

CHAPTER 3 [RE]

GENERAL REQUIREMENTS

User note:

About this chapter: Chapter 3 covers general regulations for energy conservation features of buildings. The climate zone for a building is established by geographic location tables and figures in this chapter.

SECTION R301 CLIMATE ZONES

R301.1 General. Climate zones from Table R301.1 shall be used in determining the applicable requirements from Chapter 4.

**TABLE R301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY**

Key: A – Moist, B – Dry, C – Marine.
Absence of moisture designation indicates moisture regime is irrelevant.

WASHINGTON

| | |
|-----------------|-----------------|
| 5B Adams | 4C Lewis |
| 5B Asotin | 5B Lincoln |
| 5B Benton | 4C Mason |
| 5B Chelan | 5B Okanogan |
| 4C Clallam | 4C Pacific |
| 4C Clark | 5B Pend Oreille |
| 5B Columbia | 4C Pierce |
| 4C Cowlitz | 4C San Juan |
| 5B Douglas | 4C Skagit |
| 6B Ferry | 5B Skamania |
| 5B Franklin | 4C Snohomish |
| 5B Garfield | 5B Spokane |
| 5B Grant | 5B Stevens |
| 4C Grays Harbor | 4C Thurston |
| 4C Island | 4C Wahkiakum |
| 4C Jefferson | 5B Walla Walla |
| 4C King | 4C Whatcom |
| 4C Kitsap | 5B Whitman |
| 5B Kittitas | 5B Yakima |
| 5B Klickitat | |

SECTION R302 DESIGN CONDITIONS

R302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

R302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be selected from Appendix C.

**SECTION R303
MATERIALS, SYSTEMS AND EQUIPMENT**

R303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

R303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the *R*-value shall be labeled on the product’s package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Exception: For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code* or Table R906.2 of the *International Residential Code*.

R303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height.

Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

R303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer’s *R*-value mark is readily observable upon inspection.

R303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100.

Exception: Where required, garage door *U*-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table R303.1.3(1), R303.1.3(2) or R303.1.3(4). The solar heat gain coefficient (SHGC) and visible transmittance (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table R303.1.3(3).

Exceptions:

1. Units without NFRC ratings produced by a *small business* may be assigned default *U*-factors from Table R303.1.3(5) for vertical fenestration.
2. Owner-built, nonoperable wood frame window consisting of a double pane unit with low-*e* (*E*=0.04 or less), 1/2-inch airspace with argon fill.

**TABLE R303.1.3(1)
DEFAULT GLAZED WINDOW, GLASS DOOR AND SKYLIGHT *U*-FACTOR**

| FRAME TYPE | WINDOW AND GLASS DOOR | | SKYLIGHT |
|---------------------------------------|-----------------------|-------------|-----------------------|
| | SINGLE PANE | DOUBLE PANE | |
| Metal | 1.20 | 0.80 | See Table R303.1.3(4) |
| Metal with Thermal Break ^a | 1.10 | 0.65 | |
| Nonmetal or Metal Clad | 0.95 | 0.55 | |
| Glazed Block | 0.60 | | |

a. Metal Thermal Break = A metal thermal break framed window shall incorporate the following minimum design characteristics:

1. The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;
2. The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
3. All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in (a)(1) and (2) above.

