2021

Residential Buildings Energy Code Summary

Overview

Montana homebuyers appreciate the comfort and warmth of a well-designed energy-efficient home. All new houses in Montana must meet the minimum requirements of the 2018 International Energy Conservation Code (2018 IECC) with Montana amendments. This publication is a summary of the 2018 IECC residential provisions with Montana amendments. A copy of the 2018 IECC can be ordered from the International Code Council at **www.iccsafe.org** or by calling 800-786-4452. For more information regarding the Montana Energy Code please call the Montana Department of Environmental Quality at 406-444-0281 or visit energy at https://deq.mt.gov/. The 2018 IECC with Montana amendments, took effect on February 13, 2021. Certified jurisdictions may take up to 90 days from their notification date to adopt the code.

Cities, towns, and counties who choose to adopt the building code are required to enforce the state energy code in their jurisdictions. A listing of certified jurisdictions that have adopted building codes are available at **www.buildingcodes.mt.gov**. Outside of these building code jurisdictions, builders are required to meet the requirements of the energy code and to show energy code compliance through a self-certification process. This means the builder is required to provide a written statement to the homeowner stating the house meets the state energy code requirements. The home builder may provide this certification by signing and dating the Energy Code Compliance label as shown on page 14 of this document.

Below are significant changes in the Montana energy code explained in more detail in this document:

- More efficient windows and doors – U - .30 minimum
- Combustion closets (sealed insulated separate room) required for open combustion appliances – such as a typical gas water heater
- R-5 insulation required under entire heated slab on grade floor.
- Building cavities used as heating ducts must be tested
- Log homes follow ICC-400 requirements

The statewide energy code gives house buyers an additional tool to use in making their purchase decision. The Energy Code Compliance Label is required in all new residential construction and is a way for the builder to certify the house meets the minimum code levels for insulation, window, and heating system efficiencies and other energy features required in new residential construction. A sample is shown in figure 6 on page 14. The label also ensures the information about these features is not lost over time. The label should be permanently affixed to the house's electrical breaker box, so subsequent owners will have the same information available to them.

Not only do home builders and home buyers benefit from this code, but Montana wins too. Energy efficient homes consume less energy than homes not built to meet the energy code. Less energy must be produced to heat and cool energy-efficient homes which helps conserve resources and protects our environment.

What Buildings are Covered Under the Statewide Energy Code?

The energy code applies to all new residential buildings, additions, repairs, and renovations in Montana (with exceptions noted below) regardless of fuel type (gas, electricity or other). Unaltered portions of existing buildings do not need to comply with this code. Residential buildings (R-2, R-3, and R-4) with more than three floors above ground must comply with the commercial energy code portions of the 2018 IECC.

The following buildings are exempt from this code:

- Farm and ranch buildings, any private garage or private storage structure attached to a home, buildings that are classified or determined to be eligible for a listing in the National Register of Historic Places, and Housing and Urban Development (HUD) code manufactured homes.
- Low energy use buildings or portions of a building which have a peak design rate energy use of less than 3.4 Btu/h per square foot of floor area for space conditioning (heating and cooling) are only exempt from the building thermal envelope provisions of the code.

Ways to Show Energy Code Compliance

There are two primary ways to demonstrate the thermal envelope of one- and two-family dwellings meet the requirements of the Montana Energy Code (2018 International Energy Conservation Code with Montana amendments).

- Follow the prescriptive path listed below in Table 1
- Use REScheck™, a computer analysis, to show compliance
    - A free download of REScheck™ is available at **www.energycodes.gov**
    - REScheck™ requires inputs of the areas and insulation efficiency levels for ceilings, walls, and windows

Table1 – Insulation and Window Requirements by Component

Component	Insulation or Efficiency Level*
Ceiling	R-49/38 [A]
Exterior Wall	R-21 or R13+R10 CI [B]
Mass Wall	R15/20 [C]
Floor	R-30 [D]
Basement Wall	R-19/15 CI [E]
Slab Perimeter	R-10, [F] from top edge for 4 ft.
Crawlspace Wall	R-19/15 CI [G]
Window/Door U	U -.30 [H]
Skylight	U-.55
*Contain some Montana Amendments	

The R-value requirement listings are for insulation material only, not for structural components such as drywall or siding. All materials, systems, and equipment must be installed in accordance with the manufacturer's installation instructions.

A. R-38 is acceptable if the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. See figure 4, page 10.
    a. Where there is not enough space to achieve Table 1 ceiling insulation levels, R-30 is allowed in up to 250 sq. ft. or 10 percent of the space, whichever is less.
    b. Insulation markers with at least one-inch sized numbers are required at least every 300-sq. ft. of attic space and must face the access opening.
    c. Attic access hatches and doors must be weather-stripped or sealed and baffled to prevent loose insulation from spilling into the living space and insulated to its surrounding area's requirement. Vertical access doors to unconditioned spaces must have at least a U-factor of .30, approximately R-3.

B. The second number is a listing for continuous Insulation (CI), which is insulation that runs continuously over structural members and is free of thermal bridging. Foam sheathing over exterior wall framing is an example of continuous insulation.

Table 2 – R402.26 Requirement for Steel-Frame Wall (R-Value)

Steel-Framed Wall 16'' O.C. – R-13 + 9.5 or R-15 + 9.1 or R-19 + 8.4 or R-21 + 8.1
Steel-Framed Wall 24'' O.C. – R-13 + 8.3 or R-15 + 7.7 or R-19 + 6.9 or R-21 + 6.5
Cavity insulation R-value is listed first, followed by continuous insulation R-value.

Structural Insulated Panels (SIP) with at least 5.5 inches of foam and insulated concrete foam systems (ICF) with at least 2 inches of foam on each side, usually surpass the R-21 wall requirements because of their lack of thermal bridging. A REScheck™ analysis can be used to show compliance.

C. Mass walls are above grade walls of concrete, concrete block, insulated concrete form (ICF), brick, (other than brick veneer), earth. R-20 applies when more than half the insulation is on the interior of the mass wall. Log walls must comply with ICC 400 requirements.

