

**Department of Development and Environmental Services (DDES)**

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## Residential Energy Codes

DDES Customer  
Information Bulletin #**27****• FREQUENTLY ASKED QUESTIONS •**

**Visit the DDES Web site at  
[www.kingcounty.gov/permits](http://www.kingcounty.gov/permits)  
for more information**

King County DDES has created customer information bulletins to inform the general public about the effect of codes and regulations on their projects. These bulletins are not intended to be complete statements of all laws and rules and should not be used as substitutes for them. If conflicts and questions arise, current codes and regulations are final authority. Because the codes and regulations may be revised or amended at any time, consult King County staff to be sure you understand all requirements before beginning work. It is the applicant's responsibility to ensure that the project meets all requirements of applicable codes and regulations.

For alternate formats, call 206-296-6600.

This bulletin identifies energy and ventilation code requirements for residential (single and multiple family) construction. Proposed construction must comply with these requirements.

King County enforces the Washington State Energy Code (WSEC) and the Ventilation and Indoor Air Quality Code (VIAQC). [Refer to Chapter 19.27 of the Revised Code of Washington (RCW).] Residential construction in unincorporated King County must meet the requirements of these codes. This bulletin explains how the codes pertain to the construction of different components of single-family and multiple-family dwelling units.

Customers will need to provide information to DDES staff at the time of residential permit application, demonstrating how the proposed project will meet both the Energy Code (WSEC) and the Ventilation Code (VIAQC). King County DDES provides forms to help customers determine an individual plan for proposed projects. Commonly, customers complete the DDES Energy Residential Submittal Form. This form is a helpful tool to identify the most appropriate means for meeting compliance with pertinent Codes.

The Washington State Energy Code specifies that all glazing be tested and certified by the National Fenestration Rating Council (NFRC). Exceptions to this requirement are for untested glazing and glazing manufactured by small businesses. To determine the U-Factor for these products, use WSEC Table 10-6A for untested glazing, and Table 10-6B for the small manufacturers. These are specific values and cannot be calculated. Consequently, the choice of manufacturer and the type of window will have to be specified at the time of permit application.

Energy Code compliance depends upon installation of the correct windows. To avoid the need for costly window removal or replacement, property owners must specify windows at the time of permit application. A Window Schedule Form, available from the Department of Development and Environmental Services (DDES), must be submitted for all residential buildings, additions, and remodels. Remember that each window type will usually have a different U-Factor. Please complete all of the information requested in the glazing schedule.

## How do customers find Energy Code requirements?

The Washington State Energy Code contains multiple prescriptive paths, or options, for compliance under Chapter 6. There are two primary methods of complying with the Energy Code:

- **Prescriptive Method** - outlines specific insulative values with which a customer must comply; and
- **Component Performance Approach** - where the sum of the energy transmission of all of the components is less than or equal to a budget value determined for a specific project. (This refers to a budget value of energy transmission.)

Customers should use Table 6-1 in Chapter 6 of the WSEC to determine a path of Energy Code compliance. When and if a prescriptive path is chosen, the requirements can be found in the table. The paths are referred to by Option Number. The values shown in Table 6-1 of the WESC apply to single family and duplex residences. For buildings with more than two dwelling units, see Footnote 13 in Table 6-1, attached on page 3 of this bulletin. The following is an explanation of what each Option Number represents:

- Option I: Is based on the ratio of glazed area (area of window) to floor area, with a maximum ratio of 12%. This may be used for single or multiple family dwelling buildings.
- Option II: Is also based on the ratio of glazed area (area of window), with a maximum ratio of 15%. This may also be used for single or multiple family dwelling buildings.
- Option III/IV: Allow(s) for unlimited glazing (window surface).

Looking down the list on Table 6-1 found on page 3 of this bulletin, find the appropriate percentages for a proposed project to determine Option Numbers. Once property owners have chosen an Option Number, please refer to the following table for the various R-Values and U-Values for each of the common building elements. The Energy Code permits the inclusion of an area of noncomplying glass as long as the rest of the glass is sufficiently better than the Energy Code minimum to compensate for the loss of efficiency. King County DDES has a Glazing U-Value Average Calculation Form that may be used for this calculation.

