



City of Englewood, Ohio

## FORM 1: 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>4</sup>	Floor <sup>5</sup>	Basement Wall <sup>2</sup>	Slab Perimeter <sup>3</sup>	Crawlspacewall <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, crawlspacewalls 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. When using the >40% glazed category the sunroom must be thermally isolated from the rest of the house. New walls, doors and windows separating the sunroom from the conditioned space shall meet the building thermal envelope requirements. Sunroom glazing determination. Use this formula only if using sunroom guideline. To determine the percent of glass in the exterior wall envelope:

A = Gross exterior wall area, including window and door rough openings. A = \_\_\_\_\_ Sq. Ft.

B = Total area of windows, skylights and glass doors rough openings. B = \_\_\_\_\_ Sq. Ft.

Formula to determine percent of window area = (B ÷ A) x 100

$$B \text{ _____} \div A \text{ _____} = \text{ _____} \times 100 = \text{ _____} \%$$

Example: 300 ÷ 600 = .5 x 100 = 50 %

**Summary of additional requirements:**

**1112.1.4.1 Blown or sprayed roof/ceiling insulation.** The thickness of blown in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 sq. ft (28 sq. m.) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness

**1112.1.7.1 Protection of exposed foundation insulation.** Insulation applied to the exterior of basement walls, crawl space walls, and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather- resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (152 mm) below grade.

**1112.1.8 Certificate.** A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration; and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace and/or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric base board heaters.

**1112.2.2 Ceilings with attic spaces.** When Section 1112.2.1 would require R-49 in the ceiling, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section 1112.2.1.2 and the Total UA alternative in Section 1112.2.1.3.

**1112.2.2.2 Ceilings without attic spaces.** Where Section 1112.2.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section 1112.2.1 shall be limited to 500 square feet (46 m<sup>2</sup>) or twenty per cent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section 1112.2.1.2 and the Total UA alternative in Section 1112.2.1.3.

**1112.2.2.3 Access hatches and doors.** Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment which prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

**1112.2.4.1 The building thermal envelope** shall be durably sealed to limit infiltration, including all joints and penetrations, site built windows, doors and skylights, openings between window and door assemblies, utility penetrations, dropped ceilings and chases adjacent to the thermal envelope, knee walls, walls and ceilings separating the garage from conditioned spaces, behind tubs and showers on exterior walls, common walls between dwelling units, attic access openings, rim joist junctions and other sources of infiltration.

**1112.2.4.2 Air sealing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with Section 1112.2.4.2.1.

**1112.2.4.2.1Testing.** Tested air leakage is less than 5 ACH when tested with a blower door at a pressure of 50 pascals (0.007 psi). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing: 1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed; 2. Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft, and flue dampers; 3. Interior doors shall be open; 4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed; 5. Heating and cooling system(s) shall be turned off; 6. HVAC ducts shall not be sealed; and 7. Supply and return registers shall not be sealed.

**1112.2.4.3 Fireplaces:** New wood-burning fireplaces shall have doors or tight-fitting flue dampers and outdoor combustion air. If using tight-fitting doors on UL 127 fireplaces, they must be tested and listed for the fireplace.

**1112.2.4.5 Recessed lighting.** Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**1112.3.1.1 Programmable thermostat.** Where the primary heating system is a forced air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

**1112.3.1.2 Heat pump supplementary heat.** Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

**1112.3.2.1: Supply ducts insulation,** in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6. Exception: Ducts or portions thereof located completely inside the building thermal envelope.

**1112.3.2.2 Sealing. Ducts,** air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4. Duct tightness shall be verified by either one of the following where outside the building envelope.

**1. Post-construction test:** Post-construction duct tightness shall be verified to meet the values prescribed in Table 1112.3.2.2(a) by testing either the "Leakage to Outdoors" or the "Total Leakage" in accordance with the chosen compliance path. Testing shall be conducted at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure. All register boots shall be taped or otherwise sealed during the test.

**TABLE 1112.3.2.2(a)**

Compliance path	Leakage to outdoors, per 100 sq. ft. floor area	Leakage total per 100 sq. ft. floor area
Path 1	Less than equal to 6 cfm	Less than equal to 9 cfm
Path 2	Less than equal to 4 cfm	Less than equal to 6 cfm

**2. Rough-in test:** Rough-in duct tightness shall be verified to meet the values prescribed in Table 1105.3.2.2(b) by testing the "Total Leakage" in accordance with the chosen compliance path. Testing shall be conducted at a pressure differential of 0.1 inch w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure, if installed at the time of the test. All register boots shall be taped or otherwise sealed during the test.

**TABLE 1112.3.2.2(b)**

Compliance path	Leakage to outdoors, per 100 sq. ft. floor area, with air handler installed	Leakage total per 100 sq. ft. floor area, without air handler installed
Path 1	Less than equal to 6 cfm	Less than equal to 4 cfm
Path 2	Less than equal to 4 cfm	Less than equal to 3 cfm

**Exception:** Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

**1112.3.2.3 Building cavities.** Building framing cavities shall not be used as supply ducts.

**1112.3.3 Circulating hot water systems.** The first five feet of circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

**1112.3.4 Mechanical ventilation.** Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

**1105.4.1 Lighting equipment.** A minimum of 90 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.