# Chapter 51-11R WAC <br> STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE ((2018)) 2021 EDITION OF THE INTERNATIONAL ENERGY CONSERVATION CODE, RESIDENTIAL 

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-10100 Section R101—Scope and general requirements.

R101.1 Title. This code shall be known as the Washington State Energy Code-Residential, and shall be cited as such. It is referred to herein as "this code."

The 2021 edition of the Washington State Energy Code is hereby adopted. The Washington State Energy Code adopted under chapter 51-11R WAC shall become effective in all counties and cities of this state on ((July 1, 2023)) March 15, 2024.

R101.2 Scope. This code applies to residential buildings and the buildings sites and associated systems and equipment. This code shall be the maximum and minimum energy code for residential construction in each town, city and county. Residential sleeping units, Group I-1, Condition 2 assisted living facilities licensed by Washington state under chapter 388-78A WAC and Group I-1, Condition 2 residential treatment facilities licensed by Washington state under chapter 246337 WAC shall utilize the commercial building sections of the energy code regardless of the number of stories of height above grade plane. R101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or 10/10/2023 09:49 AM [ 1 ] NOT FOR FILING OTS-5010.1
other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

R101.4.1 Mixed residential and commercial buildings. Where a building includes both residential building and commercial building portions, each portion shall be separately considered and meet the applicable provisions of the WSEC - Commercial or WSEC - Residential Provisions.

R101.5 Compliance. Residential buildings shall meet the provisions of WSEC - Residential Provisions. Commercial buildings shall meet the provisions of WSEC - Commercial Provisions.

R101.5.1 Compliance materials. The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R10100, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-10100, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, and chapters 19.27, 19.27A, and 34.05 RCW. WSR 17-17-160, § 51-11R-10100, filed 8/23/17, effective 10/1/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-10100, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R10100, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-10400 Section R104-Fees. R104.1 Fees. A permit shall not be issued until the fees prescribed in Section ((R107.2))

R104.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

R104.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

R104.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the code official, which shall be in addition to the required permit fees.

R104.4 Related fees. The payment of the fee for the construction, alteration, removal, or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

R104.5 Refunds. The code official is authorized to establish a refund policy.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R10400, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-10400, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, §51-11R-10400, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-10400, filed 5/2/17, effective 6/2/17; WSR 16-02127, § 51-11R-10400, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-10400, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-10500 Section R105-Inspections. R105.1 General.

Construction or work for which a permit is required shall be subject to inspection by the code official or his or her designated agent, and such construction or work shall remain visible and able to be accessed for inspection purposes until approved. It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes. Neither the code official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

R105.2 Required inspections. The code official or his or her designated agent, upon notification, shall make the inspections set forth in Sections ((R104.2.1 through R104.2.5)) R105.2.1 through R105.2.5.

R105.2.1 Footing and foundation inspection. Inspections associated with footings and foundations shall verify compliance with the code as to $R$-value, location, thickness, depth of burial and protection of insulation as required by the code and approved plans and specifications.

R105.2.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding $R$-values and their correct location and proper installation; fenestration properties (U-factor and SHGC) and proper installation; and air leakage controls as required by the code and approved plans and specifications.

R105.2.2.1 Wall insulation inspection. The code official, upon notification, shall make a wall insulation inspection in addition to those inspections required in Section R109 of the International Residential Code. This inspection shall be made after all wall and cavity insulation is in place and prior to cover.

R105.2.3 Plumbing rough-in inspection. Inspections at plumbing roughin shall verify compliance as required by the code and approved plans and specifications as to types of insulation and corresponding $R-$ values and protection, and required controls.

R105.2.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and approved plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding $R$-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation and minimum fan efficiency.

EXCEPTION: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.2.4.
R105.2.5 Final inspection. The building shall have a final inspection and not be occupied until approved.

R105.3 Reinspection. A building shall be reinspected when determined necessary by the code official.

R105.4 Approved inspection agencies. The code official is authorized to accept reports of third-party inspection agencies not affiliated with the building design or construction, provided such agencies are approved as to qualifications and reliability relevant to the building components and systems they are inspecting.

R105.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the code official when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R105.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the code official for inspection and testing.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R10500, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-10500, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-10800 Section R108-Referenced standards. R108.1

Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter ((5)) $\underline{6}$, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections ((R106.1.1 and R106.1.2)) R108.1.1 and R108.1.2.

R108.1.1 Conflicts. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

R108.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

R108.2 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section, or provision of this code.

R108.3 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law. In addition to the requirements of this code, all occupancies shall conform to the provisions included in the state building code (chapter 19.27 RCW ). In
case of conflicts among codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following. In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the International Mechanical Code, the duct insulation requirements of this code shall govern. [Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R10800, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-10800, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-10800, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-20201 Section R202.1-A. ABove-GRADE wall. A wall
enclosing conditioned space that is not a below-grade wall. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.
access (то). That which enables a device, appliance, or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction.
addrtion. An extension or increase in the conditioned space floor area, number of stories or height of a building or structure.
advanced framed walls. Studs framed on 24 -inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header. Headers consist of double $2 x$ material with $R-10$ insulation between the header and exterior sheathing. Interior partition wall/exterior wall
intersections are fully insulated in the exterior wall. (See Standard
Framing and Appendix $A(($, of this code) ) of chapter 51-11C WAC.)
air barrier. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.
alteration. Any construction, retrofit or renovation to an existing structure other than repair or addition. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.
Approved. Acceptable to the code official.
approved agency. An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification, where such agency has been approved by the code official.
automatic. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R20201, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-20201, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-20201, filed $1 / 6 / 16$, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-20201, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 13-04-055, filed 2/1/13, effective 7/1/13)

WAC 51-11R-30200 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 $72^{\circ} \mathrm{F}$ $\left(22^{\circ} \mathrm{C}\right)$ for heating and minimum of $75^{\circ} \mathrm{F}\left(24^{\circ} \mathrm{C}\right)$ for cooling.

R302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be selected from Appendix $\underline{R} C$.
[Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-30200, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 20-01-047, filed 12/9/19, effective 7/1/20)

WAC 51-11R-30312 Table R303.1.3(2)-Default opaque door $U$ factors.

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

| Door Type | No Glazed Fenestration | Single Glazing | Double <br> Glazing with $1 / 4$ in. Airspace | Double <br> Glazing <br> with $1 / 2$ <br> in. <br> Airspace | Double Glazing with $\mathrm{e}=\mathbf{0 . 1 0}$, 1/2 in. Argon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| SWINGING DOORS (Rough opening - 38 in. $\times 82$ in.) |  |  |  |  |  |
| Slab Doors |  |  |  |  |  |
| Wood slab in wood frame ${ }^{\text {a }}$ | 0.46 |  |  |  |  |
| $6 \%$ glazed fenestration (22 in. x 8 in. lite) | - | 0.48 | 0.47 | 0.46 | 0.44 |
| $25 \%$ glazed fenestration (22 <br> in. x 36 in. lite) | - | 0.58 | 0.48 | 0.46 | 0.42 |
| $45 \%$ glazed fenestration (22 <br> 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 ${ }^{\text {a }}$ | 0.16 |  |  |  |  |
| $6 \%$ glazed fenestration (22 in. x 8 in. lite) | - | 0.21 | 0.20 | 0.19 | 0.18 |
| $25 \%$ glazed fenestration (22 <br> in. x 36 in. lite) | - | 0.39 | 0.28 | 0.26 | 0.23 |


| Door Type | No Glazed Fenestration | Single Glazing | Double <br> Glazing with $1 / 4$ in. Airspace | Double <br> Glazing <br> with $1 / 2$ <br> in. <br> Airspace | Double <br> Glazing with $\mathrm{e}=\mathbf{0 . 1 0}$ <br> 1/2 in. <br> Argon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 45\% glazed fenestration (22 in. x 64 in. lite) | - | 0.58 | 0.38 | 0.35 | 0.26 |
| More than 50\% glazed fenestration | Use Table R303.1.3(1) |  |  |  |  |
| Foam insulated steel slab with metal edge in steel frame ${ }^{\text {b }}$ | 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 ${ }^{\text {b }}$ | 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) of chapter 51-11C WAC may also be used if applicable.
a Thermally broken sill (add 0.03 for nonthermally broken sill).
b Nonthermally broken sill.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-30312, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27.020, and 19.27.074. WSR 14-24-123, §51-11R-30312, filed 12/3/14, effective 1/3/15. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R30312, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40210 Section R402.1-General. R402.1 General. The building thermal envelope shall meet the requirements of Sections R402.1.1 through R402.1.6.

EXCEPTION: The following buildings, or portions thereof, separated from the remainder of the building by building thermal envelope assemblies complying with this code shall be exempt from the building thermal envelope provisions of this code.

1. Those with a peak design rate of energy usage less than $3.4 \mathrm{Btu} / \mathrm{hft}^{2}\left(10.7 \mathrm{~W} / \mathrm{m}^{2}\right)$ or $1.0 \mathrm{watt} / \mathrm{ft}^{2}$ of floor area for space conditioning purposes.
2. Those that do not contain conditioned space.
3. Greenhouses isolated from any conditioned space and not intended for occupancy.

R402.1.1 Vapor retarder. Wall assemblies in the building thermal envelope shall comply with the vapor retarder requirements of Section R702.7 of the International Residential Code or Section ((1405.3)) 1404.3 of the International Building Code, as applicable.

R402.1.2 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Table R402.1.2 based on the climate zone specified in Chapter 3. Assemblies shall have a U-factor equal to or less than that specified in Table R402.1.2. Fenestration shall have a U-factor equal to or less than specified in Table R402.1.2.

R402.1.3 R-value alternative. Assemblies with $R$-value of insulation materials equal to or greater than that specified in Table R402.1.3 shall be an alternative to the U-factor in Table R402.1.2.