## Windows

The only substitutions allowed by the Energy Code to Table 6-1 of the WESC is the U-Value averaging for glass. Forms and checklists designed to make a proposed application package as complete and correct as possible are available at King County DDES. Forms are available via the DDES Web site at [www.kingcounty.gov/permits](http://www.kingcounty.gov/permits), the DDES Customer Information Line at 206-296-6600 and in the DDES Permit Center in Renton, WA.

## What if a customer is not able to comply?

If none of the options are acceptable, consider the Component Performance. (See Chapter 5 of the WSEC.) The main advantage is flexibility to utilize individual R and U-Values as long as an overall maximum value is not exceeded. Note that the Component Performance requirements are no less stringent than the Prescriptive requirements. Calculations may be performed using a DDES form for calculating component performance. "Trade-Off" Forms are available directly from a Plans Examination Engineer at DDES, please contact the DDES Permit Center at 206-296-6600 for more information.

**Washington State Energy Code Chapter 6 Qualification Form**  
 (Found on the DDES Energy Residential Submittal Form: All Heat Types)

CHECK ✓One →	OPT I	OPT II *	OPT III/IV	Footnotes
	○	○	○	
Glazing Maximum				*Reference Case 0. Nominal R-values are for wood frame assemblies only or assemblies built in accordance with Section 601.1 1. Minimum requirements for each option listed. For example, if a proposed design has a glazing ratio to the conditioned floor area of 13%, it shall comply with all of the requirements of the 15% glazing option (or higher). Proposed designs which cannot meet the specific requirements of a listed option may calculate compliance by Chapter 4 or 5 of this (Energy) Code. 2. Requirement applies to all ceilings except single rafter or joist vaulted ceilings. 3. Requirement applicable only to single rafter or joist vaulted ceilings. 4. Below grade walls shall be insulated either on the exterior to a minimum level of R-10, or on the interior to the same level as walls above grade. Exterior insulation installed on below grade walls shall be a water resistant material, manufactured for its intended use, and installed according to the manufacturers specifications. See Section 602.2. 5. Floors over crawl spaces or exposed to ambient air conditions. 6. Required slab perimeter insulation shall be a water resistant material, manufactured for its intended use, and installed according to manufacturer's specifications. See Section 602.4 9. Doors, including all fire doors, shall be assigned default u-factors from Table 10-6C. 10. Where a maximum glazing area is listed, the total glazing area (combined vertical + overhead) as a percent of gross conditioned floor area shall be less than or equal to that value. Overhead glazing with U-factor or U=0.40 or less is not included in glazing area limitations. 11. Overhead glazing shall have U-factors determined in accordance with NFRC 100 or as specified in Section 502.1.5. 12. Log and solid timber walls with a minimum average thickness of 3.5" are exempt from this insulation requirement. 13. For Group R-1, the vertical glazing U-factor shall be 0.35 and walls below grade (interior) shall be R-15.
% of floor area <sup>10</sup>	12%	15%	Unlimited <sup>13</sup>	
Vertical Glazing U-Factor	0.35	0.40	0.40	
Overhead Glazing U-Factor <sup>11</sup>	0.58	0.58	0.58	
Door U-factor <sup>9</sup>	0.20	0.20	0.20	
(or R-factor)	(R-5)	(R-5)	(R-5)	
Ceilings:				
With attics <sup>2</sup>	R-38	R-38	R-38	
Vaulted <sup>3</sup>	R-30	R-30	R-30	
Walls:				
Above grade <sup>12</sup>	R-15	R-21	R-21	
Below grade <sup>4</sup>				
Interior or	R-15	R-21	R-21 <sup>13</sup>	
Exterior	R-10	R-10	R-10	
Floor: <sup>5</sup>	R-30	R-30	R-30	
Slab on grade: <sup>6</sup>	R-10	R-10	R-10	

## What specific construction techniques are required for compliance?

Construction techniques that are required in order to comply with the Washington State Energy Code are summarized below:

### Sealing

All penetrations into and through the insulated envelope must be caulked and sealed. This includes sealing all wire penetrations through plates, openings in electrical boxes located in exterior walls, the joint between the subfloor and the sill plate (and the rim joist in two-story construction), and all other such openings in the exterior envelope created by ductwork, vents, plumbing, etc.

