



## INSULATION COMPLIANCE WITH ENERGY CONSERVATION REQUIREMENTS IN THE 2019 RESIDENTIAL CODE OF OHIO FOR 1, 2 AND 3 FAMILY DWELLINGS

Effective July 1, 2019, the 2019 Residential Code of Ohio (RCO) went into effect, and now requires that all construction of 1, 2 and 3 family dwellings comply with more stringent energy conservation standards.

Construction documents submitted for permits must include information showing compliance, both graphically on the drawings, and by identifying how you intend to comply using one of the following compliance paths:

1. Show compliance with prescriptive requirements in RCO Section 1105, the Ohio Home Builders Association (OHBA) alternative energy code option. Form 1 below can be used to show compliance, and would need to be submitted with your permit application.
2. Show compliance with prescriptive requirement in RCO Section 1101 through 1104. Form 2 below can be used to show compliance, and would need to be submitted with your permit application.
3. Submit a Trade-Off analysis or a Performance analysis per the 2018 International Energy Conservation Code (IECC).

Several computer programs are available to generate a Trade-Off or Performance analysis showing compliance with the 2018 IECC. One of the most popular Trade-Off analysis programs is REScheck, available free from the Department of Energy at [www.energycodes.gov](http://www.energycodes.gov). (Be aware that it is a large download.)

The DOE also has an online version of REScheck you can use without downloading the whole program. Its website also contains a great deal of other good information about constructing energy tight buildings.

RemRate is another popular Performance Analysis program, but it is not free. For additional software options, check the Department of Energy directory of energy analysis programs at [http://apps1.eere.energy.gov/buildings/tools\\_directory](http://apps1.eere.energy.gov/buildings/tools_directory), or refer to the 2018 IECC.

At the FINAL INSPECTION, an Energy Efficiency Certificate must be attached to, or in, the electrical panel. Some computer programs such as REScheck generate such a certificate to submit and to place on/in panel.

If you have questions, please contact our inspectors between 7:00 and 9:00 am Monday Through Friday at 937-440-8121 (Miami County), 937-547-7379 (Darke County), 937-658-6220 (Shelby County).



## THE OHIO HOME BUILDERS ALTERNATIVE ENERGY CODE COMPLIANCE OPTION

Based upon the 2019 Residential Code of Ohio, Section 1112, Ohio Home Builders Alternative Energy Code

Job address \_\_\_\_\_ Date \_\_\_\_\_

Applicant Name (please print) \_\_\_\_\_ Phone No. \_\_\_\_\_

Compliance path proposed: 1  2  Sunroom  R-values on construction documents must match the chosen path option.

Insulation and Glazing Required by Component (Based upon Table 1112.2.1)									
Compliance Path	Maximum U-Factor		Minimum Insulation R-Value						
	Window and Glass Door	Skylight Glazing	Ceiling	Wood Frame Wall	Mass Wall <sup>1</sup>	Floor <sup>5, 6</sup>	Basement Wall <sup>2</sup>	Slab Perimeter <sup>3</sup>	Crawlspace Wall <sup>2</sup>
1	.32	.60	R-49	R-15 or R-13 + 3 <sup>1</sup>	R-13/17	R-30	R-10 / 13 4' depth	R-10 / 15 2' depth	R-10 / 13
2	.32	.60	R-49	R-13	R-13/17	R-30	R-10 / 13 4' depth	R-10 / 15 2' depth	R-10 / 13
Sun Room <sup>6</sup>	.50	.75	R-24	R-13	R-13/17	R-30	R-10 / 13 4' depth	R-10 / 15 2' depth	R-10 / 13