R402.1.4 R-value computation. Cavity insulation alone shall be used to determine compliance with the cavity insulation $R$-value requirement in Table R402.1.3. Where cavity insulation is installed in multiple layers, the $R$-values of the cavity insulation layers shall be summed to determine compliance with the cavity insulation $R$-value requirements. The manufacturer's settled $R$-value shall be used for blown insulation. Continuous insulation (ci) alone shall be used to determine compliance with the continuous insulation $R$-value requirements in Table R402.1.3. Where continuous insulation is installed in multiple layers, the $R$-values of the continuous insulation layers shall be summed to determine compliance with the continuous insulation $R$-value requirements. Computed $R$-values shall 10/10/2023 09:49 AM [ 11 ] NOT FOR FILING OTS-5010.1
not include an $R$-value for other building materials or air films. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.3, the manufacturer's labeled $R$-value for insulated siding shall be reduced by $R-0.6$.

R402.1.5 Total UA alternative. If the proposed building thermal envelope UA is less than or equal to the target UA, the building shall be considered in compliance with Table R402.1.2. The proposed UA shall be calculated in accordance with Equation 2. The target UA shall be calculated in accordance with Equation 1. U-factors shall be determined as specified in Section R402.1.6. In addition to UA compliance, the maximum fenestration U-factors of Section R402.5 shall be met.

R402.1.6 U-factor reference and calculations. The U-factors for typical construction assemblies are included in Appendix A in chapter 51-11C WAC. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Appendix $A$, values shall be calculated in accordance with the ASHRAE Handbook of Fundamentals using the framing factors listed in Appendix A where applicable and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

Fenestration U-factors shall comply with Section R303.1.3, Fenestration product rating.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40210, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40210, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-40210, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160,
and 19.27.074. WSR 16-02-127, § 51-11R-40210, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40210, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40211 Table R402.1.2-Insulation and fenestration requirements by component.

## TABLE R402.1.2

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT ${ }^{\text {a }}$

| CLIMATE ZONE 5 AND MARINE 4 |  |
| :--- | :---: |
| Fenestration $U$-factor ${ }^{b}$ | 0.30 |
| Skylight $U$-factor | 0.50 |
| Ceiling $U$-factor | 0.024 |
| Above-Grade Wall $U$-factor | $((0.056))$ |
|  | $\underline{0.045} 0.056$ |
| Floor $U$-factor | 0.029 |
| Slab on Grade $F$-factor | 0.54 |
| Below Grade 2' Depth | 0.042 |
| Wall $U$-factor | 0.59 |
| Slab $F$-factor |  |
| Below Grade 3.5' Depth | 0.040 |
| Wall $U$-factor | 0.56 |
| Slab $F$-factor |  |
| Below Grade 7' Depth | 0.035 |
| Wall $U$-factor | 0.50 |
| Slab $F$-factor |  |

a $U$-factors or $F$-factors shall be obtained from measurement, calculation, or an approved source or as specified in Section R402.1.5.
b A maximum $U$-factor of 0.32 shall apply to vertical fenestration products installed in buildings located above 4000 feet in elevation above sea level, or in windborne debris regions where protection of openings is required under Section R301.2.1.2 of the International Residential Code.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R-

40211, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40211, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-40211, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40211, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.025, 19.27A.045, and 19.27.074. WSR 13-20-121, § 51-11R-40211, filed 10/1/13, effective 11/1/13. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40211, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-40213 Table R402.1.3-Insulation minimum $R$-values and fenestration requirements by components.

TABLE R402.1.3
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENTS ${ }^{a}$

| Climate Zone 5 and Marine 4 |  |
| :---: | :---: |
| Fenestration ${ }^{\text {b,j }} \boldsymbol{U}$-Factor | 0.30 |
| Skylight ${ }^{\boldsymbol{b}} \boldsymbol{U}$-Factor | 0.50 |
| Ceiling ${ }^{\text {e }}$-Value | 60 |
| Wood Frame Walls ${ }^{\text {g, }} \boldsymbol{R}$-Value | $20+5$ or $13+10$ |
| Floor $\boldsymbol{R}$-Value | 30 |
| Below-Grade Wall ${ }^{\text {c, }} \boldsymbol{R} \boldsymbol{R}$-Value | 10/15/21 int + 5TB |
| Slab ${ }^{\text {d,f, }} \boldsymbol{R}$-Value and Depth | $10,4 \mathrm{ft}$. |

For SI: $\quad 1$ foot $=304.8 \mathrm{~mm}, \mathrm{ci}=$ continuous insulation, int $=$ intermediate framing.
${ }^{\text {a }} R$-values are minimums. $U$-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the compressed $R$-value of the insulation from Appendix A Table A101.4 of chapter 51-11C WAC shall not be less than the $R$-value specified in the table.
${ }^{\mathrm{b}}$ The fenestration $U$-factor column excludes skylights.
c "10/15/21+5TB" means R-10 continuous insulation on the exterior of the wall, or R-15 on the continuous insulation on the interior of the wall, or R-21 cavity insulation plus a thermal break between the slab and the basement wall at the interior of the basement wall. "10/15/21+5TB"
shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the wall. "TB" means R-5 thermal break between floor slab and basement wall.
${ }^{d} \mathrm{R}-10$ continuous insulation is required under heated slab on grade floors. See Section R402.2.9.1.
${ }^{\mathrm{e}}$ For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38 if the full insulation depth extends over the top plate of the exterior wall.
${ }^{\mathrm{f}}$ R-7.5 continuous insulation installed over an existing slab is deemed to be equivalent to the required perimeter slab insulation when applied to existing slabs complying with Section R503.1.1. If foam plastic is used, it shall meet the requirements for thermal barriers protecting foam plastics.
${ }^{\mathrm{g}}$ For $\log$ structures developed in compliance with Standard ICC 400, log walls shall meet the requirements for climate zone 5 of ICC 400.
${ }^{\mathrm{h}}$ Int. (intermediate framing) denotes framing and insulation as described in Section A103.2.2 including standard framing 16 inches on center, 78 percent of the wall cavity insulated and headers insulated with a minimum of $\mathrm{R}-10$ insulation.
${ }^{i}$ The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example " $13+10$ " means R-13 cavity insulation plus R-10 continuous insulation.
${ }^{\mathrm{j}}$ A maximum $U$-factor of 0.32 shall apply to vertical fenestration products installed in buildings located above 4000 feet in elevation above sea level, or in windborne debris regions where protection of openings is required under Section R301.2.1.2 of the International Residential Code.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, S 51-11R40213, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40213, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40213, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40213, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40230 Section R402.3-Fenestration. R402.3
Fenestration. In addition to the requirements of Section $R 402$, fenestration shall comply with Sections R402.3.1 through ((R402.3.5)) R402.3.6.

R402.3.1 U-factor. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements.

R402.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the $S H G C$ requirements.

R402.3.3 Glazed fenestration exemption. Up to 15 square feet (1.4 $\mathrm{m}^{2}$ ) of glazed fenestration per dwelling unit shall be permitted to be exempt from U-factor and SHGC requirements in Section R402.1.2. This exemption shall not apply to the total UA alternative in Section R402.1.5.

R402.3.4 Opaque door exemption. One side-hinged opaque door assembly up to 24 square feet ( $2.22 \mathrm{~m}^{2}$ ) in area is exempted from the U-factor requirement in Section R402.1.2. This exemption shall not apply to the total UA alternative in Section R402.1.5.

R402.3.5 Combustion air openings. ( (In Climate Zones 3 through 8, ) Where open combustion air ducts provide combustion air to open combustion, space conditioning fuel burning appliances, the appliances and combustion air openings shall be located outside of the building thermal envelope, or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.3, where the walls, floors, and ceilings shall meet the minimum of the below-grade wall $R$-value requirements. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R8.

EXCEPTIONS: 1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section ( ( s ) ) R402.3.6 of this code and Section R1006 of the International Residential Code.

R402.3.6 Fireplaces. New wood-burning fireplaces shall have tightfitting flue dampers or doors, and outdoor combustion air. When using tight-fitting doors on factory-built fireplaces listed and labeled in accordance with UL 127, the doors shall be tested and listed for the fireplace. Where using tight-fitting doors on masonry fireplaces, the doors shall be listed and labeled in accordance with UL 907. Gas fireplaces shall comply with the efficiency requirements in Section R403.7.2.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40230, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40230, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40230, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40230, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-40240 Section R402.4-Air leakage. R402.4 Air

leakage. The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through ((R402.4.5)) R402.4.4.

R402.4.1 Building thermal envelope air leakage. The building thermal envelope shall comply with Sections R402.4.1.1 through R402.4.1.3. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

R402.4.1.1 Installation. The components of the building thermal envelope as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the code official, an approved third party shall inspect all components and verify compliance.

R402.4.1.2 Testing. The building or dwelling unit shall be tested for air leakage. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827. Test pressure and leakage rate shall comply with Section R402.1.3. A written report of the test results, 10/10/2023 09:49 AM
[ 17 ] NOT FOR FILING OTS-5010.1
including verified location and time stamp of the date of the test, shall be signed by the testing agency and provided to the building owner and code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. Once visual inspection has confirmed air sealing has been conducted in accordance with Table R402.4.1.1, operable windows and doors manufactured by small business are permitted to be sealed off at the frame prior to the test.

Testing of single-family dwellings and townhouses shall be conducted in accordance with RESNET/ICC 380. Test pressure and leakage rate shall comply with Section R402.1.3.1.

For Group R-2 occupancies, testing shall be conducted in accordance with ASTM E779, ASTM E1827, or ASTM E3158. Test pressure and leakage rate shall comply with Section R402.1.3.2. The individual performing the air leakage test shall be trained and certified by a certification body that is, at the time of permit application, ((and)) an ISO 17024 accredited certification body including, but not limited to, the Air Barrier Association of America.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open;
4. Exterior or interior terminations for continuous ventilation systems and heat recovery ventilators shall be sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

EXCEPTION: Additions less than 500 square feet of conditioned floor area.
R402.4.1.3 Leakage rate. Detached one- and two-family dwelifings and multiple single-family dwellings (townhouses) shall comply with Section R402.4.1.3.1. Group R-2 multifamily buildings shall comply with Section R402.4.1.3.2.

