

FISCAL NOTE FOR NON-CAPITAL PROJECTS

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Legislation Title:

AN ORDINANCE relating to energy efficiency and energy conservation, amending Section 22.700.010 of the Seattle Municipal Code; enacting a new Seattle Energy Code by adopting by reference the 2009 Washington State Energy Code, with certain amendments applicable to nonresidential spaces and revisions to administrative and procedural provisions; repealing Sections 2-10 of Ordinance 122530; and providing for a deferred effective date for such repeal and for application of the new Seattle Energy Code to residential spaces.

Summary of the Legislation:

Adoption of the 2009 Seattle Energy Code (2009 Washington State Energy Code with Seattle amendments)

Background:

Regular update to the energy efficiency requirements for building construction.

Please check one of the following:

This legislation does not have any financial implications.

Attachment 1: Summary of 2009 Seattle Energy Code Proposal



SUMMARY OF 2009 SEATTLE ENERGY CODE PROPOSAL

While the first comprehensive Seattle Energy Code took effect in February 1980, Seattle has had residential insulation requirements since 1974 and the first furnace sizing and duct insulation requirements took effect in 1927. Seattle has regularly updated its Energy Code to incorporate changes in technology and to improve implementation. Resolution 30280 also provides direction for Seattle Energy Code updates. This document provides a summary of the latest regular update.

Washington State updates its codes on a three-year cycle, following publication of new versions of the model codes by the International Code Council (ICC). The Washington State Building Code Council (WSBCC) adopted the 2009 Washington State Energy Code (WSEC) on 20 November 2009 and specified an effective date of 1 July 2010. Consequently, soon after adoption of the 2009 WSEC, Seattle began the process to update the Seattle Energy Code. Through a four-month public review process earlier this year, recommendations were refined and then endorsed by DPD's Construction Code Advisory Board. The energy savings estimate for the 2009 Seattle Energy Code for one building type is slightly less than 20% compared to ASHRAE/IESNA Standard 90.1-2007, the latest published version of the national energy standard for all buildings except low-rise residential buildings.

Then, in June 2010, the WSBCC voted to delay the effective date of the 2009 WSEC until no sooner than 29 October 2010, with a preferred new effective date of 1 January 2011. There was no change in the text of the 2009 WSEC that the WSBCC had previously adopted on 20 November 2009. The WSBCC website indicates that public hearings will be held on 10 September 2010 and 24 September 2010 regarding a possible new effective date for the 2009 WSEC, and that a decision will be made on 15 October 2010. This date could be anytime from as early as 29 October 2010 (the end of the current WSBCC emergency rule) to as late as 1 April 2011.

DPD held additional public meetings to discuss the delayed implementation of the 2009 WSEC and to review options. Public comment recommended that Seattle continue on its previous path with a 2009 Seattle Energy Code that was based on amendments to the 2009 WSEC. CCAB unanimously endorsed the DPD recommendations at their meeting on 15 July 2010 and recommended that the 2009 Seattle Energy Code update move ahead with the 2009 updates to the other Seattle construction codes. As a result of the WSBCC action and given Washington State statutory limitations on amendments of the provisions for residential buildings in the WSEC, the proposed ordinance for the 2009 Seattle Energy Code would have the provisions for residential spaces in the 2006 WSEC remain in effect until the new effective date of the 2009 WSEC, while the provisions in the 2009 Seattle Energy Code for other spaces would take effect 30 days after the ordinance is passed and signed by the Mayor, with a transition period when an applicant could opt to comply with the 2006 Seattle Energy Code, until the earlier of 60 days after the 2009 Seattle Building Code takes effect or when the 2009 WSEC takes effect.



Goals for this Update Cycle

Seattle amendments to the 2009 Washington State Energy Code (WSEC) are proposed:

- to achieve the energy savings specified in Resolution 30280,
- to incorporate addenda for the next version of ASHRAE/IESNA Standard 90.1,
- to incorporate ASHRAE/USGBC/IESNA Standard 189.1, and
- to improve implementation of existing amendments.

Resolution 30280 (Section 1.B.i) directs DPD and Seattle City Light to “propose to the City Council... amendments to the Seattle Energy Code... to achieve up to 20% enhanced energy efficiency beyond the current version of ASHRAE/IESNA Standard 90.1”. The 2006 Seattle Energy Code achieved approximately 20% energy savings compared to ASHRAE/IESNA Standard 90.1-2004. However, since that time, ASHRAE/IESNA Standard 90.1-2007 has been published and it contains significant energy efficiency improvements. In addition, over 100 addenda have been proposed for incorporation into the next version of Standard 90.1, nationally-vetted ideas for our consideration. In December 2009, ASHRAE/USGBC/IESNA Standard 189.1, High-Performance Green Buildings Except Low-Rise Residential Buildings, was published, providing criteria for all aspects of green buildings.