D. Floor insulation must be in contact with the underside of the floor sheathing.

E. Basement walls, whether the space is finished or not, require R-19 cavity or R-15 continuous insulation level.

F. Heated slab-on grade includes floors with heating elements, hydronic tubing, and ductwork within or under the slab and require R-5 under the entire slab floor. Slab-on-grade floors with a floor surface less than12 inches below grade require R-10 insulation. Slab-on-grade insulation should extend downward from the top of the slab on the outside or inside of the foundation wall. The insulation should extend 4 feet by any combination of vertical and horizontal placement that extends out from the slab or under the slab (see the Insulated Slab Options, figure 1). Insulation extending away from the building must be protected by pavement or at least 10 inches of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab may be cut at a 45-degree angle. Exposed insulation shall have a weather- resistant protective covering extending at least 6 inches below grade level. R-5 required under entire floor of heated slabs.

G. Unvented crawlspace walls require a minimum of R-19 cavity or R-15 continuous insulation. Insulation must cover the entire foundation wall.

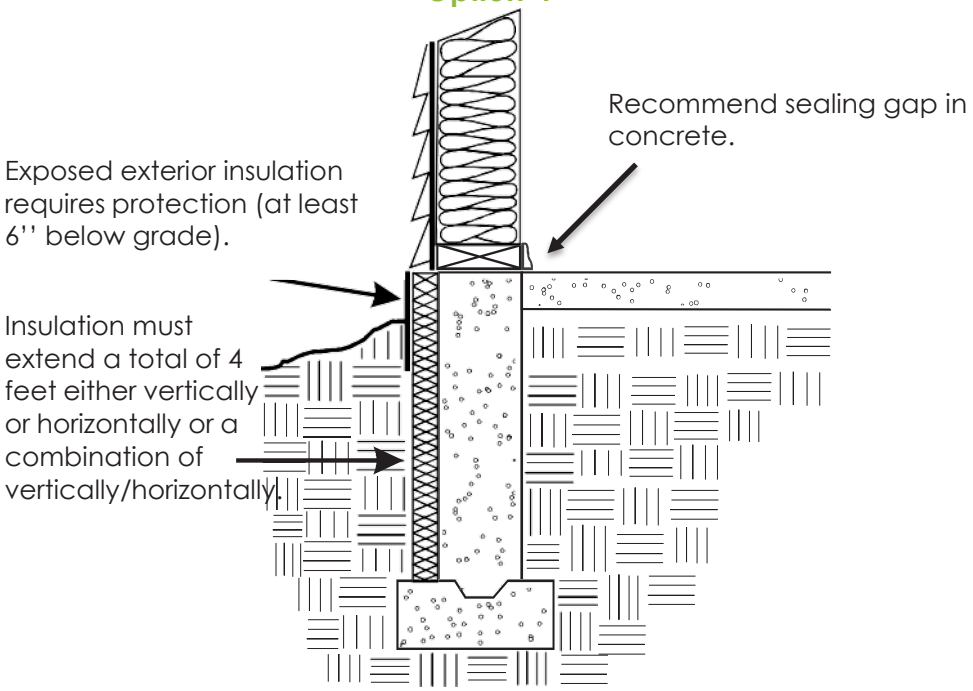
H. Because the U-factor is the inverse of the R-value, a lower U-factor indicates a window that has better thermal capabilities than a window with a higher U-value. Example: A U-.30 rated window is more efficient than a U-.32 rated window. Up to 15 sq. ft. of glazing and one side hinged door up to 24 sq. ft. is exempt from the U-factor requirements. Skylights must have a U-factor of at least .55.

Insulated Slab Options

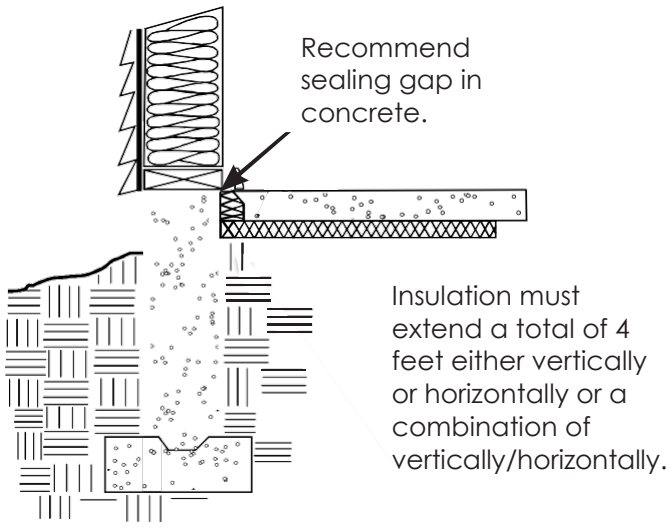
Slab perimeter insulation of at least R-10 from the top edge for at least 4 feet. At least R-5 required under entire area of a heated slab on grade and recommended under all heated slabs.

