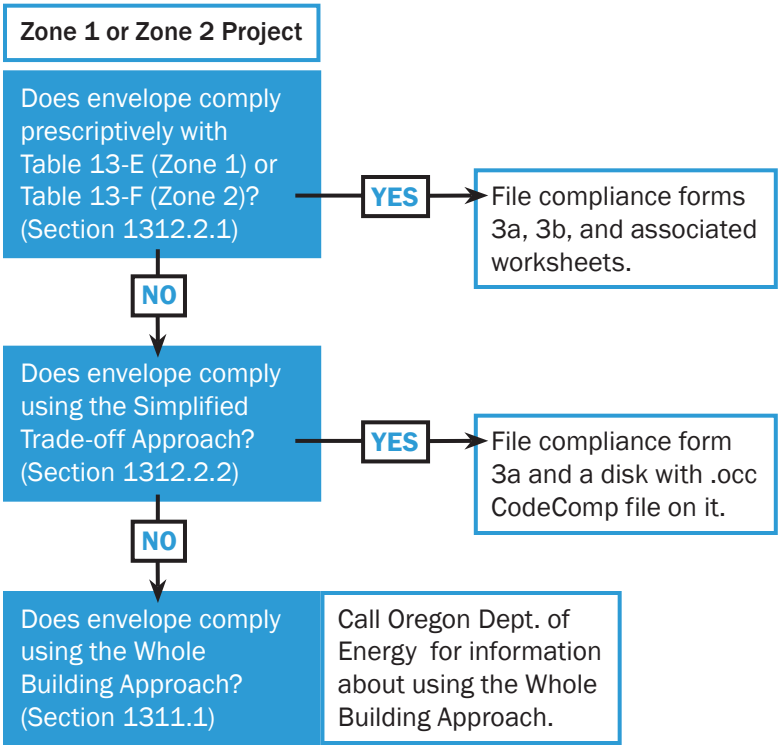
Oregon Non-Residential Building Energy Code

OREGON DEPARTMENT OF ENERGY

Envelope Compliance Approaches

Complying with Envelope Requirements

There are several methods of showing that building envelope components comply with the state's energy efficiency code as shown below.



Prescriptive Approach

The simplest is the prescriptive approach to compliance (1312.2.1), requiring buildings to meet minimum code requirements for walls, roofs, floors and windows/skylight insulation and efficiency.

This can be done by meeting R-value (for door, floors, roofs, and walls), or minimum assembly requirements for windows and skylights. If the envelope component does not meet these minimum requirements, calculate the U-factor by completing worksheets 3a through 3c, using values from tables 3a through 3d. Worksheets 3a through 3d are only necessary when using component U-factor to demonstrate compliance.

Simplified Trade-Off Approach

If your building does not meet these minimum code requirements,

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Code Language

1312.2.1 Prescriptive path approach. Buildings in Zone 1 shall meet the Prescriptive Path Approach if they comply with the values in Table 13-E. Buildings in Zone 2 shall meet the Prescriptive Path Approach if they comply with the values in Table 13-F. Each component (walls, roofs, etc.) shall meet either the U-factor standard for the assembly or the R-value standard for the insulation in the table.

Glazing and skylight fractions shall be calculated separately for conditioned spaces, semi-conditioned spaces, mechanical penthouses, and parking garages.

Documentation: To document compliance with this section of code, fill out Compliance Form 3a.

In addition:

- **Prescriptive Approach:** Form 3b with the appropriate associated worksheets.
- **Simplified Trade-Off Approach:** Submit a disk with the CodeComp file on it. This file can be found in the GDT\CodeComp\Project directory with an .occ file extension.
- **Whole Building Design Approach:** Call Oregon Dept. of Energy for information on complying via the Whole Building Design Approach.

Trade-offs between components or averaging of component U-factors is not allowed.

1312.2.2 Simplified trade-off approach. Buildings may demonstrate compliance with the thermal performance standards of this section by using the Simplified Trade-off Approach (STA). The STA is an analytical method to determine if a proposed building has no larger annual heating load through the exterior envelope and no larger annual cooling load through the exterior envelope than a similar building meeting the Prescriptive Path Approach.