Public Review Process

Beginning in January 2010, DPD distributed draft proposals for the 2009 Seattle Energy Code (2009 WSEC with Seattle amendments). During the February to July 2010 time period, DPD held 15 public meetings to review proposals:

- 8 February 2010: envelope (13, 10, 11) & on-site renewable energy systems (16)
- 9 February 2010: lighting (15, 11) & metering (12)
- 11 February 2010: mechanical (14)
- 16 February 2010: envelope (13, 10, 11) & on-site renewable energy systems (16)
- 18 February 2010: mechanical (14)
- 22 February 2010: building envelope air leakage
- 23 February 2010: lighting (15, 11) & metering (12)
- 25 February 2010: RS-29 & initial wrap-up (includes building envelope, mechanical, lighting, metering, and on-site renewable energy)
- 1 March 2010: original written comment deadline
- 2 March 2010: review of initial written comments
- 29 March 2010: revised deadline for written comments
- 15 April 2010: overview of revised draft & lighting (15, 11)
- 19 April 2010: envelope (13, 10, 11, 2), mechanical (14), on-site renewable energy systems (16) & metering (12)
- 27 April 2010: RS-29, Appendix A/B, & carryover
- 27 April 2010: written comment deadline for revised draft
- 28 April 2010: review of written comments on revised draft
- 6 May 2010: CCAB review and discussion of staff recommendations and of written public comments on staff recommendations, two major issues identified, CCAB members make recommendations for a number of minor changes

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Summary of Proposed 2009 Seattle Energy Code, 18 August 2010

- (City staff prepare revised draft responding to comments on minor issues)
- 20 May 2010: CCAB recommends two modifications to the staff recommendations for two major issues and then votes unanimous endorsement
(City staff accept recommended modifications, with some editorial changes)
- 21 June 2010: review of proposal for draft amendments to 2006 SEC
- 5 July 2010: written comment deadline for proposal for draft amendments to 2006 SEC
- 6 July 2010: review of written comments on proposal for draft amendments to 2006 SEC.
- 15 July 2010: CCAB review and discussion of staff recommendations and of written public comments on staff recommendations, CCAB recommends one minor change
CCAB supports moving ahead with an updated Seattle Energy Code with amendments to the 2009 WSEC (as opposed to further amendments to the 2006 Code)
CCAB then votes unanimous endorsement of the revised staff recommendations for the 2009 Seattle Energy Code
(City staff accept editorial change)

In addition, presentations were made to professional organizations:

- 11 February 2010 – AACE Seattle (Association for the Advancement of Cost Engineering)
- 17 February 2010 – AIA Seattle Chapter (American Institute of Architects)
- 22 February 2010 – NAIOP (National Association of Office and Industrial Parks)
- 22 April 2010 – Seattle Chamber of Commerce
- 26 April 2010 – ASHRAE Puget Sound Chapter (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)
- 17 June 2010 – Electric League of the Pacific Northwest
- 17 June 2010 – Seattle Building Envelope Enclosure Council

DPD staff made a number of revisions in response to issues raised. The most significant changes were to not include requirements for window orientation and shading in the prescriptive compliance option, to not require that all buildings demonstrate a certain level of airtightness through testing, and to reduce the amount of nonrenewable energy to be supplied onsite. Additional modifications were made to other sections based on comments received and were included in the version reviewed by CCAB. CCAB recommended two key revisions: the development of an updated version of the EnvStd building envelope trade-off software; and an allowance for less energy-efficient operable windows provided that the windows were interlocked with the cooling system and had a high visible-light transmittance for daylighting. CCAB unanimously endorsed the DPD recommendations with these two revisions at their meeting on 20 May 2010.

When the WSBC decided on 11 June 2010 to delay the initial implementation date for the 2009 WSEC, Seattle DPD considered the option of bringing forward a 2009 Seattle Energy Code that was based on amendments to the 2006 Seattle Energy Code (rather than amendments to the 2009 WSEC). However, public comment recommended that Seattle continue on its previous path with a 2009 Seattle Energy Code that was based on amendments to the 2009 WSEC. CCAB unanimously endorsed the DPD recommendations at their meeting on 15 July 2010.

DPD expresses its gratitude for all of those who participated in this process. Their efforts will result in a Seattle Energy Code that is more workable for all.

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Energy Efficiency

A preliminary analysis of the proposed 2009 Seattle Energy Code for an office building estimates an energy savings that is more than 15% but less than 20% on a total building energy consumption basis compared to ASHRAE/IESNA Standard 90.1-2007. For any particular building, energy savings will vary depending on the use of the building, hours of operation, building envelope materials, size and orientation of windows, mechanical system types, process loads, etc.