R402.4.1.3.1 Dwelling unit leakage rate. The maximum air leakage rate for any dwelling unit under any compliance path shall not exceed 4.0 air changes per hour. Testing shall be conducted with a blower door test at a test pressure of 0.2 inches w.g. (50 Pa).

EXCEPTION: Additions tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing dwelling must be prior to the 2009 Washington State Energy Code.

R402.4.1.3.2 Group R-2 multifamily building leakage rate. For Group R2 multifamily buildings, the maximum leakage rate for any dwelling unit shall not exceed 0.25 cfm per square foot of the dwelling unit enclosure area. Testing shall be conducted with a blower door at a test pressure of 0.2 inches w.g. ( 50 Pa ). Doors and windows of adjacent dwelling units (including top and bottom units) shall be open to the outside during the test.
((R402.4.3)) R402.4.2 Air leakage of fenestration. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot ( $1.5 \mathrm{~L} / \mathrm{s} / \mathrm{m}^{2}$ ), and swinging doors no more than 0.5 cfm per square foot ( $2.6 \mathrm{~L} / \mathrm{s} / \mathrm{m}^{2}$ ), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

EXCEPTIONS: 1. Field-fabricated fenestration products (windows, skylights and doors).
2. Custom exterior fenestration products manufactured by a small business provided they meet the applicable provisions of Chapter 24 of the International Building Code. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by small business shall be permitted to be sealed off at the frame prior to the test.
((R402.4.5)) R402.4.3 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be Type IC-rated and certified
under ASTM E283 as having an air leakage rate not more than 2.0 cfm ( $0.944 \mathrm{~L} / \mathrm{s}$ ) when tested at a $1.57 \mathrm{psf}(75 \mathrm{~Pa})$ pressure differential and shall have a label attached showing compliance with this test method. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.
((R402.4.6)) R402.4.4 Electrical and communication outlet boxes (airsealed boxes). Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Electrical and communication outlet boxes shall be tested in accordance with NEMA OS 4, Requirements for Air-Sealed Boxes for Electrical and Communication Applications, and shall have an air leakage rate of not greater than 2.0 cubic feet per minute ( $0.944 \mathrm{~L} / \mathrm{s}$ ) at a pressure differential of 1.57 psf (75 Pa). Electrical and communication outlet boxes shall be marked "NEMA OS 4" or "OS 4" in accordance with NEMA OS 4. Electrical and communication outlet boxes shall be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with NEMA OS 4.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40240, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-40240, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, § 51-11R-40240, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40240, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27.020, and 19.27.074. WSR 14-24-123, § 51-11R-40240, filed 12/3/14, effective 1/3/15. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40240, filed 2/1/13, effective 7/1/13.]

WAC 51-11R-40241 Table R402.4.1.1-Air barrier and insulation installation.

TABLE R402.4.1.1
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION ${ }^{\text {a }}$

| COMPONENT | AIR BARRIER CRITERIA | INSULATION CRITERIA |
| :---: | :---: | :---: |
| General requirements | A continuous air barrier shall be installed in the building envelope. <br> Breaks or joints in the air barrier shall be sealed. | Air-permeable insulation shall not be used as a sealing material. |
| Cavity insulation installation |  | All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. <br> Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation. |
| Ceiling/attic | The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. <br> Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed. | The insulation in any dropped ceiling/soffit shall be aligned with the air barrier. <br> Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation. |
| Walls | The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed. | Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. |
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| COMPONENT | AIR BARRIER CRITERIA | INSULATION CRITERIA |
| :--- | :--- | :--- |
| $\begin{array}{l}\text { Windows, skylights } \\ \text { and doors }\end{array}$ | $\begin{array}{l}\text { The space between window/door jambs and } \\ \text { framing and skylights and framing shall be } \\ \text { sealed. }\end{array}$ | $\begin{array}{l}\text { Rim joists shall include an exterior air barrier }\end{array}$ |
| Rim joists | $\begin{array}{l}\text { The junctions of the rim board to the sill plate } \\ \text { and the rim board and the subfloor shall be air } \\ \text { sealed. }\end{array}$ | $\begin{array}{l}\text { Rim joists shall be insulated so that the } \\ \text { insulation maintains permanent contact with } \\ \text { the exterior rim board. }\end{array}$ |
| $\begin{array}{l}\text { Floors (including above } \\ \text { garage and cantilevered } \\ \text { floors) }\end{array}$ | $\begin{array}{l}\text { The air barrier shall be installed at any } \\ \text { exposed edge of insulation. }\end{array}$ | $\begin{array}{l}\text { Floor framing cavity insulation shall be } \\ \text { installed to maintain permanent contact with } \\ \text { the underside of subfloor decking or floor }\end{array}$ |
| framing cavity insulation shall be permitted to |  |  |
| be in contact with the topside of sheathing or |  |  |
| continuous insulation installed on the |  |  |\(\left.] \begin{array}{l}underside of floor framing and extend from <br>

the bottom to the top of all perimeter floor <br>
framing members.\end{array}\right\}\)

| COMPONENT | AIR BARRIER CRITERIA | INSULATION CRITERIA |
| :--- | :--- | :--- |
|  |  | readily conforms to available space shall <br> extend behind piping and wiring. Insulation <br> shall be installed to fill the available space and <br> surround wiring, plumbing, or other <br> obstructions, unless the required $R$-value can <br> be met by installing insulation and air barrier <br> systems completely to the exterior side of the <br> obstructions. |
| Shower/tub on exterior <br> wall | The air barrier installed at exterior walls <br> adjacent to showers and tubs shall separate the <br> wall from the showers and tubs. | Exterior walls adjacent to showers and tubs <br> shall be insulated. |
| Electrical/phone box on <br> exterior wall | The air barrier shall be installed behind <br> electrical or communication boxes or air <br> sealed boxes shall be installed. | HVAC supply and return register boots shall <br> be sealed to the subfloor, wall covering or <br> ceiling penetrated by the boot. |
| HVAC register boots | When required to be sealed, concealed fire <br> sprinklers shall only be sealed in a manner that <br> is recommended by the manufacturer. <br> Caulking or other adhesive sealants shall not <br> be used to fill voids between fire sprinkler <br> cover plates and walls or ceilings. |  |
| Concealed sprinklers | What |  |

IC $=$ insulation contact.
${ }^{\text {a }}$ In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.
${ }^{\mathrm{b}}$ Insulation installed in unconditioned/ventilated attic spaces is not required to be enclosed within an air barrier assembly.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and
chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40241, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory

Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27
RCW. WSR 20-01-047, § 51-11R-40241, filed 12/9/19, effective 7/1/20.
Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and
19.27.074. WSR 16-02-127, S 51-11R-40241, filed 1/6/16, effective

7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters
19.27 and 34.05 RCW. WSR 13-04-055, §51-11R-40241, filed 2/1/13,
effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40320 Section R403.3-Ducts. R403.3 Ducts. Ducts and air handlers shall be installed in accordance with Sections R403.3.1 through R403.3.7.

R403.3.1 Ducts located outside conditioned space. Supply and return ducts located outside conditioned space shall be insulated to ((and)) an $R$-value of not less than $R-8$ for ducts 3 inches ( 76 mm ) in diameter and larger and not less than $R-6$ for ducts smaller than 3 inches ( 76 $\mathrm{mm})$ in diameter. Ducts buried beneath a building shall be insulated as required per this section or have an equivalent thermal distribution efficiency. Ducts within a concrete slab or in the ground shall be insulated to $\mathrm{R}-10$ with insulation designed to be used below grade. Underground ducts utilizing the thermal distribution efficiency method shall be listed and labeled to indicate the R-value equivalency.

R403.3.2 Ducts located in conditioned space. For ducts to be considered as being located inside a conditioned space, such ducts shall comply with the following:

1. All duct systems shall be located completely within the continuous air barrier and within the building thermal envelope.
2. All heating, cooling, and ventilation system components shall be installed inside the conditioned space including, but not limited to, forced air ducts, hydronic piping, hydronic floor heating loops, convectors and radiators. Combustion equipment shall be direct vent or sealed combustion.
3. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts is permitted to be located outside the conditioned space, provided they are insulated to a minimum of $R-8$.
3.1. Metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic.
3.2. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool.
4. Ductwork in floor cavities located over unconditioned space shall comply with all of the following:
4.1. A continuous air barrier installed between unconditioned space and the duct.
4.2. Insulation installed in accordance with Section R402.2.7.
4.3. A minimum $R-19$ insulation installed in the cavity width separating the duct from unconditioned space.
5. Ductwork located within exterior walls of the building thermal envelope shall comply with the following:
5.1. A continuous air barrier installed between unconditioned space and the duct.
5.2. A minimum $R-10$ insulation installed in the cavity width separating the duct from unconditioned space.
5.3. The remainder of the cavity insulation shall be fully insulated to the drywall side.

R403.3.3 Ducts buried within ceiling insulation. Where supply and return air ducts are partially or completely buried in ceiling insulation, such ducts shall comply with all of the following:

1. The supply and return ducts shall have an insulation $R$-value not less than $\mathrm{R}-8$.
2. At all points along each duct, the sum of the ceiling insulation $R$-value against and above the top of the duct, and against and below the bottom of the duct, shall be not less than $R-19$, excluding the $R$-value of the duct insulation.

EXCEPTION: Sections of the supply duct that are less than 3 feet $(914 \mathrm{~mm})$ from the supply outlet shall not be required to comply with these requirements.

R403.3.3.1 Effective $R$-value of deeply buried ducts. Where using ( (z simulated energy performance analysis)) the total building performance compliance option in Section R405, sections of ducts that are:

Installed in accordance with Section R403.3.3; located directly on, or within 5.5 inches ( 140 mm ) of the ceiling; surrounded with blown-in attic insulation having an $R$-value of $R-30$ or greater and located such that the top of the duct is not less than 3.5 inches ( 89 mm ) below the 10/10/2023 09:49 AM

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top of the insulation, shall be considered as having an effective duct insulation $R$-value of $R-25$.