Figure 1

Option 1



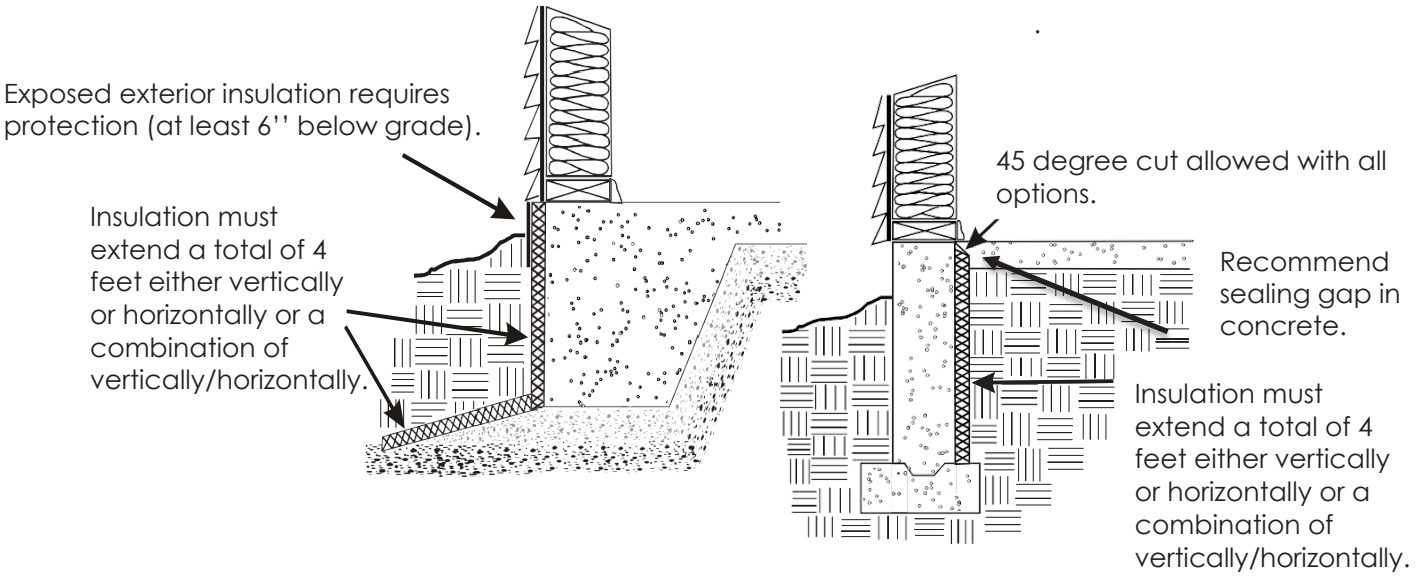
Option 2



Option 3

2012 IRC Section 403.3 allows frost protected shallow foundation footing depth of 2 feet.

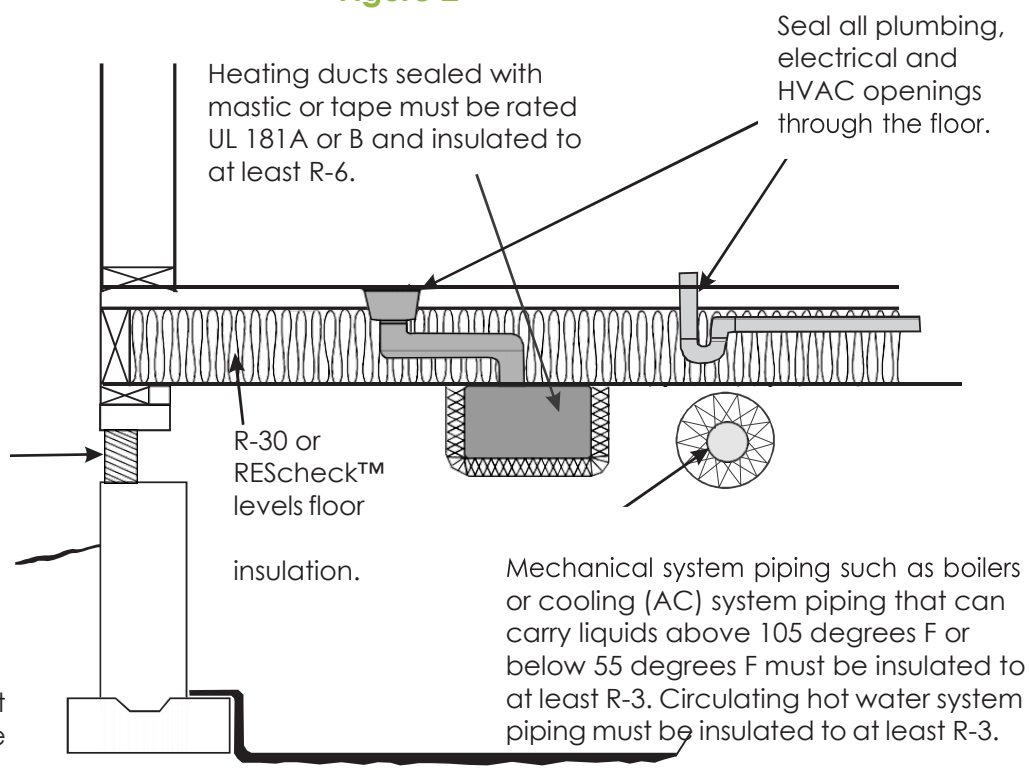
Option 4



Vented Non-Heated Crawlspace with Floor Insulation

An option for insulating a crawlspace is to insulate the floor and install code-required venting. This option treats the crawlspace as an unconditioned space. Insulation levels are listed in Table 1 under the floor requirements or follow REScheck™ results for the building. Venting, air sealing, heating system sealing, duct, and pipe insulation requirements are listed on figure 2.

Figure 2



Unvented Heated Crawlspace with Insulated Foundation Walls

As an alternative to insulating floors over a crawlspace, crawlspace walls may be insulated when the crawlspace is not vented to the outside. Temporary crawlspace vent openings are allowed during construction. These vent openings must be closed, sealed, and insulated to the same R-value of the surrounding crawlspace wall when construction is complete and prior to final inspection. Crawlspace wall insulation must be permanently attached to the wall and cover the entire height of the crawlspace wall. Exposed earth in the unvented crawlspace must be covered with a continuous class 1 vapor retarder, such as 6 mil polyethylene. All joints of the ground cover must be overlapped at least 6 inches and be sealed or taped. The edges of the ground cover must extend at least 6 inches up the foundation wall and be attached to and sealed to the foundation wall. See figure 3, page 7.

Unvented conditioned (heated) crawlspace require a dehumidification or air flow with an exhaust or supply air option.

