



Building Safety Division

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RESIDENTIAL ENERGY ADDITIONAL MEASURE SELECTION

RESIDENTIAL INFORMATION

Date: _____ Building Permit Number: _____

Owner's name: _____

Job address: _____

City: _____ State: _____ Zip: _____

INSTRUCTIONS

Please select type of construction below: sign, date and complete the entire form. Submit this form with your permit application or your project will be placed on hold until the required information is provided.

Additions. Additions to existing buildings or structures may be made without making the entire building or structure comply if the new additions comply with the requirements of ORSC Chapter 11.

Large additions. Additions that are equal to or more than 40 percent of the existing building heated floor area or 600 square feet (55m²) in area, whichever is less, must comply with Table N1101.1(2) on page 2 (N1101.3.1). *(Note: You must select one numbered **and** one lettered measure.)*

Small additions. Additions that are less than 40 percent of the existing building heated floor area or less than 600 square feet (55 m²) in area, whichever is less, must select one measure from Table N1101.1(2) on page 2 or comply with Table N1101.3 below (N1101.3.2).

Exception: Additions that are less than 15 percent of existing building heated floor area or 200 square feet (18.28 m²) in area, whichever is less, shall not be required to comply with Table N1101.1(2) or Table N1101.3.

Selected item number: _____ Selected item letter: _____

Applicant's Name: _____ Signature: _____

CHAPTER 11

ENERGY EFFICIENCY

(All of Chapter 11 is Oregon amendment)

PART I ENERGY CONSERVATION

SECTION N1101 SCOPE

N1101.1 General. The provisions of this chapter regulate the exterior envelope, as well as the design, construction and selection of heating, ventilating and air-conditioning systems, lighting and piping insulation required for the purpose of effective conservation of energy within a building or structure governed by this code.

All conditioned spaces within residential buildings shall comply with Table N1101.1(1) and two additional measures from Table N1101.1(2).

Exceptions:

1. Application to existing buildings shall comply with Section N1101.2.
2. Application to additions shall comply with Section N1101.3.
3. Heated or cooled detached accessory structures that are not habitable shall meet the following envelope requirements without any additional measures: Walls: R-21/U-0.064; Roofs: R-38/U-0.027 (attic) or R-20 continuous insulation/U-0.048 (above deck); Windows: U-0.35; Opaque doors: U-0.70; Roll-up doors: U-0.50.

N1101.2 Application to existing buildings. Alteration and repairs, historic buildings and change of use or occupancy to buildings, structures or portions thereof shall comply with the requirements in Sections N1101.2.1 through N1101.2.3.

N1101.2.1 Alteration and repair. Alterations and repairs affecting energy conservation measures shall conform to the requirements specified in this chapter.

Alterations or repairs which affect components of existing conditioned spaces regulated in this chapter, those components shall comply with this chapter.

Exception: The minimum component requirements as specified in Table N1101.2 may be used to the maximum extent practical.

N1101.2.2 Historic buildings. The building official may modify the specific requirements of this chapter for historic buildings and require in lieu thereof alternative requirements that will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings specifically designated as historically significant by the state historic preservation office(r) or by official action of a local government.

N1101.2.3 Change of occupancy or use. Definition of "Change of use" for purposes of Section N1101.2.3 is a

change of use in an existing residential building and shall include any of the following: any unconditioned spaces such as an attached garage, basement, porch, or canopy that are to become conditioned spaces; any unconditioned, inhabitable space that is to become conditioned space, such as a large attic.

N1101.2.3.1 Change of use. A building that changes use, without any changes to the components regulated in this chapter, is required to comply with Table N1101.2 to the greatest extent practical. Changes of use that are greater than 30 percent of the existing building heated floor area or more than 400 square feet (37 m²) in area, whichever is less, shall be required to select one measure from Table N1101.3.

N1101.2.3.2 Change of occupancy. Alteration and repair of conditioned nonresidential buildings, such as a small church or school, that are changing occupancy to residential shall use Table N1101.2 to the greatest extent practical and select one measure from Table N1101.1(2), or one measure from Table N1101.3.

Exception: The minimum component requirements shall be disregarded when thermal performance calculations are completed for change of use to Group R occupancy, when such calculations demonstrate similar performance to the requirements of Table N1101.2.