R403.3.4 Sealing. Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

EXCEPTIONS: 1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. For ducts having a static pressure classification of less than 2 inches of water column ( 500 Pa ), additional closure systems shall not be required for continuously welded joints and seams, and locking-type joints and seams of other than the snap-lock and button-lock types.
R403.3.4.1 Sealed air handler. Air handlers shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

R403.3.5 Duct testing. Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified.

EXCEPTION: A duct air leakage test shall not be required for ducts serving ventilation systems that are not integrated with the ducts serving heating or cooling systems.
A written report of the results shall be signed by the party conducting the test and provided to the code official.

R403.3.6 Duct leakage. The total leakage of the ducts, where measured in accordance with Section R403.3.3, shall be as follows:

1. Rough-in test: Total leakage shall be less than or equal to $4.0 \mathrm{cfm}(113.3 \mathrm{~L} / \mathrm{min})$ per 100 square feet ( $9.29 \mathrm{~m}^{2}$ ) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to $3.0 \mathrm{cfm}(85 \mathrm{~L} / \mathrm{min})$ per 100 square feet ( $9.29 \mathrm{~m}^{2}$ ) of conditioned floor area.
2. Postconstruction test: Leakage to outdoors shall be less than or equal to $4.0 \mathrm{cfm}(113.3 \mathrm{~L} / \mathrm{min})$ per 100 square feet ( $9.29 \mathrm{~m}^{2}$ ) of conditioned floor area or total leakage shall be less than or equal to $4.0 \mathrm{cfm}(113.3 \mathrm{~L} / \mathrm{min})$ per 100 square feet ( $9.29 \mathrm{~m}^{2}$ ) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g.
(25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
3. Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the building thermal envelope, total leakage shall be less than or equal to 8.0 cubic feet per minute ( $226.6 \mathrm{~L} / \mathrm{min}$ ) per 100 square feet ( $9.29 \mathrm{~m}^{2}$ ) of conditioned floor area. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located in crawl spaces do not qualify for this exception.

R403.3.7 Building cavities. Building framing cavities shall not be used as ducts or plenums. Installation of ducts in exterior walls, floors or ceilings shall not displace required envelope insulation. [Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, S 51-11R40320, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, S 51-11R-40320, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, S 51-11R-40320, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, S 51-11R-40320, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40320, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24) 10/10/2023 09:49 AM [ 27$] \quad$ NOT FOR FILING OTS-5010.1

WAC 51-11R-40340 Section R403.5—Service hot water systems.
R403.5 Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with this section. Service water-heating equipment shall meet the requirements of DOE 10 C.F.R. Part 430 Uniform Energy Factor or the equipment shall meet the requirements of Section C404.2.

R403.5.1 Heated water circulation and temperature maintenance systems. Heated water circulation systems shall be in accordance with Section R403.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.5.1.2. Automatic controls, temperature sensors and pumps shall be in a location with access. Manual controls shall be in a location with ready access.

R403.5.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe. Gravity and thermo-syphon circulation systems are prohibited. Controls automatically turn off the circulation pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

R403.5.1.1.1 Demand recirculation water systems serving an individual dwelling unit. Demand recirculation water systems shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.

R403.5.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

R403.5.2 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters, and manifolds between the nearest source of heated water and the termination of the 10/10/2023 09:49 AM [ 28 ] NOT FOR FILING OTS-5010.1
fixture supply pipe. Water heaters, circulating water systems, and heat trace temperature maintenance systems shall be considered to be sources of heated water. The volume in the piping shall be determined from Table C404.3.1 in the Washington State Energy Code, Commercial Provisions or Table L502.7 of the Uniform Plumbing Code. The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

R403.5.3 Hot water pipe insulation. Insulation for service hot water pipe, both within and outside the conditioned space, shall have a minimum thermal resistance ( $R$-value) of $R-3$.

EXCEPTION: Pipe insulation is permitted to be discontinuous where it passes through studs, joists or other structural members and where the insulated pipes pass other piping, conduit or vents, provided the insulation is installed tight to each obstruction.

R403.5.4 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2 or IAPMO PS 92. Drain water heat recovery units shall be in accordance with CSA 55.1 or IAPMO IGC 3462017.

R403.5.5 Water heater installation location. Service hot water systems shall be installed within the building thermal envelope.

EXCEPTIONS: 1. Where the hot water system efficiency is greater than or equal to 2.0 UEF.
2. Tankless water heaters.
3. Gas heat pump water heaters intended for exterior installation.
4. Atmospheric vented gas water heaters.

R403.5.6 ((Electric)) Water heater insulation. All ((electric)) tanktype water heaters in unconditioned spaces, or on concrete floors in conditioned spaces, shall be placed on an insulated surface with a minimum thermal resistance of $\mathrm{R}-10$, and a minimum compressive strength of 40 psi or engineered to support the appliance.

R403.5.7 ( (Heat pump water heating. Service hot water in one- and twofamily dwellings and multiple single-family dwellings (townhouses) shall be provided by a heat pump system. The heat pump water heating system shall be sized to provide 100 percent of peak hot water demand. Where the heat pump is located in unconditioned space, the heat pump water heating system shall be sized to provide 100 percent of peak hot water demand at an entering source dry bulb for wet bulb if rated for Wet bulb temperatures) air temperature of $40^{\circ} \mathrm{F}\left(4^{\circ} \mathrm{C}\right)$.

EXCEPTIONS: 1 . Resistance heating elements integrated into heat pump equipment.
2. Electric water heaters with a rated water storage volume of no greater than 20 gallons.
3. Dwelling units with no more than 1,000 square feet of conditioned floor area.
4. Supplementary water heating systems in accordance with Section R403.5.7.1, provided the system capacity does not exceed the eapacity of the heat pump water heating system.
5. Solar water heating systems.
6. Waste heat and energy recovery systems.
7. Heat trace freeze protection systems.
8. Snow and ice melt systems.

R403.5.7.1) ( Supplementary heat for heat pump water heating systems.
Heat pumps used for water heating and having supplementary water heating equipment shall have controls that limit supplementary water heating equipment operation to only those times when one of the following applies:

1. The heat pump water heater cannot meet hot water demand.
2. For heat pumps located in unconditioned space, the outside air temperature is below $40^{\circ} \mathrm{F}\left(4^{\circ} \mathrm{C}\right)$.
3. The heat pump is operating in defrost mode.
4. The vapor compression cycle malfunctions or loses power.

EXCEPTION: Heat trace temperature maintenance systems, provided the system capacity does not exceed the capacity of the heat pump water heating system.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40340, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40340, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 10/10/2023 09:49 AM [ 30 ] NOT FOR FILING OTS-5010.1
19.27.074. WSR 16-02-127, § 51-11R-40340, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27.020, and 19.27.074. WSR 14-24-053, § 51-11R-40340, filed 11/25/14, effective 5/1/15. Statutory Authority: RCW 19.27A.025, 19.27A.045, and 19.27.074. WSR 13-20-121, § 51-11R-40340, filed 10/1/13, effective 11/1/13. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40340, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-40392 ((section R403.13 Heat pump space heating-)) <br> Reserved. ((R403.13 Heat pump space heating. Space heating shall be provided by a heat pump system.

EXCEPTIONS: $\quad$. Detached one- and two-family dwellings and multiple-single family dwellings (townhouses up to three stories in height above grade having an installed HVAC heating capacity no greater than 1.5 watts of electric resistance heating per square foot of dwelling unit conditioned fleor areat, or up $10-500$ watts, whichever is greater.
2. Group R-2 dwelling or sleeping units having an installed HVAC heating capacity no greater than 750 watts in Climate Zone 4, and 1,000 watts in Climate Zone 5 , in any separate habitable room with exterior fenestration are permitted to be heated using electric resistance appliances. For buildings in location with exterior design conditions below $4^{\circ} \mathrm{F}\left(-15.6^{\circ} \mathrm{C}\right)$, an additional 250 watts above that allowed for Climate Zone 5 is permitted.
2.1. A room within a dwelling or sleeping unit that has two primary walls facing different cardinal directions, each with exterior fenestration, is permitted to have an installed HVAC heating capacity no greater than 1,000 watts in Climate Zone 4 , and 1,300 watts in Climate Zone 5. Bay windows and other minor offsets are not considered primary walls. For buildings in location with exterior design conditions below $4^{\circ} \mathrm{F}\left(-15.6^{\circ} \mathrm{C}\right)$, an additional 250 watts above that allowed for Climate Zone 5 is permitted.
3. Resistance heating elements integrated into heat pump equipment.
4. Solar thermal systems.
5. Waste heat, radiant heat exchanger, and energy recovery systems.
6. Supplementary heat in accordance with Section R403.1.2.
7. Where there is no electric utility service available at the building site.
8. Heating systems that rely primarily on biomass are allowed in Climate Zone 5.) )
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40392, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40520 Section R405.2-Performance based compliance. R405.2 Performance based compliance. Compliance based on total building performance requires that a proposed design meet all of the following:

1. The requirements of the sections indicated within Table R405.2 ((1)) ).
2. For structures less than 1,500 square feet of conditioned floor area, the annual ((earbon emissions)) site energy consumption shall be less than or equal to 64 percent of the annual ((earbon emissions)) site energy consumption of the standard reference design.
3. For structures 1,500 to 5,000 square feet of conditioned floor area, the annual ((earbon emissions)) site energy consumption shall be no more than 47 percent of the standard reference design.
4. For structures over 5,000 square feet of conditioned floor area, the annual ((earbon emissions)) site energy consumption shall be no more than 41 percent of the standard reference design.
5. For structures serving Group R-2 occupancies, the annual ((earbon emissions)) site energy consumption shall be less than or equal to 61 percent of the annual site energy consumption of the standard reference design. See Section R401.1 and residential building in Section R202 for Group R-2 scope.
( (Earbon emissions for both the standard reference design and the proposed design shall be calculated using Table R405.2(2).)) Energy use derived from simulation analysis shall be expressed in ( (pounds of earbon)) Btu per square foot of conditioned floor area per year.