**TABLE R303.1.3(2)
DEFAULT OPAQUE DOOR U-FACTORS**

| DOOR TYPE | NO GLAZED FENESTRATION | SINGLE GLAZING | DOUBLE GLAZING WITH 1/4 IN. AIRSPACE | DOUBLE GLAZING WITH 1/2 IN. AIRSPACE | DOUBLE GLAZING WITH e=0.10, 1/2 IN. ARGON |
|---|------------------------|----------------|--------------------------------------|--------------------------------------|---|
| SWINGING DOORS (Rough opening – 38 in. x 82 in.) | | | | | |
| Slab Doors | | | | | |
| Wood slab in wood frame ^a | 0.46 | | | | |
| 6% glazed fenestration (22 in. x 8 in. lite) | – | 0.48 | 0.47 | 0.46 | 0.44 |
| 25% glazed fenestration (22 in. x 36 in. lite) | – | 0.58 | 0.48 | 0.46 | 0.42 |
| 45% glazed fenestration (22 in. x 64 in. lite) | – | 0.69 | 0.49 | 0.46 | 0.39 |
| More than 50% glazed fenestration | Use Table R303.1.3(1) | | | | |
| Insulated steel slab with wood edge in wood frame ^a | 0.16 | | | | |
| 6% glazed fenestration (22 in. x 8 in. lite) | – | 0.21 | 0.20 | 0.19 | 0.18 |
| 25% glazed fenestration (22 in. x 36 in. lite) | – | 0.39 | 0.28 | 0.26 | 0.23 |
| 45% glazed fenestration (22 in. x 64 in. lite) | – | 0.58 | 0.38 | 0.35 | 0.26 |
| More than 50% g glazed fenestration | Use Table R303.1.3(1) | | | | |
| Foam insulated steel slab with metal edge in steel frame ^b | 0.37 | | | | |
| 6% glazed fenestration (22 in. x 8 in. lite) | – | 0.44 | 0.42 | 0.41 | 0.39 |
| 25% glazed fenestration (22 in. x 36 in. lite) | – | 0.55 | 0.50 | 0.48 | 0.44 |
| 45% glazed fenestration (22 in. x 64 in. lite) | – | 0.71 | 0.59 | 0.56 | 0.48 |
| More than 50% glazed fenestration | Use Table R303.1.3(1) | | | | |
| Cardboard honeycomb slab with metal edge in steel frame ^b | 0.61 | | | | |
| Style and Rail Doors | | | | | |
| Sliding glass doors/French doors | Use Table R303.1.3(1) | | | | |
| Site-Assembled Style and Rail Doors | | | | | |
| Aluminum in aluminum frame | – | 1.32 | 0.99 | 0.93 | 0.79 |
| Aluminum in aluminum frame with thermal break | – | 1.13 | 0.80 | 0.74 | 0.63 |

Note: Appendix A Tables A107.1(2) through A107.1(4) may also be used if applicable.

- a. Thermally broken sill (add 0.03 for nonthermally broken sill).
- b. Nonthermally broken sill.

**TABLE R303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC AND VT**

| | SINGLE GLAZED | | DOUBLE GLAZED | | GLAZED BLOCK |
|-------------|---------------|--------|---------------|--------|--------------|
| | CLEAR | TINTED | CLEAR | TINTED | |
| SHGC | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 |
| VT | 0.6 | 0.3 | 0.6 | 0.3 | 0.6 |

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TABLE R303.1.3(4)
DEFAULT U-FACTORS FOR SKYLIGHTS

| FENESTRATION TYPE | FRAME TYPE | | | |
|--|--------------------------------|-----------------------------|--|---|
| | ALUMINUM WITHOUT THERMAL BREAK | ALUMINUM WITH THERMAL BREAK | REINFORCED VINYL/ALUMINUM-CLAD WOOD OR VINYL | WOOD OR VINYL-CLAD WOOD/VINYL WITHOUT REINFORCING |
| Single Glazing glass | U-1.58 | U-1.51 | U-1.40 | U-1.18 |
| acrylic/polycarb | U-1.52 | U-1.45 | U-1.34 | U-1.11 |
| Double Glazing air | U-1.05 | U-0.89 | U-0.84 | U-0.67 |
| argon | U-1.02 | U-0.86 | U-0.80 | U-0.64 |
| Double Glazing, $e=0.20$ air | U-0.96 | U-0.80 | U-0.75 | U-0.59 |
| argon | U-0.91 | U-0.75 | U-0.70 | U-0.54 |
| Double Glazing, $e=0.10$ air | U-0.94 | U-0.79 | U-0.74 | U-0.58 |
| argon | U-0.89 | U-0.73 | U-0.68 | U-0.52 |
| Double Glazing, $e=0.05$ air | U-0.93 | U-0.78 | U-0.73 | U-0.56 |
| argon | U-0.87 | U-0.71 | U-0.66 | U-0.50 |
| Triple Glazing air | U-0.90 | U-0.70 | U-0.67 | U-0.51 |
| argon | U-0.87 | U-0.69 | U-0.64 | U-0.48 |
| Triple Glazing, $e=0.20$ air | U-0.86 | U-0.68 | U-0.63 | U-0.47 |
| argon | U-0.82 | U-0.63 | U-0.59 | U-0.43 |
| Triple Glazing, $e=0.20$ on 2 surfaces air | U-0.82 | U-0.64 | U-0.60 | U-0.44 |
| argon | U-0.79 | U-0.60 | U-0.56 | U-0.40 |
| Triple Glazing, $e=0.10$ on 2 surfaces air | U-0.81 | U-0.62 | U-0.58 | U-0.42 |
| argon | U-0.77 | U-0.58 | U-0.54 | U-0.38 |
| Quadruple Glazing, $e=0.10$ on 2 surfaces air | U-0.78 | U-0.59 | U-0.55 | U-0.39 |
| argon | U-0.74 | U-0.56 | U-0.52 | U-0.36 |
| krypton | U-0.70 | U-0.52 | U-0.48 | U-0.32 |