**TABLE N1101.2
EXISTING BUILDING COMPONENT REQUIREMENTS**

BUILDING COMPONENTS	REQUIRED PERFORMANCE	EQUIV. VALUE
Wall insulation	U-0.083	R-15
Flat ceiling	U-0.025	R-49
Vaulted ceiling > 10 inches nominal rafter depth	U-0.040	R-25
Vaulted ceiling > 8 inches nominal rafter depth	U-0.047	R-21
Underfloor > 10 inches nominal joist depth	U-0.028	R-30
Underfloor > 8 inches nominal joist depth	U-0.039	R-25
Slab edge perimeter	F-0.52	R-15
Windows	U-0.30	U-0.30
Skylights	U-0.60	U-0.60
Exterior doors	U-0.20	R-5
Exterior doors with > 2.5 ft ² glazing	U-0.40	R-2.5
Forced air ducts	n/a	R-8

For SI: inch = 25.4 mm, 1 square foot = 0.0929 m².

N1101.3 Additions. Additions to existing buildings or structures may be made without making the entire building or structure comply if the new additions comply with the requirements of this chapter.

N1101.3.1 Large additions. Additions that are equal to or more than 40 percent of the existing building heated floor area or 600 square feet (55 m²) in area, whichever is less, shall be required to comply with Table N1101.1(2).

N1101.3.2 Small additions. Additions that are less than 40 percent of the existing building heated floor area or less than 600 square feet (55 m²) in area, whichever is less, shall be required to select one measure from Table N1101.1(2) or comply with Table N1101.3.

Exception: Additions that are less than 15 percent of existing building heated floor area or 200 square feet (18.58 m²) in area, whichever is less, shall not be required to comply with Table N1101.1(2) or Table N1101.3.

**TABLE N1101.1(1)
PRESCRIPTIVE ENVELOPE REQUIREMENTS^a**

BUILDING COMPONENT	STANDARD BASE CASE		LOG HOMES ONLY	
	Required Performance	Equiv. Value ^b	Required Performance	Equiv. Value ^b
Wall insulation—above grade	U-0.059 ^c	R-21 Intermediate ^c	Note d	Note d
Wall insulation—below grade ^e	C-0.063	R-15/R-21	C-0.063	R-15/R-21
Flat ceilings ^f	U-0.021	R-49	U-0.020	R-49 A ^h
Vaulted ceilings ^g	U-0.033	R-30 Rafter or R-30A ^{g,h} Scissor Truss	U-0.027	R-38A ^h
Underfloors	U-0.033	R-30	U-0.033	R-30
Slab edge perimeter	F-0.520	R-15	F-0.520	R-15
Heated slab interior ⁱ	n/a	R-10	n/a	R-10
Windows ^j	U-0.30	U-0.30	U-0.30	U-0.30
Window area limitation ^{j, k}	n/a	n/a	n/a	n/a
Skylights ^l	U-0.50	U-0.50	U-0.50	U-0.50
Exterior doors ^m	U-0.20	U-0.20	U-0.54	U-0.54
Exterior doors with > 2.5 ft ² glazing ⁿ	U-0.40	U-0.40	U-0.40	U-0.40
Forced air duct insulation	n/a	R-8	n/a	R-8

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m², 1 degree = 0.0175 rad, n/a = not applicable.

- a. As allowed in Section N1104.1, thermal performance of a component may be adjusted provided that overall heat loss does not exceed the total resulting from conformance to the required U-factor standards. Calculations to document equivalent heat loss shall be performed using the procedure and approved U-factors contained in Table N1104.1(1).
- b. R-values used in this table are nominal for the insulation only in standard wood framed construction and not for the entire assembly.
- c. Wall insulation requirements apply to all exterior wood framed, concrete or masonry walls that are above grade. This includes cripple walls and rim joist areas. Nominal compliance with R-21 insulation and Intermediate Framing (N1104.5.2) with insulated headers.
- d. The wall component shall be a minimum solid log or timber wall thickness of 3.5 inches (90 mm).
- e. Below-grade wood, concrete or masonry walls include all walls that are below grade and do not include those portions of such wall that extend more than 24 inches (609.6 mm) above grade. R-21 for insulation in framed cavity; R-15 continuous insulation.
- f. Insulation levels for ceilings that have limited attic/rafter depth such as dormers, bay windows or similar architectural features totaling not more than 150 square feet (13.9 m²) in area may be reduced to not less than R-21. When reduced, the cavity shall be filled (except for required ventilation spaces). R-49 insulation installed to minimum 6-inches depth at top plate at exterior of structure to achieve U-factor.
- g. Vaulted ceiling surface area exceeding 50 percent of the total heated space floor area shall have a U-factor no greater than U-0.026 (equivalent to R-38 rafter or scissor truss with R-38 advanced framing).
- h. A = Advanced frame construction. See Section N1104.6.
- i. Heated slab interior applies to concrete slab floors (both on and below grade) that incorporate a radiant heating system within the slab. Insulation shall be installed underneath the entire slab.
- j. Sliding glass doors shall comply with window performance requirements. Windows exempt from testing in accordance with Section NF1111.2, Item 3 shall comply with window performance requirements if constructed with thermal break aluminum or wood, or vinyl, or fiberglass frames and double-pane glazing with low-emissivity coatings of 0.10 or less. Buildings designed to incorporate passive solar elements may include glazing with a U-factor greater than 0.35 by using Table N1104.1(1) to demonstrate equivalence to building envelope requirements.
- k. Reduced window area may not be used as a trade-off criterion for thermal performance of any component.