TABLE R405.2(((1)))
MANDATORY COMPLIANCE MEASURES FOR TOTAL BUILDING PERFORMANCE

| Section $^{\text {a }}$ | Title | Comments |
| :--- | :--- | :--- |
| General |  |  |
| R401.3 | Certificate |  |
| Envelope |  |  |
| R402.1.1 | Vapor retarder |  |
| R402.2.3 | Eave baffle |  |


| Section ${ }^{\text {a }}$ | Title | Comments |
| :---: | :---: | :---: |
| R402.2.4.1 | Access hatches and doors |  |
| ( (R402.2.10.4 | Crawlspace wall insulation installations) ) |  |
| R402.4 | Air leakage |  |
| R402.5 | Maximum fenestration $U$-factor |  |
| Systems |  |  |
| R403.1 | Controls |  |
| R403.3 | Ducts | Except for R403.3.2 and R403.3.3 |
| R403.4 | Mechanical system piping insulation |  |
| R403.5.1 | Heated water circulation and temperature maintenance system |  |
| R403.5.3 | Drain water heat recovery units |  |
| ( (R403.5.7 | Heat pump water heating) ) |  |
| R403.6 | Mechanical ventilation |  |
| R403.7 | Equipment sizing and efficiency rating |  |
| R403.8 | Systems serving multiple dwelling units |  |
| R403.9 | Snow melt system controls |  |
| R403.10 | Energy consumption of pools and spas |  |
| R403.11 | Portable spas |  |
| R403.12 | Residential pools and permanent residential spas |  |
| ( (R403.13 | Heat pump space heating) ) |  |
| Electrical Power and Lighting |  |  |
| R404.1 | Lighting equipment |  |
| R404.2 | Interior lighting controls |  |

${ }^{\text {a }}$ Reference to a code section includes all the relative subsections except as indicated in the table.
( (TABLER405.2(2)
CARBON EMISSIONS FACTORS

| Type | CO2e <br> (lb/unit) | Unit |
| :--- | :---: | :---: |
| Electricity | 0.44 | kWh |
| Natural gas | 11.7 | Therm |
| Oil | 19.2 | Gallon |
| Propane | 10.5 | Gallon |
| Other ${ }^{\text {a }}$ | 195.00 | mmBta |
| On-site renewable energy | 0.00 |  |

a District energy systems may use alternative emission factors supported by calculations approved by the code official.) )
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40520, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 22-10-094, § 51-11R-40520, filed 5/3/22, effective 6/3/22. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, §51-11R-40520, filed 12/9/19, effective 7/1/20. Statutory
Authority: RCW 19.27A.020, 19.27A.045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40520, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40530 Section R405.3-Documentation. R405.3
Documentation. Documentation of the software used for the performance design and the parameters for the building shall be in accordance with Sections R405.3.1 through ((R405.3.3)) R405.3.2.2.

R405.3.1 Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the code official.

R405.3.2 Compliance report. Compliance software tools shall generate a report that documents that the proposed design complies with Section R405.2.

A compliance report on the proposed design shall be submitted with the application for the building permit. Upon completion of the building, a confirmed compliance report based upon the confirmed condition of the building shall be submitted to the code official before a certificate of occupancy is issued.

Compliance reports shall include information in accordance with Sections R405.3.2.1 and R405.3.2.2.

R405.3.2.1 Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. The name, organization, and contact information of the individual performing the analysis and generating the compliance report.
3. The name and version of the compliance software tool.
4. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
5. A certificate indicating that the proposed design complied with Section R405.2. The certificate shall document the building components' energy specifications that are included in the calculation including: Component-level insulation $R$-values or $U$-factors; duct system and building envelope air leakage testing assumptions; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation, and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate shall report the type and production size of the proposed system. Additional documentation reporting estimated annual energy production shall be provided.
6. When a site-specific report is not generated, the proposed design shall be based on the worst-case orientation and configuration of the rated home.

## R405.3.2.2 Compliance report for certificate of occupancy. A

compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification.
2. Declaration of the total building performance path on the title page of the energy report and the title page of the building plans.
3. A statement bearing the name of the individual performing the analysis and generating the report, along with their organization and contact information, indicating that the as-build building complies with Section R405.2.
4. The name and version of the compliance software tool.
5. A site-specific energy analysis report that is in compliance with Section R405.2.
6. A final confirmed certificate indicating compliance based on inspection, and a statement indicating that the confirmed rated design of the built home complies with Section R405.2. The certificate shall report the energy features that were confirmed to be in the home, including component level insulation $R$-values or $U$-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed.
7. Where on-site renewable energy systems have been installed, the certificate shall report the type and production size of the installed system. Additional documentation reporting estimated annual energy production shall be provided.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40530, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-40530, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01-

047, § 51-11R-40530, filed 12/9/19, effective 7/1/20. Statutory
Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR
16-02-127, § 51-11R-40530, filed 1/6/16, effective 7/1/16. Statutory
Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05
RCW. WSR 13-04-055, § 51-11R-40530, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-40551 Table R405.4.2(1)-Specifications for the standard reference and proposed designs.

TABLE ((R402.4.2(1))) R405.4.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

| $\begin{array}{c}\text { BUILDING } \\ \text { COMPONENT }\end{array}$ | STANDARD REFERENCE DESIGN | PROPOSED DESIGN |
| :--- | :--- | :--- |
| Above-grade walls | $\begin{array}{l}\text { Type: Mass wall if proposed wall is mass; } \\ \text { otherwise wood frame. } \\ \text { Gross area: Same as proposed } \\ U \text {-factor: From Table R402.1.2 } \\ \text { Solar absorptance }=0.75 \\ \text { Emittance }=0.90\end{array}$ | $\begin{array}{l}\text { As proposed } \\ \text { As proposed } \\ \text { As proposed }\end{array}$ |
| As proposed |  |  |
| As proposed |  |  |\(\left.] \begin{array}{l}As proposed <br>

As proposed <br>
As proposed\end{array}\right\}\)

| BUILDING COMPONENT | STANDARD REFERENCE DESIGN | PROPOSED DESIGN |
| :---: | :---: | :---: |
| Vertical fenestration other than opaque doors ${ }^{\text {a }}$ | Total area ${ }^{\mathrm{h}}=$ <br> (a) The proposed glazing area; where proposed glazing area is less than $15 \%$ of the conditioned floor area. <br> (b) $15 \%$ of the conditioned floor area; where the proposed glazing area is $15 \%$ or more of the conditioned floor area. | As proposed |
|  | Orientation: Equally distributed to four cardinal compass orientations (N, E, S \& W). | As proposed |
|  | $U$-factor: From Table R402.1.2 | As proposed |
|  | SHGC: From Table R402.1.1 except that for climates with no requirement (NR) $\mathrm{SHGC}=0.40$ shall be used. | As proposed |
|  | Interior shade fraction: 0.92-(0.21×SHGC for the standard reference design) <br> External shading: None | 0.92 - ( $0.21 \times$ SHGC as proposed $)$ As proposed |
| Skylights | None | As proposed |
| Air exchange rate | Air leakage rate of 4 air changes per hour at a pressure of 0.2 inches w.g. ( 50 Pa ). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times C F A+7.5 \times$ $\left(N_{b r}+1\right)$ <br> where: <br> $C F A=$ conditioned floor area $N_{\text {br }}=$ number of bedrooms <br> - The mechanical ventilation system type shall be the same as in the proposed design. Energy recovery shall not be assumed for mechanical ventilation. | As proposed ${ }^{\text {a }}$. The mechanical ventilation rate ${ }^{\mathrm{b}}$ shall be in addition to the air leakage rate and shall be as proposed. |
| Mechanical ventilation | None, except where mechanical ventilation is specified by the proposed design, in which case: <br> Annual vent fan energy use: <br> $\mathrm{kWh} / \mathrm{yr}=\left(1 \mathrm{e}_{\mathrm{f}}\right) \times\left(0.0876 \times C F A+65.7 \times\left(N_{b r}+1\right)\right.$ where: <br> $\mathrm{e}_{\mathrm{f}}=$ the minimum fan efficacy from Table R403.6.1 corresponding to the system type at a flow rate of $0.01 \times C F A+7.5 \times\left(N_{b r}+1\right)$ <br> $C F A=$ conditioned floor area <br> $N_{\mathrm{br}}=$ number of bedrooms | As proposed |
| Internal gains | $\text { IGain }=17,900+23.8 \times C F A+4104 \times N_{b r}$ <br> (Btu/day per dwelling unit) | Same as standard reference design |
| Internal mass | An internal mass for furniture and contents of 8 pounds per square foot of floor area. | Same as standard reference design, plus any additional mass specifically designed as a thermal storage element ${ }^{c}$ but not integral to the building envelope or structure. |
| Structural mass | For masonry floor slabs, $80 \%$ of floor area covered by R-2 carpet and pad, and $20 \%$ of floor directly exposed to room air. | As proposed |


| BUILDING <br> COMPONENT | STANDARD REFERENCE DESIGN | PROPOSED DESIGN |
| :--- | :--- | :--- | :--- |

For SI: 1 square foot $=0.93 \mathrm{~m}^{2}, 1$ British thermal unit $=1055 \mathrm{~J}, 1$ pound per square foot $=4.88 \mathrm{~kg} / \mathrm{m}^{2}$, 1 gallon $(\mathrm{U} . \mathrm{S})=.3.785 \mathrm{~L},{ }^{\circ} \mathrm{C}=\left({ }^{\circ} \mathrm{F}-3\right) / 1.8,1$ degree $=0.79 \mathrm{rad}$
a Where required by the code official, testing shall be conducted by an approved party. Hourly calculations as specified in the ASHRAE Handbook of Fundamentals, or the equivalent, shall be used to determine the energy loads resulting from infiltration.
b The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE Handbook of Fundamentals, page 26.19 for intermittent mechanical ventilation.
c Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees ( 0.26 rad ) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.
d For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
e For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
f For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
g For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40 -gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.
${ }^{\mathrm{h}}$ For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine fenestration area: $A F=A_{s} \times F A \times F$
Where:
$A F=$ Total fenestration area.
$A_{s}=$ Standard reference design total fenestration area.
$F A=$ (Above-grade thermal boundary gross wall area) $/$ (above-grade boundary wall area +0.5 x below-grade boundary wall area) .
$F \quad=\quad$ (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56 , whichever is greater.
and where:
Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.
Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.
Below-grade boundary wall is any thermal boundary wall in soil contact.
Common wall area is the area of walls shared with an adjoining dwelling unit.
$L$ and $C F A$ are in the same units.
i The factor for the compactness of the hot water distribution system is the ratio of the area of the rectangle that bounds the source of hot water and the fixtures that it serves (the "hot water rectangle") divided by the floor area of the dwelling.