Notes for Table R303.1.3(4)

1. U-factors are applicable to both glass and plastic, flat and domed units, all spacers and gaps.
2. Emissivities shall be less than or equal to the value specified.
3. Gap fill shall be assumed to be air unless there is a minimum of 90% argon or krypton.
4. Aluminum frame with thermal break is as defined in footnote 1 to Table R303.1.3(1).

TABLE R303.1.3(5)
SMALL BUSINESS COMPLIANCE TABLE
DEFAULT U-FACTORS FOR VERTICAL FENESTRATION

| VERTICAL FENESTRATION DESCRIPTION | | | | FRAME TYPE | | |
|-----------------------------------|--------------------|------------------|-------|------------|-------------------------------------|-------------------------------|
| PANES | LOW-e ¹ | SPACER | FILL | ANY FRAME | ALUMINUM THERMAL BREAK ² | WOOD/VINYL/FIBERGLASS |
| Double ³ | A | Any | Argon | 0.48 | 0.41 | 0.32 |
| | B | Any | Argon | 0.46 | 0.39 | 0.30 |
| | C | Any | Argon | 0.44 | 0.37 | 0.28 |
| | C | High Performance | Argon | 0.42 | 0.35 | Deemed to comply ⁵ |
| Triple ⁴ | A | Any | Air | 0.50 | 0.44 | 0.26 |
| | B | Any | Air | 0.45 | 0.39 | 0.22 |
| | C | Any | Air | 0.41 | 0.34 | 0.20 |
| | Any double low-e | Any | Air | 0.35 | 0.32 | 0.18 |

- a. Low-eA (emissivity) shall be 0.24 to 0.16.
 Low-eB (emissivity) shall be 0.15 to 0.08.
 Low-eC (emissivity) shall be 0.07 or less.
- b. Aluminum Thermal Break = An aluminum thermal break framed window shall incorporate the following minimum design characteristics:
1. The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;
 2. The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
 3. All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in (a)(1) and (2) above.
- c. A minimum air space of 0.375 inches between panes of glass is required for double glazing.
- d. A minimum air space of 0.25 inches between panes of glass is required for triple glazing.
- e. Deemed to comply glazing shall not be used for performance compliance.

R303.1.4 Insulation product rating. The thermal resistance, *R*-value, of insulation shall be determined in accordance with Part 460 of US-FTC CFR Title 16 in units of $h \cdot ft^2 \cdot ^\circ F/Btu$ at a mean temperature of 75°F (24°C).

R303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (C.F.R. Title 16, Part 460) in units of $h \times ft^2 \times ^\circ F/Btu$ at a mean temperature of 75°F (24°C).

R303.1.4.1 Insulated siding. The thermal resistance (*R*-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

R303.1.4.1 Insulated siding. The thermal resistance, *R*-value, of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's instructions.

R303.2 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the *International Building Code* or *International Residential Code*, as applicable.

R303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

R303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily *accessible* label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.