Exception: Table N1101.1(2), Envelope Measure 6: calculation allows baseline case 15 percent of total wall area as window when design case utilizes window area of less than 15 percent.
- l. Skylight area installed at 2 percent or less of total heated space floor area shall be deemed to satisfy this requirement with vinyl, wood or thermally broken aluminum frames and double-pane glazing with low-emissivity coatings. Skylight U-factor is tested in the 20-degree (0.35 rad) overhead plane in accordance with NFRC standards.
- m. A maximum of 28 square feet (2.6 m²) of exterior door area per dwelling unit can have a U-factor of 0.54 or less.
- n. Glazing that is either double pane with low-e coating on one surface, or triple pane shall be deemed to comply with this U-0.30 requirement.

**TABLE N1101.1(2)
ADDITIONAL MEASURES**

Envelope Enhancement Measures (Select One)	1	High efficiency walls Exterior walls—U-0.045/R-21 cavity insulation + R-5 continuous
	2	Upgraded features Exterior walls—U-0.057/R-23 intermediate or R-21 advanced, Framed floors—U-0.026/R-38, and Windows—U-0.28 (average UA)
		Upgraded features Exterior walls—U-0.055/R-23 intermediate or R-21 advanced, Flat ceiling ^e —U-0.017/R-60, and Framed floors—U-0.026/R-38
	4	Super Insulated Windows and Attic OR Framed Floors Windows—U-0.22 (Triple Pane Low-e), and Flat ceiling ^e —U-0.017/R-60 or Framed floors—U-0.026/R-38
		Air sealing home and ducts Mandatory air sealing of all wall coverings at top plate and air sealing checklist ^f , and Mechanical whole-building ventilation system with rates meeting M1503 or ASHRAE 62.2, and All ducts and air handlers contained within building envelope ^d or All ducts sealed with mastic ^b
	6	High efficiency thermal envelope UA^g Proposed UA is 8% lower than the code UA
Conservation Measure (Select One)	A	High efficiency HVAC system^a Gas-fired furnace or boiler AFUE 94%, or Air source heat pump HSPF 9.5/15.0 SEER cooling, or Ground source heat pump COP 3.5 or Energy Star rated
	B	Ducted HVAC systems within conditioned space All ducts and air handlers contained within building envelope ^d <i>Cannot be combined with Measure 5</i>
	C	Ductless heat pump Ductless heat pump HSPF 10.0 in primary zone of dwelling
	D	High efficiency water heater^c Natural gas/propane water heater with UEF 0.85 OR Electric heat pump water heater Tier 1 Northern Climate Specification Product

For SI: 1 square foot = 0.093 m², 1 watt per square foot = 10.8 W/m².

- Appliances located within the building thermal envelope shall have sealed combustion air installed. Combustion air shall be ducted directly from the outdoors.
- All duct joints and seams sealed with listed mastic; tape is only allowed at appliance or equipment connections (for service and replacement). Meet sealing criteria of Performance Tested Comfort Systems program administered by the Bonneville Power Administration (BPA).
- Residential water heaters less than 55 gallon storage volume.
- A total of 5 percent of an HVAC system's ductwork shall be permitted to be located outside of the conditioned space. Ducts located outside the conditioned space shall have insulation installed as required in this code.
- The maximum vaulted ceiling surface area shall not be greater than 50 percent of the total heated space floor area unless vaulted area has a *U*-factor no greater than U-0.026.
- Continuous air barrier. Additional requirement for sealing of all interior vertical wall covering to top plate framing. Sealing with foam gasket, caulk or other approved sealant listed for sealing wall covering material to structural material (example: gypsum board to wood stud framing).
- Table N1104.1(1) Standard base case design, Code UA shall be at least 8 percent less than the Proposed UA. Buildings with fenestration less than 15 percent of the total vertical wall area may adjust the Code UA to have 15 percent of the wall area as fenestration.