1. Sources of hot water include water heaters, or in multifamily buildings with central water heating systems, circulation loops, or electric heat traced pipes.
2. The hot water rectangle shall include the source of hot water and the points of termination of all hot water fixture supply piping.
3. The hot water rectangle shall be shown on the floor plans and the area shall be computed to the nearest square foot.
4. Where there is more than one water heater and each water heater serves different plumbing fixtures and appliances, it is permissible to establish a separate hot water rectangle for each hot water distribution system and add the area of these rectangles together to determine the compactness ratio.
5. The basement or attic shall be counted as a story when it contains the water heater.
6. Compliance shall be demonstrated by providing a drawing on the plans that shows the hot water distribution system rectangle(s), comparing the area of the rectangle(s) to the area of the dwelling and identifying the appropriate compactness ratio and HWDS factor.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and
chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, S 51-11R40551, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-40551, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW
19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, § 51-11R-40551, filed 12/9/19, effective 7/1/20. Statutory

Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR
16-02-127, § 51-11R-40551, filed 1/6/16, effective 7/1/16. Statutory
Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05
RCW. WSR 13-04-055, § 51-11R-40551, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

# WAC 51-11R-40552 Table R405.4.2(2)—Default distribution system efficiencies for proposed designs. 

TABLE ((R402.4.2(2))) R405.4.2(2)
DEFAULT DISTRIBUTION SYSTEM
EFFICIENCIES FOR PROPOSED DESIGNS ${ }^{\text {a }}$

| DISTRIBUTION SYSTEM <br> CONFIGURATION AND <br> CONDITION | DISTRIBUTION SYSTEM <br> EFFICIENCY |
| :--- | :---: |
| Distribution system components <br> located in unconditioned space | 0.88 |
| Distribution systems entirely <br> located in conditioned space |  |
| Zonal systems $^{\mathrm{c}}$ | 0.93 |

For SI: 1 cubic foot per minute $=0.47 \mathrm{~L} / \mathrm{s}, 1$ square foot $=0.093 \mathrm{~m}^{2}, 1$ pound per square inch $=6895 \mathrm{~Pa}, 1$ inch water gauge $=1250 \mathrm{~Pa}$.
${ }^{a}$ Values given by this table are for distribution systems, which must still meet all prescriptive requirements for duct and pipe system insulation and leakage.
${ }^{\mathrm{b}}$ Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space. All components must be located on the interior side of the thermal envelope (inside the insulation) and also inside of the air barrier. Refrigerant compressors and piping are allowed to be located outside.
${ }^{\text {c }}$ Zonal systems are systems where the heat source is located within each room. Systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure. Hydronic systems do not qualify.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40552, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 10/10/2023 09:49 AM [ 41 ] NOT FOR FILING OTS-5010.1

16-02-127, § 51-11R-40552, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40552, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-40560 Section R405.5-Calculation software tools.

 R405.5 Calculation software tools. Calculation software, where used, shall be in accordance with Sections R405.5.1 through R405.5.3.R405.5.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the standard reference design and the proposed design and shall include the following capabilities:

1. Calculation of whole-building (as a single zone) sizing for the heating and cooling equipment in the standard reference design residence in accordance with Section R403.6.
2. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
3. Printed code official inspection checklist listing each of the proposed design component characteristics from Table ((R405.5.2(1))) R405.4.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., R-value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

R405.5.2 Specific approval. Performance analysis tools meeting the applicable sections of Section $R 405$ shall be permitted to be approved. Tools are permitted to be approved based on meeting a specified threshold for a jurisdiction. The code official shall be permitted to approve tools for a specified application or limited scope.

R405.5.3 Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an approved source.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40560, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40560, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40610 Section R406.1-Scope. R406.1 Scope. This section establishes additional energy efficiency requirements for all new construction covered by this code, including additions subject to Section R502 and change of occupancy or use subject to Section R505 unless specifically exempted in Section R406. Credits from both Sections R406.2 and R406.3 are required.

R406.2 Carbon emission equalization. This section establishes a base equalization between fuels used to define the equivalent carbon emissions of the options specified. The permit shall define the base fuel selection to be used and the points specified in Table R406.2 shall be used to modify the requirements in Section R406.3.

TABLE R406.2
((FUEI NORMAIIZATION)) ENERGY EQUALIZATION CREDITS

| System <br> Type | Description of Heating Sources | Credits |  |
| :---: | :---: | :---: | :---: |
|  |  | All Other | Group R-2 ${ }^{\text {a }}$ |
| 1 | For combustion heating system using equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(5) or C403.3.2(6) | $\begin{gathered} ((-3.0)) \\ \underline{0} \end{gathered}$ | 0 |
| 2 | For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) and supplemental heating provided by electric resistance or a | $\begin{gathered} ((\theta)) \\ \underline{1.5} \end{gathered}$ | 0 |


| System <br> Type | Description of Heating Sources | Credits |  |
| :---: | :--- | :---: | :---: |
|  | combustion furnace meeting minimum standards <br> listed in Table C403.3.2(5) |  | Group R-2 |

a See Section R401.1 and residential building in Section R202 for Group R-2 scope.
${ }^{\text {b }}$ The gas back-up furnace will operate as fan-only when the heat pump is operating. The heat pump shall operate al all temperatures above $38^{\circ} \mathrm{F}$ $\left(3.3^{\circ} \mathrm{C}\right)$ (or lower). Below that "changeover" temperature, the heat pump would not operate to provide space heating. The gas furnace provides heating below $38^{\circ} \mathrm{F}\left(3.3^{\circ} \mathrm{C}\right)$ (or lower).
c Additional points for this HVAC system are included in Table R406.3.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, S 51-11R40610, filed $1 / 3 / 23,6 / 7 / 23$, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40610, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-40610, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, §51-11R-40610, filed 2/1/13, effective 7/1/13.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40620 Section R406.3-Additional energy efficiency requirements. R406.3 Additional energy efficiency requirements. Each dwelling unit in a residential building shall comply with sufficient options from Table R406.2 and R406.3 so as to achieve the following minimum number of credits:

1. Small Dwelling Unit:

Dwelling units less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. Additions to existing building that are greater than 500 square feet of heated floor area but less than 1500 square feet.
2. Medium Dwelling Unit:
( (2.5) )
5.0 credits
( (5.0) ) 8.0 credits

All dwelling units that are not included in \#1, \#3, or \#4.
3. Large Dwelling Unit:

Dwelling units exceeding 5000 square feet of conditioned floor area.
4. Dwelling units serving Group R-2 ( (4.5) ) occupancies. See Section R401.1 and residential building in Section R202 for Group R-2 scope.
5. Additions 150 square feet to $500 \quad 2.0$ credits square feet:
The drawings included with the building permit application shall identify which options have been selected and the point value of each option, regardless of whether separate mechanical, plumbing, electrical, or other permits are utilized for the project.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40620, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-40620, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40620, filed $1 / 6 / 16$, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.045 and chapters

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19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40620, filed 2/1/13,
effective 7/1/13.]
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AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-40621 Table R406.3-Energy credits.
TABLE 406.3
ENERGY CREDITS

|  |  | CREDIT(S) |  |
| :---: | :---: | :---: | :---: |
| OPTION | DESCRIPTION | All Other | Group R-2 |

1. EFFICIENT BUILDING ENVELOPE OPTIONS

Only one option from Items 1.1 through 1.4 may be selected in this category.
Compliance with the conductive UA targets is demonstrated using Section R402.1.5, Total UA alternative, where [1(Proposed UA/Target UA)] >; the required \%UA reduction

| 1.1 | Prescriptive compliance is based on Table R402.1.3 with the following modifications: Vertical fenestration $U=0.22$. | 0.5 | 0.5 |
| :---: | :---: | :---: | :---: |
| 1.2 | Prescriptive compliance is based on Table R402.1.3 with the following modifications: <br> Vertical fenestration $U=0.25$ <br> Floor R-38 <br> Basement wall R-21 int plus R-5 ci <br> Ceiling and single-rafter or joist-vaulted R- <br> 60 advanced <br> Slab on grade R-10 perimeter and under entire slab <br> Below grade slab $\mathrm{R}-10$ perimeter and under entire slab <br> or <br> Compliance based on Section R402.1.5: Reduce the Total conductive UA by $15 \%$. | $\begin{gathered} ((0.5)) \\ \underline{1.0} \end{gathered}$ | 1.0 |
| 1.3 | Prescriptive compliance is based on Table R402.1.3 with the following modifications: <br> Vertical fenestration $\mathrm{U}=0.18$ <br> Ceiling and single-rafter or joist-vaulted R- <br> 60 advanced <br> Floor R-38 <br> Basement wall R-21 int plus R-12 ci <br> Slab on grade R-10 perimeter and under entire slab <br> Below grade slab R-10 perimeter and under entire slab <br> or <br> Compliance based on Section R402.1.5: Reduce the Total conductive UA by $22.5 \%$. | $\begin{gathered} ((1.0)) \\ 1.5 \end{gathered}$ | 1.5 |


