Frequently Asked Questions

Q How do I handle additions or alterations?

A Additions must meet energy code requirements, unless they are for the same use as the existing building, don't exceed 10 percent of the building floor area or 1,000 ft^2, and don't exceed required U-factors. Alterations must meet prescriptive code requirements and neither increase overall heat gain nor heat loss of the building envelope.

Q Do I have to insulate a slab-on-grade foundation?

A Not unless it is directly heated — hydronically, for example.

Q I'm building an automotive garage. The doors will be open. Do I need to insulate the building?

A Yes. But if the heating system is controlled by a thermostat with a maximum setpoint capacity of 55°F, only the roof/ceiling assembly must meet prescriptive code requirements.

Q When should I use the "Simplified Trade-Off Approach"?

A This approach compares your building to one that's the same size and shape and meets prescriptive requirements. It's used most commonly when window area exceeds prescriptive requirements or when wall insulation is insufficient. Use the Simplified Trade-Off Approach only after you have tried thoroughly to meet prescriptive code requirements.

Find Out More

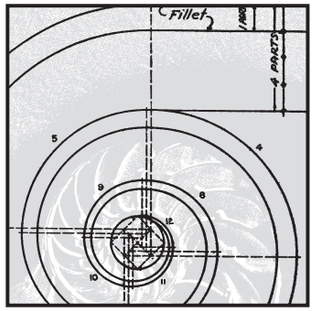
This brochure is not intended to replace the code. Additional information is available at your local library, technical bookstore or from the following organizations:

Copies of code:
Oregon Building Officials Association
phone: (503) 873-1157 • fax: (503) 373-9389

Technical support:
Oregon Office of Energy
625 Marion St. NE, Salem, OR 97301
phone: (503) 378-4040 • toll-free: 1-800-221-8035
fax: (503) 373-7806 • www.energy.state.or.us

Funding for this brochure is provided by the Northwest Energy Efficiency Alliance, a non-profit utility-funded consortium whose mission is to transform markets for energy-efficient goods and services, and by the U.S. Department of Energy, Grant No. DE-FG51-96R020761. However, any opinions, findings, conclusions or recommendations expressed herein are those of the author and do not necessarily reflect the views of the Alliance or USDOE.

Oregon Office of Energy • October 1997



Oregon Non-Residential Energy Code

ENVELOPE

Introduction

This brochure will help you become familiar with **envelope requirements** for non-residential buildings and may help you speed up the permit process.

Oregon law requires that all applicants for non-residential buildings complete the forms provided in the Code Compliance Forms Manual. It's available at your local building department and on the Oregon Office of Energy Web site (www.cbs.state.or.us/external/ooe/cons/ecode1.htm). The manual provides all the information you need to design your building to meet energy code and to demonstrate compliance with code requirements.

What Is the Energy Code?

The Non-Residential Energy Code is part of Chapter 13 of the Oregon Structural Specialty Code. It applies to all construction, additions and alterations, **except the following:** one- and two-family dwellings, hotels, motels, apartment houses and boarding houses three stories or less.

The Oregon Non-Residential Energy Code was last revised in 1996. Code requirements are simple, easy to enforce and allow flexibility in design.

The code requires all new buildings, including speculative buildings, to meet a minimum level of energy efficiency. It helps ensure that future occupants don't get stuck paying high energy bills because the building wasn't designed to be energy-efficient.

The cost of conservation measures required by code generally pays for itself quickly through energy savings.

Know the Code

Oregon's energy code consists of three primary areas:

- Envelope Requirements
- Mechanical System Requirements
- Lighting Requirements

You will need to demonstrate compliance or a permitted exception with these requirements to obtain a building permit. The Code Compliance Manual describes requirements for each of these areas in detail and includes forms to guide you.

Construction

If an examiner rejects a set of plans or forms, make sure you understand why so you can make required corrections. Clear communication between the owner, the builder, the subcontractors and the building department is essential to meeting specifications of *approved plans* during construction.

Keep in mind that a plans examiner cannot tell you how to build your building, only how it fails to meet the code. Don't expect the plans examiner to act as a design consultant.

If inspectors find details that do not meet code, they may require compliance with the code before they issue a certificate of occupancy.

To avoid unnecessary expense and stress, ***do not make any changes in the field to the approved plans without prior approval from the building department.***

Envelope Requirements

Oregon's Non-Residential Energy Code for the building envelope is based on prescriptive requirements. You can use the Prescriptive Path to show compliance with envelope requirements, or use the Simplified Trade-Off Approach or Whole Building Approach for more flexibility in building design.

The **Prescriptive Path** is easiest to use and accommodates nearly all building designs. The most common reason for not using the Prescriptive Path is that window areas exceed allowable limits or wall construction does not allow sufficient insulation.

If the building cannot meet Prescriptive Path requirements, the next step is to consider using the **Simplified Trade-Off Approach**, which allows you to trade off between building components. For example, increasing roof insulation may compensate for insulation in walls or windows lower than prescriptive levels. The Simplified Trade-Off Approach is not easy and requires use of the "CodeComp" computer program, available on the Energy Office Web site.

The **Whole Building Approach** is rarely used because it is complex. It requires the applicant to model the interaction of all elements of the proposed building using the DOE 2.1E software.

Forms and Worksheets

Forms are a guide for you and a review tool for building jurisdictions. Code requirements are clearly displayed on code forms. The instructions included with the forms cover exceptions and other important information.

Worksheets give the plans examiner additional information about unique elements of your building. If you use U-factor values to show compliance of wall, floor or door insulation, you need to complete worksheets detailing how you calculated these values.

Getting a Permit

1 Make sure your building design complies with the energy code. Reading the Code Compliance Forms Manual is the easiest way to learn code requirements. Code compliance forms specify requirements for each building component. Take time to understand the basic requirements of the code before you finalize the building design.