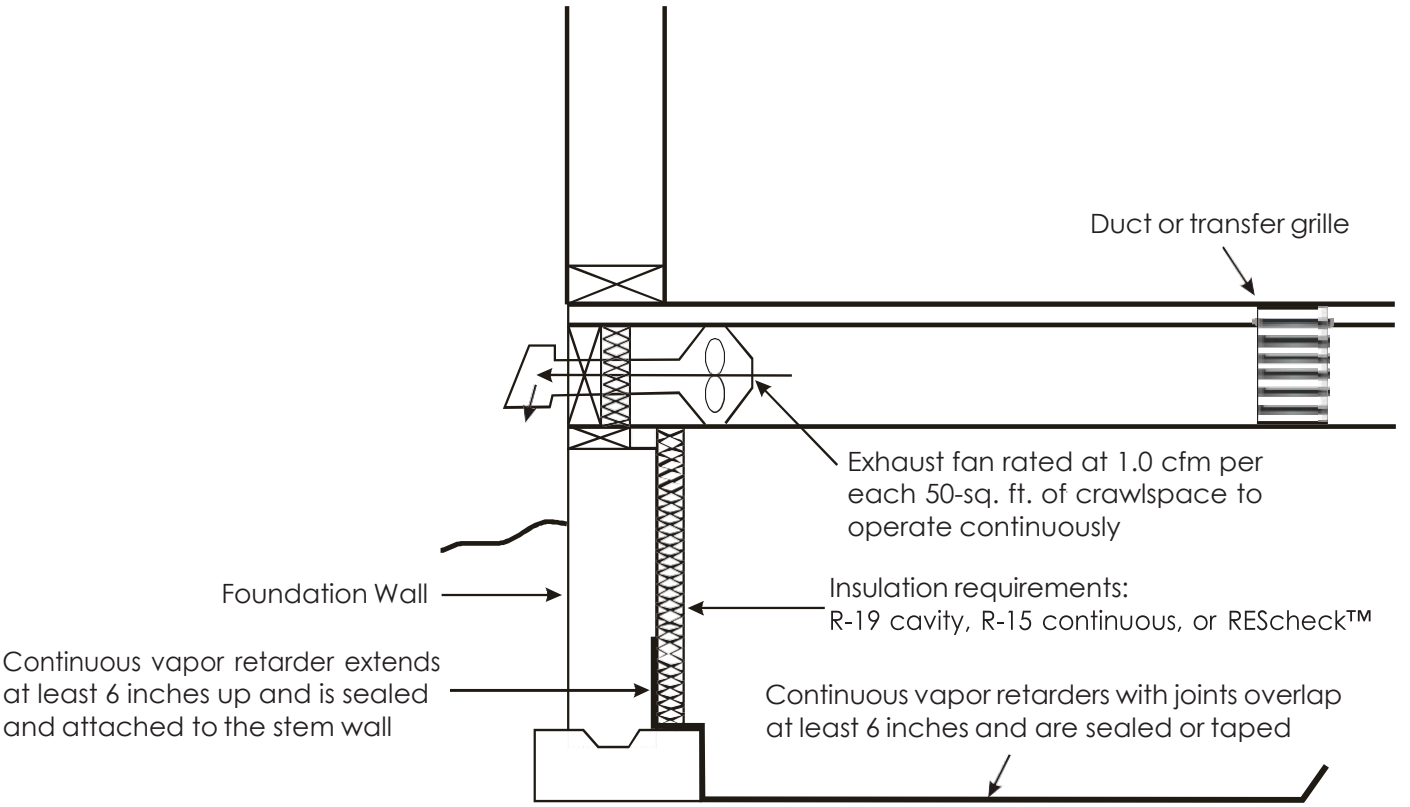
Exhaust Air Option

This code option requires continuously exhausted air from the crawlspace at a rate of 1 cubic foot per minute (cfm) for each 50 square feet of crawlspace. The ground in the crawlspace must be covered with a Class 1 vapor retarder, such as 6 mil polyethylene. Section 408.3 of the IRC requires an air pathway to the common area (such as a duct or transfer grille).

Crawlspace Exhaust Air Option

Figure 3

A sealed vapor retarder is part of a radon mitigation system. See figure 5, page 13. Note: Radon mitigation systems are not required by the energy code.



Section 408.3 of the IRC requires the exposed earth to be covered with a continuous vapor retarder. Joints of the vapor retarder must be overlapped by 6 inches and must be sealed or taped. The edges of the vapor retarder must extend at least 6 inches up the stem wall and be attached and sealed to the stern wall.

Supply Air Option

This code option is accomplished by supplying a small amount of airflow into the crawlspace; 1 cfm of airflow for each 50 square feet of crawlspace. Below are three ways used for supplying air into crawlspaces:

1. Heat recovery ventilator providing supply and return air
2. Heating/air conditioning system providing supply air
3. Supplemental fan providing supply air

During the season when the heating/air conditioning system would not be operating, the recommendation is to have the air handler or supplemental fan cycled on for 5 minutes each hour.

The IRC requires an air pathway from the crawlspace to the common area (such as a duct or transfer grille). See figure 3 above.

Air Sealing Requirements – Section R402.4

Uncontrolled air leakage in the building envelope can significantly increase heating bills, allow warm moist interior air to enter building cavities, with potential for moisture damage, and cause uncomfortable drafts. Therefore, the energy code requires an air barrier for control of air leakage. An air barrier is a material or assembly of materials that reduces air flow through or into the building envelope. The new Montana energy code requires compliance with the Air Barrier and Insulation Installation requirements and requires the house tightness be blower door tested.

Blower Door Test – Section R402.4.1.2 (Montana Amended)

A blower door test measurement of building air tightness showing four air changes per hour or less when tested at 50 Pascal (4 ACH50) is required. A blower door test is performed using a large fan assembly placed in an exterior door opening. The fan draws air out of the building while measuring the air flow required to create a pressure difference of 50 Pascals with reference to outside. Where required by the code official, testing shall be conducted by an approved party. Multi-unit residential buildings may be tested as an entire building or individual units may be tested.

Air Barrier and Insulation Installation Requirements – Section 402.4.1.1

The energy code includes table R402.4.1 that lists the air barrier and insulation installation requirements for sixteen building envelope components. Some of the requirements of that table are listed below.

Insulation placed in the thermal envelope of the building (walls, ceilings, dropped ceilings/soffit, rim joists, fireplace walls, shower/tub) must be in substantial contact and continuous alignment with the building envelope air barrier. See figure 4, page 10.

Some of the air leakage areas that must be sealed with an air barrier material, durablecaulk, or foam sealant are:

1. Openings between the building structure and exterior windows and door frames
2. Openings around electrical wire, boxes, recessed light fixtures, and plumbing piping through the attic, exterior walls, and other unheated spaces
3. Dropped ceilings or chases adjacent to the thermal boundary
4. Behind tub and showers on exterior walls
5. Common walls between dwelling units
6. Attic access openings, drop-down stairs, and knee-wall doors
7. Rim/band joist junctions
8. Top plate at exterior walls
9. Electrical/phone boxes on the exterior wall or air sealed boxes are installed
10. HVAC registered boots
11. Recessed lighting – recessed lighting installed in the thermal envelope shall be airtight, IC rated and sealed to the drywall
12. Fireplace – An air barrier shall be installed on fireplace walls and fireplaces shall have gasketed doors

Some of these locations are shown on figure 4. Note: Fiberglass and cellulose are not an acceptable air barrier material. Generally, the facing materials used on fiberglass batt insulation cannot be adequately sealed to be considered an air barrier.