| OPTION | DESCRIPTION | CREDIT(S) |  |
| :---: | :---: | :---: | :---: |
|  |  | All Other | Group R-2 ${ }^{\text {b }}$ |
| 1.4 | Prescriptive compliance is based on Table <br> R402.1.3 with the following modifications: <br> Vertical fenestration $U=0.18$ <br> Ceiling and single-rafter or joist-vaulted R- <br> 60 advanced <br> Wood frame wall R-21 int plus R-16 ci <br> Floor R-48 <br> Basement wall R-21 int plus R-16 ci <br> Slab on grade R-20 perimeter and under <br> entire slab <br> Below grade slab R-20 perimeter and under entire slab <br> or <br> Compliance based on Section R402.1.5: Reduce the Total conductive UA by $30 \%$. | $\begin{gathered} ((1.5)) \\ \underline{2.5} \end{gathered}$ | 2.0 |
| 2. AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION OPTIONS <br> Only one option from Items 2.1 through 2.3 may be selected in this category. |  |  |  |
| 2.1 | Compliance based on Section R402.4.1.2: <br> Reduce the tested air leakage to 2.0 air changes per hour maximum at 50 Pascals <br> or <br> For R-2 Occupancies, optional compliance based on Section R402.4.1.2: Reduce the tested air leakage to $0.25 \mathrm{cfm} / \mathrm{ft}^{2}$ maximum at 50 Pascals <br> and <br> All whole house ventilation requirements as determined by Section M1505.3 of the International Residential Code or Section 403.8 of the International Mechanical Code shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.65 . <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system. | $\begin{gathered} ((0.5)) \\ \underline{1.0} \end{gathered}$ | 1.0 |
| 2.2 | Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum at 50 Pascals or <br> For R-2 Occupancies, optional compliance based on Section R402.4.1.2: Reduce the tested air leakage to $0.20 \mathrm{cfm} / \mathrm{ft}^{2}$ maximum at 50 Pascals and <br> All whole house ventilation requirements as determined by Section M1505.3 of the International Residential Code or Section 403.8 of the International Mechanical Code shall be | $\begin{gathered} ((1.0)) \\ \underline{1.5} \end{gathered}$ | 1.5 |



| OPTION | DESCRIPTION | CREDIT(S) |  |
| :---: | :---: | :---: | :---: |
|  |  | All Other | Group R-2 ${ }^{\text {b }}$ |
|  | To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency. |  |  |
| $3.3{ }^{\text {a,c,d }}$ | Air-source centrally ducted heat pump with minimum HPSF2 of 8.1 (HSPF of 9.5). <br> In areas where the winter design temperature as specified in Appendix RC is $23^{\circ} \mathrm{F}$ or below, a cold climate heat pump found on the NEEP cc ASHP qualified product list shall be used. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency. | 0.5 | N/A |
| $3.4{ }^{\text {a,d }}$ | Closed-loop ground source heat pump; with a minimum COP of 3.3 <br> or <br> Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency. | 1.5 |  |
| $3.5{ }^{\text {d }}$ | Ductless mini-split heat pump system, zonal control: In homes where the primary space heating system is zonal electric heating, a ductless mini-split heat pump system with a minimum HSPF2 of 9 (HSPF of 10.0) shall be installed and provide heating to the largest zone of the housing unit. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency. |  | 2.0 |
| $3.6{ }^{\text {a,d }}$ | Air-source, centrally ducted heat pump with minimum HSPF2 of 9.4 (HSPF of 11.0). <br> A centrally ducted air source cold climate variable capacity heat pump (cc VㄷHP) found on the NEEP cc VCHP qualified product list with a minimum of 9 HPSF2 ( 10 HSPF ) may be used to satisfy this requirement. <br> In areas where the winter design temperature as specified in Appendix RC is $23^{\circ} \mathrm{F}$ or below, an air source centrally ducted heat pump shall be a cold climate variable capacity heat pump as listed on the NEEP qualified product list. <br> To qualify to claim this credit, the building permit drawings shall specify the option being | 1.0 | N/A |



| OPTION | DESCRIPTION | CREDIT(S) |  |
| :---: | :---: | :---: | :---: |
|  |  | All Other | Group R-2 ${ }^{\text {b }}$ |
|  | with a minimum UEF of 1.15 , shall serve all units. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and, for solar water heating systems, the calculation of the minimum energy savings. |  |  |
| $3.9{ }^{\text {e }} 3.11^{\text {c }}$ | Connected thermostat meeting ENERGY STAR Certified Smart Thermostats/EPA ENERGY STAR specifications. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the thermostat model. | 0.5 | 0.5 |
| 3.10 | Gas-fired heat pump(s) meeting ANSI Z21.10.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15. <br> For R 2 Oceupancy, gas fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15 , shall serve all units. | 1.5 | 1.5 |
| $\underline{3.14}$ | Combination water heating and space heating system shall include one of the following: Gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0. <br> 脬 <br> For R-2 Occupancy, gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0., shall serve all units. <br> 最 <br> For R 2 Oceupancy, gas fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15 , shall serve all units. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and, for solar water heating systems, the calculation of the minimum energy savings. | $2.5$ | 2.5 |
| 4. HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM OPTIONS |  |  |  |
| 4.1 | HVAC equipment and associated duct system(s) installation shall comply with the requirements of Section R403.3.2. | 0.5 | N/A |





| OPTION | DESCRIPTION | CREDIT(S) |  |
| :---: | :---: | :---: | :---: |
|  |  | All Other | Group R-2 ${ }^{\text {b }}$ |
|  | or <br> For R-2 Occupancy, gas-fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15 , shall supply all units. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and, for solar water heating systems, the calculation of the minimum energy savings. |  |  |
| 6. RENEWABLE ELECTRIC ENERGY OPTION |  |  |  |
| 6.1 | For each 600 kWh of electrical generation per housing unit provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 4.5 credits. Generation shall be calculated as follows: <br> For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTs or approved ( (alternate) ) alternative by the code official. <br> Documentation noting solar access shall be included on the plans. <br> For wind generation projects designs shall document annual power generation based on the following factors: <br> The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower. <br> To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the photovoltaic or wind turbine equipment type, provide documentation of solar and wind access, and include a calculation of the minimum annual energy power production. | 0.5-4.5 | 0.5-4.5 |
| 7. APPLIANCE PACKAGE OPTION |  |  |  |
| 7.1 | All of the following appliances shall be new and installed in the dwelling unit and shall meet the following standards: <br> 1. Dishwasher, standard - Energy Star rated, Most Efficient 2021 or Dishwasher, compact Energy Star rated (Version 6.0) <br> 2. Refrigerator (if provided) - Energy Star rated (Version 5.1) <br> 3. Washing machine (Residential) - Energy Star rated (Version 8.1) <br> 4. Dryer - Energy Star rated, Most Efficient 2022 | 0.5 | 1.5 |


| OPTION | DESCRIPTION | CREDIT(S) |  |
| :--- | :--- | :--- | :--- |
|  | All Other | Group R-2b |  |
|  | To qualify to claim this credit, the building <br> permit drawings shall specify the option being <br> selected and shall show the appliance type and <br> provide documentation of Energy Star <br> compliance. At the time of inspection, all <br> appliances shall be installed and connected to <br> utilities. Dryer ducts and exterior dryer vent caps <br> are not permitted to be installed in the dwelling <br> unit. |  |  |

${ }^{\text {a }}$ An alternative heating source sized at a maximum of $0.5 \mathrm{Watts} / \mathrm{ft}^{2}$ (equivalent) of heated floor area or 500 Watts , whichever is bigger, may be installed in the dwelling unit.
${ }^{\mathrm{b}}$ See Section R401.1 and residential building in Section R202 for Group R-2 scope.
| ${ }^{\text {c }}$ Option 3.93 .11 can only be taken with Options 3.1 and 3.3. To qualify to claim option 3.83 .11 with 3.3 , the system shall be a $1-2$ speed heat pump system. Variable capacity heat pumps are ineligible from claiming this option.
${ }^{d}$ This option may only be claimed if serving System Type 4 or 5 from Table R406.2.
${ }^{\mathrm{e}}$ Primary living areas include living, dining, kitchen, family rooms, and similar areas.
${ }^{\text {f }}$ Option 3.113 .10 may only be taken with Efficient Water Heating Options 5.1 or 5.2. Equipment sizing for space heating shall be calculated as provided in Section R403.7 with increased capacity to provide a minimum of 75 percent of peak hot water demand or shall be sized in accordance with approved manufacturer's specifications or guidance. Supplementary heat for water heating system shall be in accordance with Section R403.5.7.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R40621, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 22-10-094, § 51-11R-40621, filed 5/3/22, effective 6/3/22. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, § 51-11R-40621, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-40621, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-40621, filed 1/6/16, effective 7/1/16. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27.020, and 19.27.074. WSR 14-24-123, § 51-11R-40621, filed 12/3/14, effective 1/3/15. Statutory Authority: RCW 19.27A.025, 19.27A.045, and 19.27.074. WSR 13-20-121, § 51-11R-40621, filed 10/1/13, effective 11/1/13. Statutory Authority: RCW 19.27A.020, 19.27A. 045 and chapters 19.27 and 34.05 RCW. WSR 13-04-055, § 51-11R-40621, filed 2/1/13, effective 7/1/13.]

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

WAC 51-11R-50100 Section R501-General. R501.1 Scope. The provisions of this chapter shall control the alteration, repair, addition and change of occupancy of existing buildings and structures. R501.1.1 General. Except as specified in this chapter, this code shall not be used to require the removal, alteration, or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code. Unaltered portions of the existing building or building supply system shall not be required to comply with this code.

