Detached ADU must comply with Chapter 4 (like a new SFD)

- Converting space to commercial, see C505



R103.2 - Construction Documents Required

➤ Prescriptive Only – R-Value or u-Value Alternative R502

1. Insulation materials and their R-values
2. Fenestration U-factors and SHGC
3. Building thermal envelope depicted
4. Air sealing details depicted to verify compliance with Table R402.4.1.1
5. Mechanical system and equipment types, sized and efficiencies
 - a. With new complete HVAC system
 - b. Documentation for mechanical ventilation, type of ventilation, CFM, and efficiency R403.6
 - c. **Provide ACCA Form – see slide #27**
6. Documentation for energy conservation measures for service water heating
 - a. With a new hot water system
7. Documentation that shows all lighting is high efficacy and show interior and exterior lighting controls



R103.2 - Construction Documents Required

Total Building Performance R405

- R405.3.2 Documentation that proposed design complies with this section
 - R405.3.2.1 Compliance report for permit application (third-party)
 - R405.3.2.2 Compliance report before occupancy (third-party)





Montgomery County
Department of Permitting Services

DPS

YOUR PROJECT PARTNER





QUESTIONS