Insulation Installation Requirements

Batt insulation must be cut to fit around wiring, piping and fill narrow cavities and must be in contact with the air barrier. Wall corners and headers located in the thermal boundary must be insulated.

Insulation markers must be placed facing the attic access showing the thickness of insulation. The markers must be placed at least one every 300 square feet throughout the attic.

Eave baffles are required in vented attics insulated with air permeable insulation (fiberglass and cellulose). The baffles (any solid material) must extend from the soffit and eave vents, over the top of the insulation and maintain an opening at least the size of the vent.

Mechanical Ventilation Requirements – Section R403.6

Kitchen and Bathroom Exhaust Fan Requirements

Kitchen fans must provide at least 100 cfm (cubic feet per minute) intermittent or 25 cfm of continuous air flow, Bathroom-toilet room fans must provide at least 50 cfm of intermittent or 20 cfm of continuous air flow. Bathroom and toilet room fans must be vented/exhausted to the outdoors; these fans cannot have discharge into the attic, crawlspace, or any area inside the building.

Whole House Mechanical Ventilation Requirements

The energy code requires a whole-house mechanical ventilation system that at least meets the specifications listed in International Residential Code (IRC) or International Mechanical Code (IMC). Those requirements can be accomplished by installing a fan in a bathroom, utility room, hallway, or another location, sized according to the square-foot size of the house and number of bedrooms as specified on the following IRC Table M1507.3.3(1). Whole house mechanical ventilation system fan efficiencies are listed on page 12.

IRC Table M1505.4.3.1

Continuous whole-house mechanical ventilation system airflow rate requirements in cubic feet per minute:

Dwelling Unit Floor Area (sq. ft.)	Number of Bedrooms				
	0 to 1	2 to 3	4 to 5	6 to 7	More
<1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
>7,500	105	120	135	150	165

If non-continuous ventilation is provided, then the capacity of the fans must be increased as specified by Table M1507.3 below.

Table 7.4 M1505.4.3.2

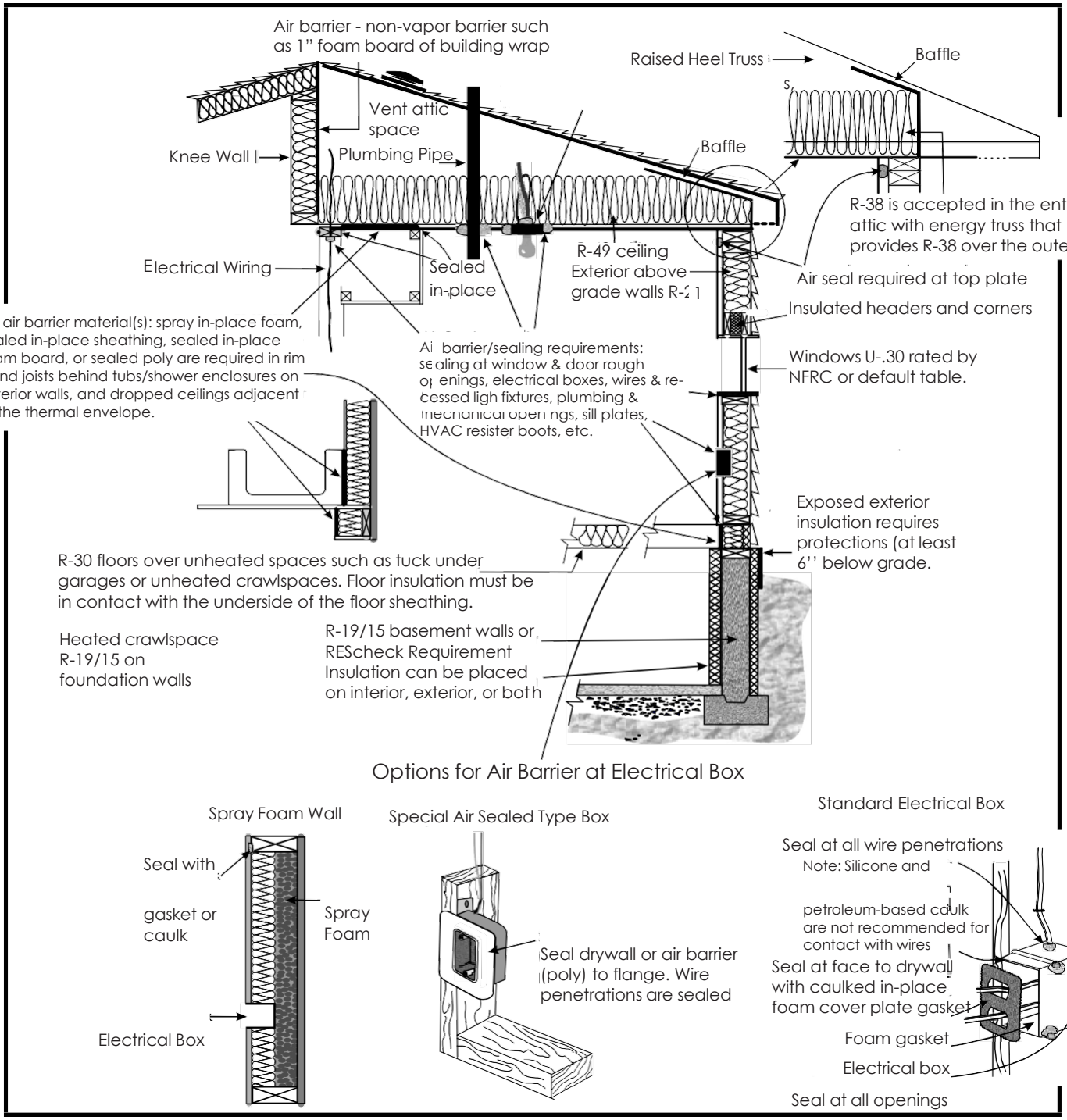
Intermittent Whole-House Mechanical Ventilation Rate Factors

Run-Time Percentage in Each 4-Hour Segment	25%	33%	50%	66%	75%	100%
Factor	4.0	3.0	2.0	1.5	1.3	1.0

For example, a 1,600-square foot, 3-bedroom house requires a continuously operating 60 cubic feet per minute (cfm) fan. If the fan runs half of the time the fan should be sized at 120 cfm.

