



Oregon Residential Energy Code

Construction and Remodeling

Building or Remodeling

Building a home can be a complicated process. Planning and attention to detail can ensure your project will meet code and avoid delays. This brochure can help you design your residential building to pass the design and inspection process more easily.

What is the Energy Code?

The Residential Energy Code is contained in Chapter 11 of the Oregon Residential Specialty Code (Chapter 13 of the Oregon Structural Specialty Code). It applies to all new construction, alterations and additions to buildings classified as occupancy group R that are three stories and less in height. This includes one- and two-family dwellings, hotels, motels, apartment houses, dormitories and boarding houses.

The Oregon Residential Energy Code was significantly revised in 2008. The code requires residential building design to take into account the cost of heating and to incorporate a minimum level of cost-effective, energy-saving features. The cost of the energy-saving features is more than offset by lower energy bills.

Know the Code

You comply with the Oregon Residential Energy Code by following the Standard Base Case, building component requirements from Table N1101.1(1). You then select one of the nine Additional Measures from Table N1101.1(2).

If your building does not meet the Standard Base Case, building component requirements, you can use Table N1104.1(1), which allows trade-offs between building envelope components to develop your own custom path. For example, better insulated walls will compensate for less floor insulation than the Standard Base Case requires.

Calculations must be completed using Table N1104.1(1) or OSSC, Table 13-B. A special guide shows how to use this table and is available to download at the Oregon Department of Energy's Web site. When using Table N1104.1(1), you must still select an Additional Measure from Table N1101.1(2).

Construction

When you pick up your permit, make sure you check for additions or corrections – and make sure you understand them. Clear communication between the homeowner, the builder, the subcontractors and the building department is essential to meeting requirements of *approved plans*.

During construction, an inspector may find some building details that do not meet code. Major problems can be expensive to correct. To avoid unnecessary expense and stress, *do not make any changes in the field without prior approval from the building department*.

Building Envelope Requirements

The following table shows Oregon Residential Energy Code requirements for standard wood framed building components in the Standard Base Case. Consult the building code for details about this, the log home base case and other options.

BUILDING COMPONENTS	BASE CASE
Maximum Allowable Window Area	No Limit
Window & Sliding Glass Door U-factor ¹	U-0.35
Skylight U-factor ¹	U-0.60
Skylight Area <2% Htd Sp Fl Area ²	²
Exterior Doors ³ (No Glazing)	U-0.20
Doors w/≤2.5 ft ² Glazing	U-0.40
Above-Grade Wall Insulation	R-21 ⁴
Basement Wall Insulation ⁵	R-15
Underfloor Insulation	R-30
Flat Ceilings ⁶	R-38
Vaulted Ceilings	R-38 ⁷
Slab Floor Edge Insulation	R-15
Heated Slab Interior Insulation ⁹	R-10
Forced Air Duct Insulation	R-8

¹ Window and skylight U-values shall not exceed value listed. Skylight U-factor is tested in the 20 degree overhead plane per NFRC standards.

² Skylights constructed with vinyl, wood, or thermally broken aluminum frames and double-pane glazing with low-emissivity coatings meet this requirement. Skylight area is a percentage of the heated space floor area. Any glazing in the roof/ceiling assembly above the conditioned space shall be considered a skylight.

³ A maximum of 28 square feet (2.6 m2) of exterior door per dwelling unit can have a U-factor of 0.54 or less.

⁴ R-19 Advanced Frame or 2x4 wall with rigid insulation may be substituted if total nominal insulation R-value is 18.5 or greater.

⁵ Basement walls include wood, concrete or masonry walls that are below grade and do not include those portions of such walls that extend more than 24 inches above grade.

⁶ Insulation level for ceilings that have limited attic/rafter depth such as dormers, bay windows or similar architectural features totaling no more than 150 square feet (13.9 m2) in area per building may be reduced to not less than R-21. When reduced, the cavity shall be filled (except for required ventilation spaces), and a 0.5 perm (dry cup) vapor retarder installed.

⁸ The maximum vaulted ceiling surface area shall not be greater than 50 percent of the total heated space floor area unless area has a U-factor no greater than U-0.031. The U-factor of 0.042 is representative of a vaulted scissor truss. A 10-inch deep rafter vaulted ceiling with R-30 insulation is U-0.033 and complies with this requirement, not to exceed 50 percent of the total heated space floor area.

⁹ For slab-on-grade floors that incorporate hydronic heating, in addition to perimeter insulation, the entire underside of slab shall be insulated to R-10.

General Requirements

General requirements that warrant special attention include the following:

- Window U-factors shall be certified through the National Fenestration Rating Council (NFRC) certification program or have exempt labeling.

- Batt-type insulation shall be installed flush against the warm side of the cavity, insofar as practical.
- Recessed light fixtures may not be installed in insulated cavities, unless listed as airtight and IC-rated (direct contact with insulation).
- Below-grade walls shall be insulated from bottom of above-grade subfloor downward and to top of below-grade finished floor.
- Window and door air leakage rates shall meet the ASTM standards.
- All exterior joints around windows, around door frames, between wall cavities and window or door frames, between wall and foundation, between wall and roof, and other openings in the exterior envelope shall be sealed in a manner approved by the building official.
- Exterior envelope insulation shall have vapor retarders installed on the warm side (in winter) with a 1-perm dry cup rating or less.
- An approved ground cover shall be installed in the crawl space for both new and existing buildings when insulation is installed.
- All heating, ventilating and air conditioning systems shall be provided with proper controls.
- All fireplaces and stoves shall meet code requirements for outside combustion air.
- Split-system heat pumps shall have a heating seasonal performance factor of no less than 7.7 and 13.0 SEER.
- Air conditioners shall have a seasonal energy efficiency rating no less than 13.0.
- Gas- and oil-fired furnaces shall have an annual fuel utilization efficiency of no less than 78 percent.
- Gas-fired boilers shall have an AFUE not less than 80 percent, and gas-fired steam boilers shall have an AFUE of not less than 75 percent.
- All hot water piping shall be insulated.

Frequently Asked Questions

- Q** I'm adding a single room. Do I need to make my entire building comply with the energy code?
- A** Only areas of new construction must meet the code.
- Q** What is "advanced framing" for walls?
- A** Advanced framing is an optional construction method that provides higher insulation value than standard wall construction. Walls are framed with 2X studs, 24 inches on center. Full insulation must be provided at corners, intersections and headers.

Q Can I use metal studs instead of wood?

A Yes, but not easily. The code is based on the thermal performance of wood studs. Because metal studs conduct heat much faster, you need to provide calculations demonstrating compliance with code. You generally need to put a 1-inch thick layer of continuous rigid foam insulation (such as R-5) outside the frame wall to meet code requirements.

Copies of code:

Oregon Building Officials Association
Phone: (503) 873-1157
Fax: (503) 373-9389

Technical support:

Oregon Department of Energy
625 Marion St. NE, Salem, OR 97301
Phone: (503) 378-4040 or 1-800-221-8035
Fax: (503) 373-7806
<http://egov.oregon.gov/ENERGY/CONS/Codes/codehm.shtml>

Find Out More

This brochure is not intended to replace code. Additional information is available at your local library, technical bookstore or from the following organizations:

Getting a Permit

1 Make sure the building design complies with energy code.

Take time to understand the basic requirements of the code before you finalize your design.

2 Make sure your plans show compliance with the energy code.

Your plans should describe the construction of all building envelope components: walls, windows and doors, ceiling/roofs and floors. Describe the components in enough detail to show that you meet the requirements (see example below).