More than one type of product may have to be used in some areas in order to comply with all energy codes. When sealing wires that penetrate wall plates, please note that the UBC requires that a fire-stop material, such as rock wool, be stuffed in the opening around the wire. However, fibrous insulation does not meet the air sealing requirements of the Energy Code. In this case, it would be necessary to seal additionally with a caulk or foam type product. Products are available that will do both jobs simultaneously.

### Face-stapled insulation

Batt insulation installed with staples in walls and roofs must be stapled to the face of the stud, joist, or rafter rather than inset-stapled as has been permitted in the past. Drywall installers will probably recommend installing the drywall with screws to avoid potential nail-popping and will not like to see bunching or folds in the backing/vapor retarder.

### Unfinished spaces

There are no exceptions that allow unfinished spaces in a heated area to be left uninsulated until the area is finished. All portions of the heated structure must be insulated, whether or not the area is finished. This may require the use of an FS-25 (Flamespread 25) backed insulation if any heated spaces intended to be left unfinished. Normally, FS-25 insulation is foil backed.

If customers have further questions about how to comply with the Washington State Energy Codes they may call DDES and speak with a Plans Examination Engineer at 206-296-6600. See the Additional Information section at the end of this bulletin for information about how to obtain a copy of the WSEC.

## How is indoor air quality ensured?

As customers insulate homes and make them more airtight, they save on energy bills, and make houses less subject to drafts and generally quieter and more comfortable. Energy-saving technology carries along with it the responsibility to ensure healthful indoor air quality. The Ventilation and Indoor Air Quality Code includes many provisions in response to this concern. Please refer to the King County DDES Web site for forms explaining the provisions and specific requirements at <http://www.kingcounty.gov/permits>. Key Washington State VIAQC provisions are listed below:

There are two categories of required ventilation:

1. Source Specific Ventilation (e.g. bathroom, kitchen); and
2. "Whole House Ventilation System" (Overall System For a Dwelling).

The following are methods for complying with Whole Home Ventilation Systems:

- A. System Engineering - Designed by an Engineer for a specific building and in compliance the Washington State Ventilation and Air Quality Code;
- B. Using Exhaust Fan System, (See DDES Form VIAQC2.);
- C. Integration With a Forced Air System, (See DDES Form VIAQC2.);
- D. Using a Supply Fan System, (See DDES Form VIAQC3.); and
- E. Using a Heat Recovery (Heat Exchanger) Ventilation System, (See DDES Form VIAQC5).

Note: Building additions with less than 500 square feet of conditioned floor area (heated space) are exempt from the provisions for whole house ventilation systems, but must still provide spot ventilation systems.

More details regarding these provisions are available through the King County DDES Building Plan Review Section at 206-296-6600. If customers have further questions or needs for information about how to comply with the Washington State Ventilation and Indoor Air Quality Code, please call DDES staff, or speak with an Plans Examination Engineer at 206-296-6600.

### **Additional information**

The Washington State Energy Code and VIAQC may be purchased, for a nominal fee, from the Washington Association of Building Officials (Toll-free 1-888-664-9515 or 360-586-6725). Information is also available online at the State Building Code Council Web site <http://www/sbcc.wa.gov>.

The Energy Code can also be purchase or viewed on the Washington State Building Code Council Web site <http://www/sbcc.wa.gov>.

### **Other bulletins and telephone numbers that may be helpful**

Bulletin 1	Building and Development Permit Telephone Numbers
Bulletin 7	Obtaining a Mobile Home Permit
Bulletin 9	Obtaining a Residential Building Permit
Bulletin 9A	Express Processing For Small Projects
Bulletin 12	Residential Building Permit Process
Bulletin 21	Critical Areas Review

These and other DDES bulletins are available via the department Web site at [www.kingcounty.gov/permits](http://www.kingcounty.gov/permits).

206-296-6600 DDES customer service  
 360-586-6725 Washington State Association of Building Officials  
 1-888-664-9515  
 (Toll-Free)

360-725-2966 State of Washington, Building Code Council

Additional Forms:

Energy Residential Submittal forms: All Heat Types



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King County complies with the Americans with Disabilities Act (ADA). If you require an accommodation to attend a meeting (two weeks' notice) or require this information in Braille, audiocassette, or large print, please call 206-296-6600 or TTY 206-296-7217.