



Update 1002

May 1988

WASHINGTON STATE RESIDENTIAL ENERGY CODE

This update will introduce you to the Washington State Energy Code (WSEC), discuss how it applies primarily to residential buildings in Washington, and tell you how you can learn more about it.

The Washington State Legislature first adopted a statewide energy code for residential buildings in 1977. It was then extended to nonresidential buildings two years later. All legal jurisdictions in Washington were required to adopt and enforce this code. The WSEC applies to all new, altered, or remodeled buildings that shelter people or provide facilities. It regulates the thermal efficiency of a building's envelope (that portion of the building shell that separates heated space from unheated space). It also regulates the building's heating, cooling, and ventilation systems, its water heating systems, and lighting. For all practical purposes there are no buildings that are exempt from the WSEC. However, certain special purpose buildings, such as hospitals and historical buildings, may be exempt from some requirements, to the extent necessary to perform their special functions.

Envelope Exemptions

Certain buildings are exempted from the envelope requirements of the WSEC. Those buildings that are unheated (kept below 50°F) and those buildings that use a non depletable energy source for heating and cooling are exempt. For example, a residence that is entirely heated by wood may be considered exempt from the envelope requirements by some code jurisdictions. However the other requirements of the WSEC still apply.

Climate Zones

The requirements of the WSEC are adjusted to reflect the effect of climate on energy use. The code recognizes two climate zones in the State. Zone 1 is the warmer of the two and includes those counties west of the Cascades and in the Columbia Basin. The Zone 2 counties are those that lie east of the Cascades (except for some warmer counties along the Columbia River.)

Fig. 1 TWO CLIMATE ZONES IN WASHINGTON STATE

ZONE 1		ZONE 2	
	Adams	Lincoln	Spokane
ALL	Ferry	Okanogan	Stevens
COUNTIES LESS THAN	Grant	Pend Orielle	Whitman
6000 DEGREE DAYS	Kittitas		

Fuel Type

The levels of energy efficiency required by the WSEC also vary depending upon the type of depletable fuel used. The code requirements are more stringent for buildings directly heated by electricity and less stringent for those heated by gas, oil, propane, or electric heat pumps.

Flexibility

Three alternate compliance paths were developed in order to allow a maximum of flexibility in meeting the WSEC requirements. In addition to meeting some general requirements one must choose to follow one of the three available paths. Each path is listed as a separate in the code:

- Prescriptive Path
- Component Performance Path
- Systems Analysis Path

Each path is described in more detail below.

General Requirements

The general requirements must be met regardless of the path chosen. They include such items as:

- Heating system size & performance limits
- Air leakage control measures
- Duct insulation
- Water heater efficiency
- Fireplace combustion air supply from outside
- Vapor retarders and crawlspace ground cover
- Methods for installation of insulation
- Requirements for testing of window U values

Prescriptive Path

The Prescriptive Path is the least complex path to follow as one simply follows a chosen menu of requirements. For each climate zone a number of menus is offered, depending upon the fuel type to be used. The different menus specify:

- Ceiling, wall, floor, and slab-on-grade R values.
Required amounts of insulation depend on the type of heating and the climate zone.
- Allowable window (glazing) U values.
In this path glazings are divided into groups of

"efficiency classes" depending on their ability to resist heat transfer. A minimum double glazing is required.

- Allowable glazing percentage.

The surface area of the glazing cannot exceed 21% of the heated floor area in Zone 1. It can't exceed 17% in zone 2. For example, a house with 1000 square feet of heated floor area would be allowed $1000 \times .21 = 210$ square feet in zone 1 or $1000 \times .17 = 170$ square feet of glass in zone 2.

- Combustion furnace efficiency.

The seasonal efficiency of gas, oil and propane furnaces must meet or exceed the level specified in the selected menu.

- Heat pump efficiency.

Seasonal efficiency of heat pumps is also specified. Acceptable heat pumps are divided into two "classes".

The value of the prescriptive path is that the required overall energy performance levels for a building can be met relatively simply; that is, without calculations. The prescriptive method is more stringent than the other paths. However, the intent of the different menus in the path is to allow more flexibility in attaining the required performance. For example, selection of a more efficient heating system will allow the use of the less efficient windows (or vice versa).

Component Performance

This compliance path increased flexibility in building design and materials, and increases the potential for reducing costs. It requires calculating the overall heat loss rate of the proposed building and comparing the result to the calculated overall heat loss rate that same building would have had if its components simply met the listed menu of requirements. As long as the proposed building's overall heat loss rate does not exceed what it would have under the listed menu, it complies with the code. Individual component efficiencies can be increased or decreased, as long as the net affect is acceptable. The calculations are reasonably straightforward and can be readily done with a pocket calculator, because the component performance path considers only the overall heat loss rate of a building. If you would like to learn how to do the necessary calculations, you can contact WEES for additional information.

Systems Analysis This is the most flexible compliance path but is also the most complex. The calculations require the use of a computer with appropriate software. The calculation procedure is similar to the component performance method in that the proposed building's performance must be equal to or better than it would have been had the listed menu for component efficiencies been followed. However much more than the heat loss rate of the building is calculated. Also calculated are energy gains from occupants, appliances, and sunlight. The effect of the particular climate in which the building is located must also be

incorporated, because the systems analysis path calculates the annual energy usage of the building.

System analysis offers the greatest potential for minimizing costs. Software programs for such analysis are also readily available, and some are relatively inexpensive. You must check with your local building jurisdiction to determine if a particular analysis program is acceptable and appropriate for the building you wish to build. For example the Washington State Energy Office sells a program, Wattsun, that is easy to learn and operate, and acceptable to a number of jurisdictions for residential analysis. You can learn about Wattsun and other available software by contacting WEES.

References

Washington Energy Extension Service

More detailed information about the WSEC can be obtained from WEES at 1-800-962-9731.

1986 Washington State Energy Code-\$3.50

Copies of the code can be purchased from your building department or from the Washington Association of Building Officials (WABO). The 2nd Edition is currently the correct copy.

WABO

P.O. Box 7310

Olympia, WA 98507

206-754-0825

WATTSUN Computer Software-\$65.00

Program disk, reference manual, and worksheets are available at cost.

Washington State Energy Office

809 Legion Way S.E.

Olympia, WA 98504-1211

206-586-5045

Written by: Mike Nuess

Washington Energy Extension Service, a Washington State Energy Office program, is funded by the Bonneville Power Administration and the U.S. Department of Energy.

You can obtain free copies of this and other publications by contacting the WEES office listed on page one of this document, or:

Energy Librarian

Washington State Energy Office

809 Legion Way S.E., FA-11

Olympia, WA 98504-1211

Any opinions, findings, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the BPA or U.S. DOE.