2 Make sure your plans show compliance with the energy code. Your plans should describe construction of all building envelope components: walls, windows, doors, ceilings/roofs and floors. Describe components in enough detail to indicate that you meet requirements shown on the Prescriptive Path form. Describe construction *and* energy features for every component. Example building plans shown here illustrate how simple this can be.

3 Make sure you submit complete and accurate code compliance forms. If you are following the Prescriptive Path, you must submit these forms:

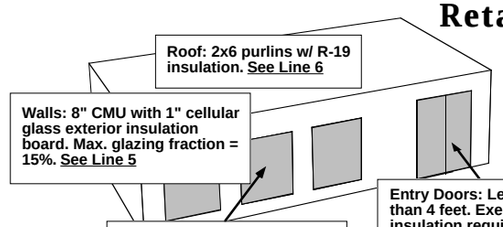
- Form 2a Summary
- Form 3a Building Envelope - General
- Form 3b Prescriptive Path - Zone 1 (shown at right)

If you use U-factors to show compliance, you must attach worksheets that show how U-factors were calculated. You also must complete all three forms if your building requires modification of mechanical or lighting systems.

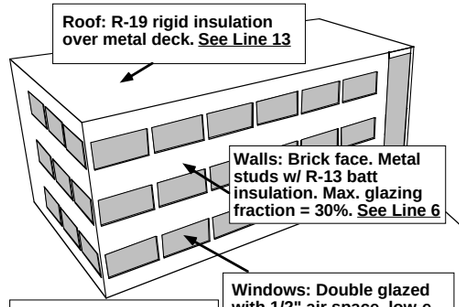
You'll get through the permit process faster if your plans and specifications clearly show component performance.

Example Buildings

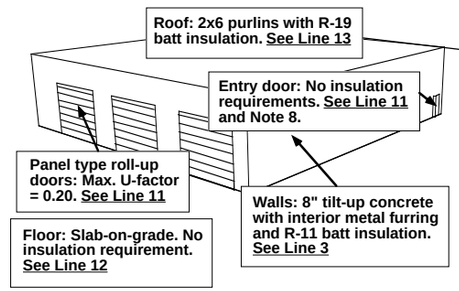
Retail



Office



Warehouse



Form 3b Project Name: Page:

PRESCRIPTIVE PATH – ZONE 1

Climate Zones

A building site is in Climate Zone 1 if its elevation is less than 3,000 ft above sea level and it is within one of the following counties: Benton, Columbia, Clackamas, Clatsop, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Yamhill, or Washington. Building sites not in Zone 1 are in Zone 2.

(a) Wall/Insulation Type	Proposed (b) Wall Area (ft²)	(c) Glazing Area (ft²)	(d) Glazing (%) (c)÷(b) x100	(e) Wall U-Factor	(f) Insul'n R-value		Code Requirements (g) Max % Glaz'g	(h) Max U-factor		(i) Min Insul'n R-value
1 Masonry[1], integral loose fill[2]							15%	0.30		na
2 Masonry[1], integral w/ rigid fill[3]							30%	0.21		na
3 Masonry or concrete[1] w/interior insulation							30%	0.13	or	11
4 Masonry or concrete[1] w/continuous exterior insulation							15%	0.30	or	1.4
5 Masonry or concrete[1] w/continuous exterior insulation							30%	0.21	or	2.8
6 Frame[4]							30%	0.13	or	13
7 Other							30%	0.13	or	13
8 Below-grade walls							na	0.11	or	7.5

Walls

See pp. 3-12 through 3-14 for a discussion of part of this form.

(a) Component	(b) Proposed: Proposed roof area (gross ft²)	Proposed skylight area (ft²)	Skylight fraction (%) (c)÷(b)x100	Proposed U-factor	(c) Code Requirements: Skylight percent (Max.)	Assembly U-factor (Max.)
9 Skylights Max. shading coefficient: 0.57 [7]					6%	1.23[5]

Skylights

See p. 3-14 for a discussion of skylights and glazed smoke vents.

(a) Component	(b) Proposed: U-factor	R-value	(d) Code Requirements: Max. U-factor of assembly		Min R-value of insulation only
10 Windows[6] Max. shading coefficient: 0.57 [7]			0.54		
11 Doors[8]			0.20		
12 Floors over unconditioned spaces			0.07	or	11
heated slab edge[9]					7.5
13 Roofs[10]			0.05	or	19
14 Glazed smoke vents			1.23	or	double-glazed[5]

Other Components

See pp. 3-15 through 3-16 for a discussion of this section of the form.

Notes

1 Minimum weight of masonry and concrete walls = 50 lb/ft² of wall face area.
2 All cores to be filled. At least 50 percent of cores must be filled with vermiculite or equivalent fill insulation.
3 All cores except bond beams must contain rigid insulation inserts approved for use in reinforced masonry walls.
4 Batt insulation installed in metal or wood frame walls shall be insulated to the full depth of the cavity, up to 6 inches in depth.
5 This value was set to allow a double-glazed skylight with a 0.5 inch air space with one pane tinted.
6 This value was set to allow a double-glazed window with a 0.5 inch air space, low-e coating (e 0.40). That window or any window with the same or better energy characteristics will meet the standard.
7 This is a center-of-glass value and can be met with a tinted outdoor pane. Vertical glazing for merchandise display is exempt from shading coefficient requirements.
8 The U-factor is a center of panel U-factor for an overhead door. The following doors are exempt: 1) entry/exit doors with a leaf width of 4 feet or less, and 2) overhead coil doors.
9 See p. 3-15 for a discussion of approved methods for installing slab-edge insulation for heated slabs-on-grade.
10 Opaque smoke vents are exempt from U-factor requirements.