**Foot Notes:**

1. Exterior wall R-value includes insulation in wall and exterior continuous sheathing. "13+3" means R-13 cavity insulation plus R-3 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. Submit manufacturer's insulation R-values for the sheathing if this option is used.
2. As an alternative to insulating floors over crawlspaces, crawlspace walls are permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished exterior grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm) below the exterior finished grade. Exposed earth in unvented crawl space foundations shall be covered with a continuous vapor retarder. All joints of the vapor retarder shall overlap by 6 inches and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches up the stem wall and shall be attached to the foundation wall and piers. R-10 means continuous insulation on the interior or exterior of the wall. R-13 refers to cavity insulation within the interior of the wall.
3. Slab perimeter insulation depth is 2 feet minimum, from the top of the slab on the inside or outside. Use R-15 for heated slabs. A heated slab is defined as a slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under the slab. Includes floor slabs less than 12" below grade. The top edge of the insulation shall be permitted to be cut at a 45-degree angle away from the exterior wall.
4. Mass walls for the purposes of this form shall be considered walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs. The second R-Value applies when more than half the insulation is on the interior of the mass wall.
5. May be less than R-30 if floor joist depth is insufficient, but must completely fill the framing cavity, R-19 minimum. Floor insulation must be installed to maintain permanent contact with the floor sheathing.
6. Per 1112.2.2.9 of the Residential Code of Ohio, Crawlspace floor insulation can be omitted if crawlspace is conditioned and crawlspace walls are insulated to a minimum R10.



## 2019 RESIDENTIAL CODE OF OHIO PRESCRIPTIVE INSULATION METHOD

Based upon 2019 RCO, and the 2018 International Energy Conservation Code

Job address \_\_\_\_\_ Date \_\_\_\_\_

Applicants Name (please print) \_\_\_\_\_ Phone No. \_\_\_\_\_

Building Envelope Requirements									
Zone for Mont. Co.	Maximum		Minimum Insulation R-Value						
	Window and Glass Door U-Factor	Skylight Glazing U-Factor	Ceiling <sup>a</sup>	Wood Frame Wall	Mass Wall <sup>4</sup>	Floor <sup>7,8</sup>	Basement Wall <sup>5,6</sup>	Slab Perimeter <sup>3</sup>	Crawlspace Wall <sup>2,5</sup>
5	.35	.55	R-49	R-20 or R-13 + 5 <sup>1</sup>	R-13/17	R-30	R-10 / 13	R-10 / 15	R-10 / 13
Thermally Isolated Sunrooms (greater than 40% glazing). <sup>10,11</sup>									
5	.50	.75	R-24	R-13	R-13	R-30	R-10 / 13	R-10 / 15	R-10 / 13

**Foot Notes:**

1. Exterior wall R-value includes insulation in wall and exterior continuous sheathing. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. Where Section 1102.1.2 requires continuous insulation on exterior walls and structural sheathing covers 40 percent or less of the gross area of all exterior walls, the required continuous insulation R-value shall be permitted to be reduced by an amount necessary, but not more than R-3, to result in a consistent total sheathing thickness on areas of the walls covered by structural sheathing.
2. Per 1102.2.11: As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous vapor retarder. All joints of the vapor retarder shall overlap by 6 inches and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches up and attached to foundation wall and piers.
3. Slab perimeter insulation depth is 2 feet minimum, from the top of the slab. Use R-15 for heated slabs. A heated slab is defined as a slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under the slab.
4. Mass walls for the purposes of this form shall be considered walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs. The second R-value applies when more than half the insulation is on the interior of the mass wall.
5. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
6. 1102.2.7 Basement walls. Exterior walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections 1102.1.2 and 1102.2.8.
7. May be less than R-30 if floor joist depth is insufficient, but must completely fill the framing cavity. R-19 minimum. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Exception: As an alternative, the floor framing-cavity insulation shall be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum wood frame wall R-value in Table 1102.1.2 and that extends from the bottom to the top of all perimeter floor framing members.
8. Where Section 1102.1.2 requires R-49 insulation in the ceiling, installing R-38 insulation over 100 percent of the ceiling area requiring insulation shall satisfy the requirement for R-49 insulation wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.
9. Per 1112.2.2.9 of the Residential Code of Ohio, Crawlspace floor insulation can be omitted if crawlspace is conditioned and crawlspace walls are insulated to a minimum R10.