The whole-house mechanical ventilation fan must meet minimum efficiency requirements. Bathroom and utility room fans between 10 and 90 cubic feet per minute (cfm) must deliver at least 1.4 cfm per watt. Fans larger than 90 cfm, range hoods, and in-line fans, must deliver at least 2.8 cfm per watt.

Figure 4 – Air Sealing and Prescriptive Path Insulation Requirements



Recessed Light Requirements – Section R402.4.5

Recessed lights that are installed in the building thermal envelope (typically a ceiling with unheated space above) must be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed lights must be IC rated and labeled as meeting ASTM E 283. All recessed lights shall be sealed with a gasket or caulk between the housing and interior ceiling or wall covering.

Rooms Containing Fuel Burning Appliances – R402.4.4

Where open combustion air ducts provide air to an open combustion burning appliance, the appliance and combustion air opening must be located outside the building thermal envelope or enclosed in a room with walls, floors and ceiling insulated to at least basement insulation requirements and with gasketed door. Combustion air ducts passing through conditioned space must be insulated to at least R-8. Exemptions are fireplaces, stoves with exterior air supply and sealed combustion appliances.

Systems – Section R403

Programmable Thermostats – Section R403.1.1

Programmable thermostats are required on forced air (furnaces). The thermostat must be able to set back or temporarily operate the system to maintain temperatures down to 55 degrees or up to 85 degrees. It must be initially programmed with a heating temperature no higher than 70 degrees and a cooling temperature no lower than 78 degrees. Hot water boilers must have an outdoor setback control that decreases the boiler water temperature based on the outside temperature.
Heat pumps with supplementary electric resistance heat must have controls that, except during defrost, prevent supplemental heat operation when heat pump compressor can meet the heating load.

Duct Insulation – Section R403.2.1

Supply ducts in unconditioned attics must be insulated to at least R-8. All other ducts, both supply and return, located outside the thermal boundary must be insulated to at least R-6. Supply and return ducts buried within ceiling insulation must have at least R-8 and surrounded by at least R-19, excluding R-value of duct insulation. To be considered inside conditioned space the ducts must be inside the air barrier, usually the drywall ceiling.

Duct Sealing and Testing – Section R403.3.2

All ducts, both supply and return, air handlers, filter boxes, and building cavities used as ducts, shall be sealed. Building cavities cannot be used for supply ducts. Building framing cavities may be used as return ducts if there are no atmospherically vented combustion appliances in the house outside of a sealed and insulated room that is separated from conditioned floor area and **if the duct system is tested as having total leakage no more than 4 cfm per 100 square feet of conditioned floor area of the house.** If any of the ductwork is located outside of conditioned space, the system must be tested for tightness. The total leakage allowed for both the rough in and post construction test must be no more than 4 cfm per 100 sq. ft. of conditioned floor area. If the air handler is not installed at time of test the total leakage must be no more than 3cfm per 100 sq. ft. of conditioned floor area.
Duct testing is not required for heat or energy recovery ventilation systems not integrated with heating or cooling systems.
Duct leakage testing is not required if all ducts and the air handler are located within the thermal envelope.

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

Mechanical System Pipe Insulation – Section R403.4

Mechanical system piping such as boiler or cooling (AC) system piping that can carry fluids above 105 degrees F or below 55 degrees F must be insulated to at least R-3.

Circulating hot water system piping must be insulated to at least R-3. These systems must also include automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not operating.

Hot Water Pipe Insulation – Section R403.5.3

At least R-3 insulation is required for the following:

- □ Piping ¾ inch diameter and larger
- □ Piping serving more than one dwelling unit
- □ Piping located outside conditioned space
- □ Piping from the water heater to a distribution manifold
- □ Piping located under a floor slab. (not part of in-floor heating system)
- □ Buried piping
- □ Supply and return piping in recirculating systems other than demand recirculation systems

Proper Sizing of Heating and Cooling Equipment – Section R403.7

Heating and cooling equipment sizing shall be based on building loads calculated in accordance with ACCA Manual S & J or other approved heating and cooling calculation method. In the past many heating and cooling systems were oversized, resulting in increased installation and operating costs.

Lighting Requirements – Section R404

At least 90 percent of the permanently installed lighting fixtures must have high-efficiency lamps or light bulbs. These bulbs include compact fluorescent (CFL), T-8 or smaller linear fluorescent, or LED or lamps.

Existing Buildings – Chapter 5

Additions, alterations, or repairs to an existing building or building system must comply with the energy code. Unaltered portions of an existing, lawfully in existence, need not apply with the energy code.

The following alterations are exempt from the energy code provided that the energy use in the building is not increased.

- □ Storm windows over existing windows.
- □ Existing ceiling, wall, or floor cavities exposed during construction provided they are filled with insulation.
- □ Construction where the existing roof, wall or floor cavity is not exposed.
- □ Roof re-cover.
- □ Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
- □ Surface applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided that the code doesn't require window replacement.
- □ Heating ducts extended less than 40 feet in unconditioned space need not be tested.

Spaces undergoing a change in occupancy resulting in an increase energy demand must comply with the energy code.

TABLE R403.6.1
WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM FAN EFFICACY*