R501.1.2 Thermostats for accessory dwelling units. Where a separate dwelling unit, that provides independent facilities for living, sleeping, cooking, bathing and sanitation, is established within or attached to an existing dwelling unit, the heating and cooling for the newly-created dwelling unit shall be controllable with a separate programmable thermostat in accordance with Section R403.1.1.

R501.2 Compliance. Additions, alterations, repairs or changes of occupancy to, or relocation of, an existing building, building system or portion thereof shall comply with Sections R502, R503, R504 or R505, respectively, in this code. Changes where unconditioned space is changed to conditioned space shall comply with Section R502.

R501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's authorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

R501.4 Compliance. Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in this code and the International Residential Code, International Building Code, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, Uniform Plumbing Code, International Property Maintenance Code, and NFPA 70.

R501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

R501. 6 Historic buildings. The code official may modify the specific requirements of this code for historic buildings and require ((alternate)) alternative provisions which will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state register of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the National Register of Historic Places.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R50100, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A. 045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-50100, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW 10/10/2023 09:49 AM [ 58 ] NOT FOR FILING OTS-5010.1
19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, § 51-11R-50100, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-50100, filed 1/6/16, effective 7/1/16.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-50200 Section R502—Additions. R502.1

General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code, except as specified in this chapter. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section ((R502.1.1 or R502.1.2)) R502.3 or R502.4.

R502.1.1 Small additions. Additions not greater than 150 square feet (13.9 m²) shall not be required to comply with Section R406.

R502.2 Change in space conditioning. Any nonconditioned or low-energy space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

EXCEPTION: Where the total building performance option in Section R405 is used to comply with this section, the annual energy use of the proposed design is permitted to be 110 percent of the annual energy use otherwise allowed by Section R405.3.
R502.3 Prescriptive compliance. Additions shall comply with Sections R502.3.1 through R502.3.4.

R502.3.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

EXCEPTION: Where nonconditioned space is changed to conditioned space, the building envelope of the addition shall comply where the UA, as determined in Section R402.1.5, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to UA generated for the existing building.

R502.3.1.1 Existing ceilings with attic spaces. Where an addition greater than 150 square feet (( (9.2)) $\left.13.9 \mathrm{~m}^{2}\right)$ adjoins existing ceilings with attic spaces, the existing attic spaces shall comply with Section R402.

R502.3.2 Heating and cooling systems. HVAC ducts newly installed as part of an addition shall comply with Section R403.

EXCEPTION: The following need not comply with the testing requirements of Section R403.3.3:

1. Additions of less than 150 square feet.
2. Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in WSU RS-33.
3. Existing duct systems constructed, insulated or sealed with asbestos.

R502.3.3 Service hot water systems. New service hot water systems that are part of the addition shall comply with Section R403.5.

R502.3.4 Lighting. New lighting systems that are part of the addition shall comply with Section 404.1 .

R502.4 Existing plus addition compliance (Total Building
Performance). Where nonconditioned space is changed to conditioned space the addition shall comply where the annual energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy use of the existing building when modeled in accordance with Section R405. The addition and any alterations that are part of the project shall comply with Section R 405 in its entirety.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R50200, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160 and chapter 19.27 RCW. WSR 20-01-047, § 51-11R-50200, filed 12/9/19, effective 7/1/20. 10/10/2023 09:49 AM [ 60 ] NOT FOR FILING OTS-5010.1

Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, § 51-11R-50200, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-50200, filed 1/6/16, effective 7/1/16.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-50300 Section R503-Alterations. R503.1 General.

Alterations to any building or structure shall comply with the requirements of the code for new construction, without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration.

Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Sections R503.1.1 through R503.2.

The code official may approve designs of alterations which do not fully conform to all of the requirements of this code where in the opinion of the code official full compliance is physically impossible and/or economically impractical and:

The alteration improves the energy efficiency of the building; or
The alteration is energy efficient and is necessary for the health, safety, and welfare of the general public.

R503.1.1 Building envelope. Building envelope assemblies that are part of the alteration shall comply with Section R402.1.3 or R402.1.5,

Sections R402.2.1 through R402.2.1110, R402.3.1, R402.3.2, ((R402.4.3, and R402.4.4) (R402.3.5, and R402.4.2.

EXCEPTION: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation. $2 \times 4$ framed walls shall be insulated to a minimum of R-15 and $2 \times 6$ framed walls shall be insulated to a minimum of R-21.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing fenestration to be replaced.

R503.1.1.1 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for $U$-factor and SHGC in Table R402.1.3. Where more than one replacement fenestration unit is being installed, an area-weighted average of the U-factor and SHGC of all replacement fenestration shall be permitted to be used to demonstrate compliance.

R503.1.2 Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Section R403.

EXCEPTIONS: 1. Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.
2. Existing duct systems constructed, insulated or sealed with asbestos.
( (3. Replacements of space heating equipment shall not be required to comply with Section $R 403.13$ where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.) )

R503.1.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section R403.5.

EXCEPTION ( (\$) ) : ( ( t ) ) Replacement of water heating equipment shall not be required to comply with Section R403.5.5.
( ( 2 . Replacement of water heating equipment shall not be required to comply with Section R 403.5 .7 where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.) )

R503.1.4 Lighting. New lighting systems that are part of the alteration shall comply with Section R404.1.

EXCEPTION: Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R50300, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.045 and chapter 19.27A RCW. WSR 20-21-081, § 51-11R-50300, filed 10/19/20, effective 2/1/21. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27 RCW. WSR 20-01047, § 51-11R-50300, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-063, §51-11R-50300, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-50300, filed 1/6/16, effective 7/1/16.]

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

## WAC 51-11R-51000 Chapter 6-Referenced standards. This chapter

lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section R106.

| AAMA | American Architectural Manufacturers Association <br> 1827 Walden Office Square <br> Suite 550 <br> Schaumburg, IL 60173-4268 |  |
| :--- | :--- | :--- |
| Standard reference number | Title |  |
| AAMA/WDMA/CSA <br> 101/I.S.2/A C440-17 | North American Fenestration <br> Standard/Specifications for Windows, Doors <br> and Unit Skylights | Referenced in code section number |
| ACCA | Air Conditioning Contractors of America <br> 2800 Shirlington Road, Suite 300 <br> Arlington, VA 22206 | (R402.4.3)) R402.4.2 |


| Standard reference number | Title |  | Referenced in code section number |
| :---: | :---: | :---: | :---: |
| Manual J-16 | Residential Load Calculation Eighth Edition | . . . . . . . | R403.7 |
| Manual S-14 | Residential Equipment | ........ | R403.7 |
| ANSI | American National Standards Institute 25 West 43rd Street, 4th Floor New York, NY 10036 |  |  |
| Standard reference number | Title |  | Referenced in code section number |
| Z21.50-2016/CSA 2.22-2016 | Vented Decorative Gas Appliances |  | $\begin{gathered} ((\mathrm{R} 402.4 .2 .1, \mathrm{R} 403.1 .3) \\ \mathrm{R} 403.7 .1 \end{gathered}$ |
| Z21.88-2017/CSA 2.33-2017 | Vented Gas Fireplace Heaters | . . . . . . . . | ( (R402.4.2.4) ) R 403.7 .1 |
| $\underline{\text { Z21.40.2-1996 }}$ | Gas-fired, Work Activated Air-Conditioning and Heat Pump Appliances (Internal Combustion) |  | Table R406.3 |
| $\underline{\text { Z21.40.4-1996 }}$ | Performance Testing and Rating of Gas-Fired, Air-Conditioning and Heat Pump Appliances | ....... | Table R406.3 |
| APSP | The Association of Pool and Spa Professionals <br> 2111 Eisenhower Avenue, Suite 500 <br> Alexandria, VA 22206 |  |  |
| Standard reference number | Title |  | Referenced in code section number |
| ANSI/APSP/ICC 14-2019 | American National Standard for Portable Electric Spa Energy Efficiency | . . | R403.11 |
| ANSI/APSP/ICC 15a-2011 | American National Standard for Residential Swimming Pool and Spa Energy EfficiencyIncludes Addenda A approved January 9, 2013 |  | R403.12 |
| ASHRAE | American Society of Heating, Refrigerating and Engineers, Inc. <br> 1791 Tullie Circle, N.E. <br> Atlanta, GA 30329-2305 | tioning |  |
| Standard reference number | Title |  | Referenced in code section number |
| ASHRAE-2021 <br> ASHRAE 193-2010 (RA 2014) | ASHRAE Handbook of Fundamentals <br> Method of Test for Determining the Airtightness of HVAC Equipment |  | $\begin{aligned} & \text { R402.1.5, Table R405.5.2(1) } \\ & ((\mathrm{R} 403.3 .2 .1)) \text { R403.3.4.1 } \end{aligned}$ |
| ASTM | ASTM International <br> 100 Barr Harbor Drive <br> West Conshohocken, PA 19428-2859 |  |  |
| Standard reference number | Title |  | Referenced in code section number |
| C1363-11 | Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus |  | R303.1.4.1 |
| E283-2004 (2012) | Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen |  | ( (R402.4.5) ) $\underline{\mathrm{R} 402.4 .3}$ |
| E779-2010 (2018) | Standard Test Method for Determining Air Leakage Rate by Fan Pressurization |  | R402.4.1.2 |
| E1554/E1554M-E2013 | Standard Test Method for Determining Air Leakage of Air Distribution Systems by Fan Pressurization |  | R403.3.5 |
| E1827-2011 (2017) | Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door |  | R402.4.1.2 |
| E2178-2013 | Standard Test Method for Air Permeance of Building Materials |  | R303.1.5 |




[Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and chapter 19.27A RCW. WSR 23-02-060, 23-12-102, and 23-20-022, § 51-11R51000, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A. 160 and chapter 19.27

RCW. WSR 20-01-047, § 51-11R-51000, filed 12/9/19, effective 7/1/20. Statutory Authority: RCW 19.27A.020, 19.27A.045, 19.27A.160, and 19.27.074. WSR 16-02-127, § 51-11R-51000, filed $1 / 6 / 16$, effective 7/1/16.]