TABLE N1101.3
SMALL ADDITION ADDITIONAL MEASURES (Select one)

1	Increase the ceiling insulation of the existing portion of the home as specified in Table N1101.2.
2	Replace all existing single-pane wood or aluminum windows to the <i>U</i> -factor as specified in Table N1101.2
3	Insulate the floor system as specified in Table N1101.2 & install 100 percent of permanently installed lighting fixtures as CFL, LED, or linear fluorescent or a min. efficacy of 40 lumens per watt as specified in Section N1107.2.
4	Test the entire dwelling with a blower door and exhibit no more than 6.0 air changes per hour @ 50 Pascals.
5	Seal and performance test the duct system.
6	Replace existing 78 percent AFUE or less gas furnace with a 92 percent AFUE or greater system.
7	Replace existing electric radiant space heaters with a ductless mini split system with a minimum HSPF of 10.0.
8	Replace existing electric forced air furnace with an air source heat pump with a minimum HSPF of 9.5.
9	Replace existing water heater with a water heater meeting Conservation Measure D [Table N1101.1(2)]

N1101.4 Information on plans and specifications. Plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems as herein governed, including, but not limited to: exterior envelope component materials; *R*-values of insulating materials; HVAC equipment efficiency performance and system controls, lighting and other pertinent data to indicate conformance with the requirements of this chapter.

SECTION N1102
DEFINITIONS

AFUE (ANNUAL FUEL UTILIZATION EFFICIENCY).

The energy output divided by the energy input, calculated on an annual basis and including part load and cycling effects. AFUE ratings shall be determined using the U.S. Department of Energy test procedures (10 CFR Part 430).

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, such as a change in current strength, pressure, temperature or mechanical configuration. (See also "Manual.")

BASEMENT WALL. The opaque portion of walls which encloses a basement and is partially or totally below grade walls.

BELOW GRADE WALLS. The walls or the portion of walls entirely below the finished grade or which extend 2 feet (610 mm) or less above the finished grade.

BTU (British Thermal Unit). The amount of heat required to raise the temperature of 1 pound (0.454 kg) of water (about 1 pint) from 59°F to 60°F (15°C to 16°C).

BUILDING ENVELOPE. That element of a building which encloses conditioned spaces through which thermal energy

may be transmitted to or from the exterior or to or from unconditioned spaces.

C (Thermal Conductance). See "Thermal conductance."

CONDITIONED SPACE. A space within the building, separated from unconditioned space by the exterior envelope, which by introduction of conditioned air, by heated and/or cooled surfaces, or by air or heat transfer from directly conditioned spaces is maintained at temperatures of 55°F (13°C) or higher for heating and/or 85°F (29.4°C) or below for cooling. (Enclosed corridors between conditioned spaces shall be considered as conditioned space. Spaces where temperatures fall between this range by virtue of ambient conditions shall not be considered as conditioned space.)

COOLED SPACE. A space within a building provided with a mechanical cooling supply.

EXTERIOR DOOR. A permanently installed operable barrier by which an entry is closed and opened. Exterior doors include doors between conditioned and unconditioned spaces, such as a door between a kitchen and garage.

EXTERIOR ENVELOPE. See "Building envelope."

EXTERIOR WALL. Any member, or group of members, which defines the exterior boundaries of the conditioned space and which has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane.

EXTERIOR WINDOW. An opening, especially in the wall of a building, for admission of light or air that is usually closed by casement or sashes containing transparent material (such as glass) and in some cases capable of being opened and shut. All areas, including frames, in the shell of a conditioned space that let in natural light, including skylights, sliding glass doors, glass block walls and the glazed portions of the doors.

When calculating the energy performance of the exterior envelope, the area of the window shall be the total area of glazing measured using the rough opening dimensions, and including the glass, sash and frame.

FENESTRATION. Windows and doors in the exterior envelope. See the definitions for "Exterior door" and "Exterior window."

FLOOR AREA. The area included within the surrounding exterior walls of a building or portion thereof, exclusive courts. The floor area of a building or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above.

GLAZING. All areas including frames in the shell of a conditioned space that let in natural light, including windows, clerestories, skylights, sliding glass doors, glass block walls and the glazed portion of doors.

GROSS AREA OF EXTERIOR WALLS. Consists of wall areas, as measured on the exterior, including foundation walls above grade; peripheral edges of floors; window areas, including sash; and door areas, where such surfaces are exposed to outdoor air and enclose a heated or mechanically cooled space.