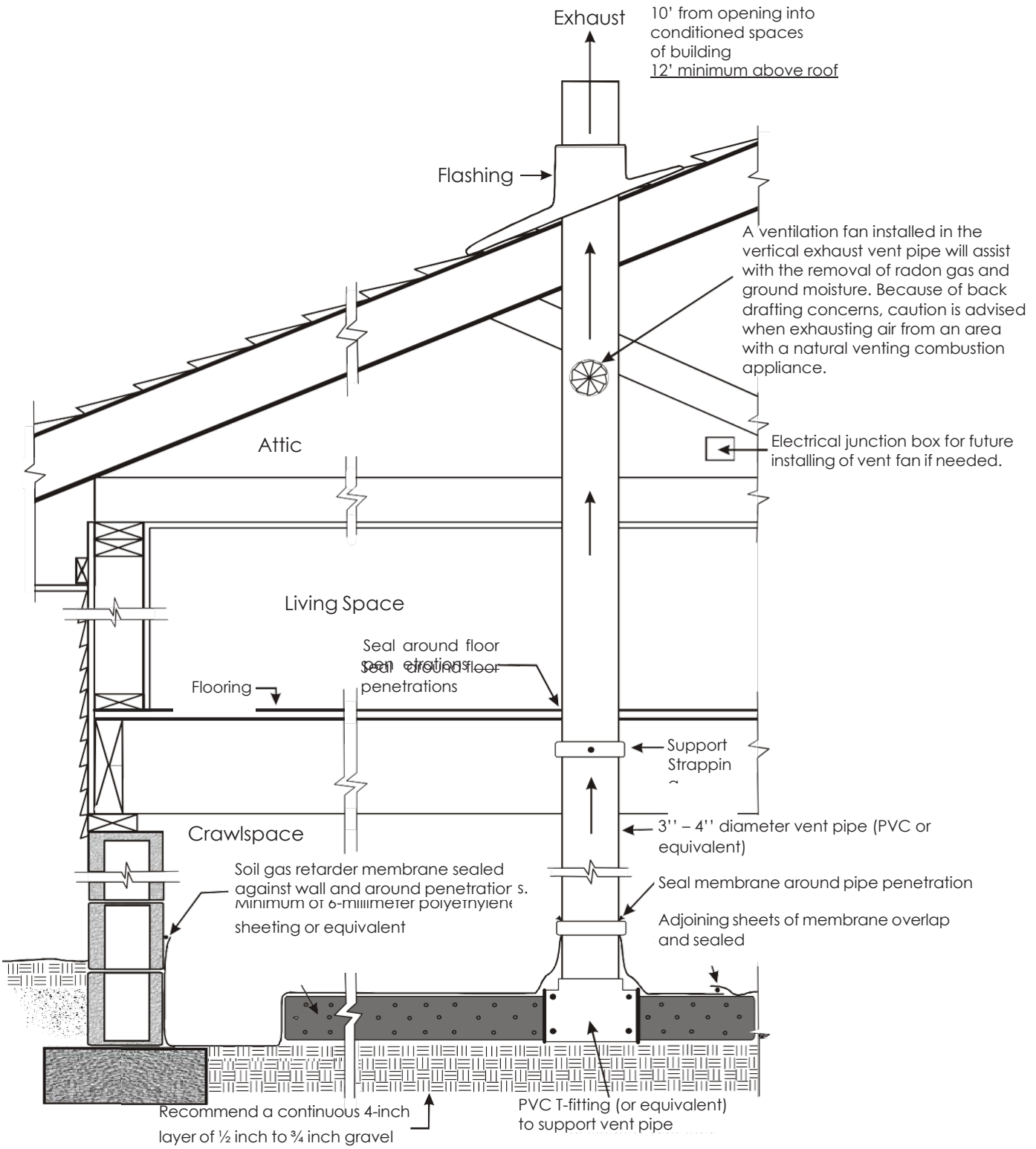
FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MIMIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
Range Hoods	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bathroom, utility room	10	1.4 cfm/watt	<90
Bathroom, utility room	90	2.8 cfm/watt	Any

*When tested in accordance with HVI Standard 916.

Radon Mitigation

Because of the potential for high indoor levels of radon, the Montana Department of Environmental Quality recommends new houses have basic radon mitigation systems installed during construction. Contact the Montana Radon hotline for more information at 1-800- 546-0483.

Figure 5 – Radon Mitigation System in Crawlspace (not required by code)



Energy Efficiency Component Labels

Labels are available at no cost from many sources. Several utility companies distribute labels as a public service. Local Montana Homebuilder Association offices in Billings, Bozeman, Great Falls, Helena, Kalispell, and Missoula distribute labels to their members. Labels are also available from the Montana Department of Environmental Quality's Energy Bureau at 1520 East 6th Avenue in Helena, Montana. You can also call the Energy Bureau at 406-444-0281 for information. Blank printable copies are also available on our website at deq.mt.gov/Energy/eec/EnergyCode.

Figure 6 – Energy Code Compliance Certificate with Prescriptive Path Listings

ENERGY CODE COMPLIANCE LABEL

Address: _____

Ceiling:	Flat	R - 49
	Vaulted	R - 38
Walls	Above grade walls	R - 21
	Basement walls	R - 19/15
	Crawlspace walls	R - 19/15
Floors:	Over unheated spaces	R - 30
	Perimeter slab for 4 feet	R - 10
	Under slab for ____ feet ____ full	R - ____
Exterior doors:		U - .30
Windows:	NFRC unit rating	U - .30
Water heater:	Energy factor (EF) rating _____	
Heating system:	Energy efficiency rating 80% _____	
	(AFUE for gas; HSPF heat pump)	
Cooling system:	EER _____ SEER _____	
Heating ducts:	Systems sealed: X Yes per code	
	In non-conditioned areas insulated to	
	Supply R- 8 Return R- 6	
	Leakage test at rough in ____ or final ____	
	results _____ CFM 25 per 100 sq. ft	
	or N/A _____	
Air Sealing:	Blower door test results 4 ACH 50	

Whole house mechanical ventilation: _____ Yes per code

Other (i.e., radon mitigation, solar ready) _____

_____

_____

Builder: _____ Date: _____

Signature: _____

The builder or representative certifies compliance with ARM 24.301.161 and MCA 50-60-802, by completing and signing this label.

July 2021

THIS LABEL MUST BE PERMANENTLY AFFIXED BY HOME BUILDERS TO THE BREAKER PANEL ON ALL NEW RESIDENTIAL BUILDINGS, AS REQUIRED BY SECTION 50-60-803, MONTANA CODE ANNOTATED AND 2018 IECC – SECTION 401.3

Montana Energy Conservation Tax Credit

Tax credit will end December 31, 2021.

Homebuyers are eligible for a state tax credit of up to $500 per individual and $1000 per couple when they purchase or build an above energy code home or improve the efficiency of their existing home. Certified ENERGY STAR® or Montana Green Building Program (above Bronze level) homes with an ENERGY STAR® heating system receive a $500 Montana tax credit. Only one of these credits can be used. For new houses, the credit is 25 percent of certain high efficiency heating, cooling, water heating, ventilation equipment, and the extra cost of the building components, such as windows, doors, and insulation levels, that are more energy efficient than the Montana energy code requirements. Go to deq.mt.gov/energy for additional information.