- Example Only -

Florida Energy Efficiency Code for Building Construction

Envelope Leakage (Blower Door) Test Report

Please note that completed reports can be emailed to [Inspections@leegov.com](mailto:Inspections@leegov.com).

Permit Number: \_\_\_\_\_

Builder Name: \_\_\_\_\_

Job Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

2017 Florida Building Code R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 7 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w. g. (50 Pascals). Testing shall be conducted by either individuals as defined in Section 553.993 (5) or (7), Florida Statutes or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i) or approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

During Testing:

- 1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

Envelope Leakage Test Results:

CFM(50) = \_\_\_\_\_ Volume = \_\_\_\_\_ ACH(50) = CFM(50) X 60 / Volume = \_\_\_\_\_

Pass Fail

Passing results must be 7 ACH(50) or less

\*Note: if the report shows less than 3 air changes, mechanical ventilation will be required per Florida Building Code R303.4.

I hereby certify that the above envelope leakage performance results demonstrate compliance with Florida Energy Code requirements.

License/Certification Number: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Energy Efficiency Certificate		
Permit No: _____		
Address: _____		
Insulation Ratings		R-Value
Roof/Ceiling:	With attic	R-
	Without Attic	R-
Walls:	Frame	R-
	Mass	R-
	Basement	R-
Floors:	Crawlspace	R-
	Over Conditioned Space	R-
	Slab edge (depth)	R- / ft
Ducts:	Outside conditioned space	R-
Fenestration Ratings		NFRC U-Factor
Opaque doors:		U-
Windows:		U-
Skylights:		U-
Equipment Performance		Efficiency
Heating System:		HSPF/AFUE
Cooling System:		COP/SEER
Water Heater/Boiler:		EF/E <sub>c</sub> or E <sub>t</sub>
Air Test		Results
Envelope-		Air Changes Per Hour
Duct Tightness Rough In-		CFM per 100 Sq. Ft. w/o handler
Duct Tightness Rough In-		CFM per 100 Sq. Ft. w/ handler
Duct Tightness Post Construction-		CFM per 100 Sq. Ft.
Builder/Designer: _____		
Certified by: _____		
Adopted Code Edition: _____		Date: _____
<b>THIS CERTIFICATE SHALL BE PERMANENTLY POSTED ON OR IN THE ELECTRICAL DISTRIBUTION PANEL REQUIRED BY RESIDENTIAL CODES</b>		

Energy Efficiency Certificate		
Permit No:	BLD19-00245	
Address:	123 Oak Street	
Insulation Ratings		R-Value
Roof/Ceiling:	With attic	R- 49
	Without Attic	R- 38
Walls:	Frame	R- 21
	Mass	R- 13
	Basement	R- 13
Floors:	Crawlspace	R- 10
	Over Conditioned Space	R- 20
	Slab edge (depth)	10 / 2 ft
Ducts:	Outside conditioned space	R- 8
Fenestration Ratings		NFRC U Factor      NFRC SHGC
Opaque doors:	U-12	
Windows:	U-32	
Skylights:	.32	
Equipment Performance		Efficiency
Heating System:	AFUE -90%	
Cooling System:	COP/SEER- 13	
Water Heater/Boiler:	EF/E <sub>c</sub> or E <sub>t</sub> 80%	
Air Test		Results
Envelope-	Air Changes Per Hour	
Duct Tightness Rough In-	4	CFM per 100 Sqft w/o furn.
Duct Tightness Rough In-	3	CFM per 100 Sq. Ft. w/ furn.
Duct Tightness Post Construction-	6	CFM per 100 Sq. Ft.
Builder/Designer:		
Certified by:		
Adopted Code Edition:	Date:	
<b>THIS CERTIFICATE SHALL BE PERMANENTLY POSTED ON OR IN THE ELECTRICAL DISTRIBUTION PANEL REQUIRED BY RESIDENTIAL CODES</b>		