1311.1 Alternate method of compliance using the whole building approach. Alternative building systems and equipment designs may be approved by the building official for other buildings. Applicants shall demonstrate that the whole building annual energy consumption will not exceed that used by a similar building using similar forms of energy designed in accordance with the prescriptive requirements of this chapter. Compliance under this section allows trade-offs between the performance requirements in all sections of this chapter using 8,760-hour annual building simulation. The building official may require review of the simulation results by an independent reviewer.

Examples

Q My design doesn't meet prescriptively, so I want to use one of the tradeoff approaches. Can I use the data from LEED modeling to demonstrate compliance via the STA or the WBA?

A No, the Oregon Energy Code has strict requirements for both of those two approaches that are different from the requirements of LEED and utility programs. STA requires the use of CodeComp, which can not used for LEED or incentive programs. WBA requires the use of DOE2.1E, which may be used for LEED or utility programs, but extensive modifications would be needed.

Q My building has a window-wall-ratio of 45%. (a) Can I use the STA by reducing interior lighting usage and daylighting? (b) Can I achieve compliance by reducing plug loads (installing more energy efficient office equipment)?

A (a) No. The STA only considers the heat gain and loss through the building envelope. The WBA is the only approach that can be used to demonstrate compliance in this case. (b) No. While the WBA allows tradeoffs between building envelope and other building components, reducing plug loads is not a component that would be eligible for tradeoffs.

Find Out More

Copies of Code:
Oregon Building Officials Association
phone: 503-873-1157 fax: 503-373-9389

Technical Support:
Oregon Department of Energy
625 Marion Street NE phone: 503-378-4040
Salem, OR 97301-3737 toll free: 800-221-8035
www.oregon.gov/energy fax: 503-373-7806

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Northwest Energy Efficiency Alliance
www.nwalliance.org

Photo on page 1 c/o Warren Gretz, DOE/NREL

12/05 ODOE CF-125/Fact Sheet 5

Non-residential code ENVELOPE fact sheets include:

- Envelope Compliance Approaches
- Fenestration Performance
- Walls
- Roofs

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you can use the Simplified Tradeoff Approach (STA) (1312.2.2), which takes into consideration the entire building's annual heating and cooling loads through the exterior envelope. This approach is generally used when a building has higher glazing percentages (usually higher than 30%–40% in Climate Zone 1 and 25%–30% in Climate Zone 2) or when not insulating walls (want protected durable surface). The STA allows tradeoffs between different components of the building envelope—for example, an increase in wall and roof insulation beyond the code minimum may offset the high heat loss and heat gain through buildings with high window-wall ratios. The STA uses a program called CodeComp that can be downloaded at: www.oregon.gov/energy/cons/codes/cdpub.shtml. If using the STA, you must turn in a disk with the .occ file on it along with Form 3b to show compliance.

Whole Building Approach

Finally, the Whole Building Approach (WBA) (1311.1) can be used to demonstrate compliance with building energy codes as well. The WBA differs from the STA in that it allows tradeoffs between almost all energy code-related components, including building envelope, lighting, and HVAC systems. This approach would be required for a building with an energy-inefficient shell that meets neither the prescriptive nor the simplified tradeoff approaches of compliance. An example would be a library that uses large amounts of glazing for daylighting. Through the WBA, the poor thermal performance of the building envelope could be traded off with other efficiency measures, such as reduced electric lighting and efficient heating and cooling systems. The WBA uses an hourly building energy simulation program (DOE-2.1E) to predict annual energy use. The building must use no more energy than a "baseline" reference building that minimally complies with Oregon prescriptive requirements. However, this approach is complex and rarely used. Before going down the path of complying via the WBA, you must contact the Oregon Deptartment of Energy for more information.

Additions and Alterations [1313.6]

Building envelope components (walls, roof, floor, windows, etc.) in additions to or alterations of existing buildings must comply with the envelope requirements of Section 1312, with several exceptions outlined in Section 1312.3. Exceptions to requirements for additions and alterations can be documented using any of the three compliance approaches described.

Examples

Q My building meets the prescriptive code requirements. But, can I still use CodeComp and the STA method of compliance if I want to?

A No, CodeComp should only be used if one or more components of your building don't meet prescriptive requirements.