Refrigerators, washing machines, and dryers do not qualify for the credit. Taxpayers should use tax form ENRG-C to claim the energy conservation tax credit.

Alternative Energy Tax Incentives

Alternative Energy Systems Income Tax Credit

Tax credit will end December 31, 2021.

A $500 income tax credit is available to individuals living and paying taxes in Montana who have installed a new alternative energy system in their primary dwelling. If you and your spouse both paid for the system, and the cost is $1,000 or more, you both may claim up to $500. Unused credit may be carried forward for up to four years. File MT Revenue form ENRG-B to claim the credit. Qualifying expenditures include installation costs for an alternative energy system, such as:

- Solar photovoltaics (PV)
- Solar thermal system
- Ground Source Heat Pump
- EPA certified low-emission pellet or wood stove
- Wind turbine
- Hydroelectric plant under 1 megawatt

Montana Geothermal System Tax Credit

Tax credit will end December 31, 2021.

A $1,500 income tax credit is available to individuals living and paying taxes in Montana who have installed a new geothermal energy system or ground source heat pump for heating or cooling their principal dwelling. Home builders that are individuals or C corporations are also eligible for the credit, however the builder and home buyer may not both claim the credit. The credit may not exceed $1,500 per installation. Unused credit may be carried forward for up to seven years. File MT Revenue form ENRG-A to claim the credit.

Federal Residential Renewal Enegy Tax Credit

A federal income tax credit of 26% for systems installed in 2021 and 2022, of the installation costs of a solar PV, solar water heating system, a wind turbine no larger than 100 kilowatts, geothermal heat pump and wood or pellet stoves of at least 75% efficiency is available to individuals, with no upper limit. For individuals, the system does not have to be installed on the taxpayer's principal residence. Excess credit generally may be carried forward to next tax year. The Federal tax credit is scheduled to step down to 22% for systems installed in 2023. Credit will end on December 31, 2023.

Glossary of Energy Efficient Terms

A good comparison shopper needs to understand certain units of measurement, such as MPG (miles per gallon) when shopping for a new car. Shopping for energy efficiency also involves knowing a few units of measurement. Each Energy Efficiency Components Label may contain five or more different units of measurement. The following definitions will help you crack the code of energy efficiency.

R-Value – The units used to measure the insulating value of an object. The higher the R-value, the more insulating value an object has. For example, a high-density batt of fiberglass insulation for a 2" x 6" wall has an R-value of 21.

U-Value – Insulation measurement, measure heat loss through windows. The U-value of a window is the reciprocal of its R-Value (U = 1/R). For instance, a window with a U-value of 0.33 is equivalent to an R-value of 3 (0.33 = 1/3). Because the U-value is the inverse of the R-value, a lower U-value indicates a window that has better insulating capabilities than a window with a higher U-value.

BTU – A British Thermal Unit is the amount of heat energy needed to raise the temperature of one pound of water by one-degree F.

NFRC Unit Rating – The National Fenestration Rating Council (NFRC) determines the U-value for most windows. This rating is placed on a label attached to all new NFRC rated windows. If the NFRC rating is available, the home builder should use this number when filling in the U-value on the Energy Efficiency Components Label.

EF – Used to determine the energy efficiency of hot water tanks, EF is the abbreviation for Energy Factor. This unit is a ratio of the heat energy contained in the water in a hot water tank over a certain period divided by the energy that the hot water heater consumes over the same period. The most efficient electric water heaters have an EF rating of 0.93 to 0.96, while the most efficient gas-fired water heaters have energy factors ranging from 0.8 to 0.9. To be eligible for the Montana Energy Conservation tax credit, a gas water heater must have an EF of at least .82 or thermal efficiency of at least 90. Electric heat pump water heaters must have an EF of at least 2.

AFUE – An abbreviation for Annual Fuel Utilization Efficiency, AFUE is a measure of the effectiveness of gas and oil space heating systems. All furnaces and boilers in the United States are required to have an AFUE rating of at least 78 percent. The most efficient gas furnaces have an AFUE of 92 percent to over 96 percent, while the most efficient gas hot-water boilers have AFUE ratings of around 84 percent to 95 percent. Energy-efficient oil furnaces have similar AFUE ratings, in the mid-80s to 90 percent. The most efficient oil-fired hot water boilers have efficiencies that are slightly lower, with AFUE ratings up to around 90 percent. To be eligible for the Montana Energy Conservation tax credit, a gas furnace must have an AFUE of at least 95 percent.

HSPF – Heating Season Performance Factor is the measurement unit for determining the efficiency of heat pumps. It is calculated by dividing the estimated seasonal heating output (in Btu) by the seasonal power consumption (in watts). To be eligible for the Montana Energy Conservation tax credit, an air source heat pump split system must have an HSPF of at least 8.5

SEER – Seasonal Energy Efficiency Ratio. The total cooling output of an air conditioner during its normal annual usage period for cooling, in Btu/hours, divided by the total electric energy input during the same period in watt- hours. To be eligible for the Montana Energy Conservation tax credit, a central air conditioning split system must have a SEER of at least 16.

EER – Energy Efficiency Ratio. Energy Efficiency Ratio is the ratio of the cooling capacity in BTUs per hour to the power input (in watts). The higher the EER rating, the more efficient the air conditioner. To be eligible for the Montana Energy Conservation tax credit, a central air conditioning split system must have an EER of at least 13.

Additional Energy Conservation Resources

Organization	Location	Website
Building American Solution Center	Washington, DC	basc.pnnl.gov
Building Science Corporation	Westford, MA	buildingscience.com
Better Built Northwest	Portland, OR	betterbuiltnw.com
Efficient Windows Collaborative	Washington, DC	efficientwindows.org
Energy and Environmental Building Association	Bloomington, MN	eeba.org
EPA Home Performance with Energy Star	Washington, DC	energystar.gov
MT. Dept. of Environmental Quality	Helena, MT	deq.mt.gov/energy
National Center for Appropriate Technology	Butte, MT	ncat.org
U.S. Department of Energy	Washington, DC	energy.gov
National Fenestration Rating Council		nfrc.org
Montana Green Power		ncat.org/montana-green-power

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