If additional energy savings were desired for the 2009 Seattle Energy Code so as to achieve the 20% energy savings compared to ASHRAE/IESNA Standard 90.1-2007, requiring tested compliance with maximum building air leakage rates would be a logical step. While energy analysis models (and practical experience) show that building air leakage rates can have a significant impact on building energy consumption, past Energy Codes have neglected this arena. However, Energy Codes are beginning to correct this omission. The 2009 WSEC will require tested compliance with maximum building air leakage rates for single-family residential buildings. This is understandable as there is a broad data set of tested results for these small buildings. The 2009 WSEC will also require building air leakage testing for larger buildings, but will not require compliance with specific values as less building air leakage testing has been done for large buildings. During the adoption process for the 2009 WSEC, the intent expressed was to use the next three years to develop additional information through testing of these larger buildings, and then to establish criteria in the 2012 WSEC. When tested compliance with maximum building air leakage rates was discussed as a possible requirement during the public review meetings for the 2009 Seattle Energy Code, concerns were expressed about the uncertainty of the performance of current buildings. Consequently, based on the public review, at this point it is not recommended that nonresidential buildings be required to demonstrate tested compliance with maximum building air leakage rates.

Code Language Proposals

Consistent with the current Seattle Energy Code, the plan is for the 2009 Seattle Energy Code (the update to be adopted this summer and effective this fall) to consist of the 2009 Washington State Energy Code (WSEC) with Seattle amendments to the provisions for nonresidential spaces. This document only contains the proposed Seattle amendments to the 2009 Washington State Energy Code. As is the case with the current Seattle Energy Code, there are no proposed Seattle amendments to the provisions for residential spaces in the Washington State Energy Code, other than administrative provisions and citing of Seattle codes and procedural requirements. (Please note, however, that the Washington State Building Code Council, WSBCC, did adopt significant revisions to the provisions for residential spaces that are contained in the 2009 WSEC. These changes have been published in the Washington State Register WSR 10-03-115 and can be viewed at the WSBCC website at: <http://sbcc.wa.gov/Page.aspx?nid=138> .)

All of the Seattle amendments are summarized below in section number order and include:

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- **Section number and title.**
- *Discussion:* This contains a summary of the issues and the source of the language if it has been taken from another document, such as ASHRAE/IESNA Standard 90.1-2007. (Standard 90.1 is cited in the 1992 National Energy Policy Act as the basis for Energy Codes in all 50 states. Previous versions of the Seattle Energy Code have drawn substantially from this document and its predecessors.)
 - “No Seattle changes (retain existing Seattle amendment)” indicates that the 2009 Seattle amendment is the same as an existing 2006 Seattle amendment, or revised only to reflect partial adoption into the 2009 Washington State Energy Code.
- *Proposal:* This contains the proposed text. All strikethroughs and underlines show changes from the 2009 Washington State Energy Code.
 - Changes to Seattle amendments or new Seattle amendments are shown by a bar in the margin. (Changes to tables are shown by a bar in the margin next to the table title. Changes are not indicated to notes in boxed text or brackets).

EXISTING SEATTLE AMENDMENTS TO BE RETAINED – NO CHANGES

The Seattle amendments to the following sections and tables are proposed to be retained with no changes:

1001	General.
1311.6	Radiant Floors.
1402	Mechanical Ventilation.
1411.2	Rating Conditions.
1413.5	Economizer Heating System Impact.
1414.2	Insulation.
1513.1	Local Control and Accessibility.

EXISTING SEATTLE AMENDMENTS TO BE RETAINED – MINOR CHANGES

The Seattle amendments to the following sections were partially adopted into the 2009 Washington State Energy Code and are modified to reflect that partial adoption:

1431.2	System Sizing Limits.
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EXISTING SEATTLE AMENDMENTS NO LONGER NEEDED – STATE ADOPTION

The previous Seattle amendments to the following sections have been incorporated into the 2009 Washington State Energy Code and so are no longer needed:

1005.1	Above-Grade Walls, General.
Table 10-5	Default U-Factors for Above-Grade Walls
1007.1	Ceilings, General.

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1310.2	Semi-Heated Spaces.
1314.1	Building Envelope Sealing.
1314.5	Loading Dock Weatherseals.
1411.5	Heating Systems in Unenclosed Spaces.
1421	System type.
1422	Controls.
1423	Economizers.
1440	Service Water Heating.
1454	Pool Covers and Insulation.
1512	Exempt Lighting.

PROPOSED AMENDMENTS

Amendments are proposed for the following:

- 101.1 Title and Applicability: Clarify applicability to and transition for single-family residential spaces.
- 101.2 Purpose and Intent: Clarify that purpose is for single-family residential spaces.
- 101.3 Scope: Clarify the scope for single-family residential spaces and other spaces.
- 105.2.1 Required Inspections: Revise reference to cite Seattle code.
- 106 Violations and Penalties: Companion change to Section 1144.
- 107 Liability: Revise reference to cite City of Seattle.
- 108 Conflicts with Other Codes: Revise references to cite Seattle codes.
- Chapter 2 Definitions: (1) add definition of computer room per addendum bu to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14); (2) add definition of daylighted zone in parking garages per addendum cz to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 15); (3) add definition of dynamic glazing per addendum cl to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 13); (4) add definition for integrated energy efficiency ratio per addendum s to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14); (5) add definitions for types of on-site renewable energy systems (with a modification to include ground-source and groundwater-source heat pumps), and geothermal energy, per ASHRAE/USGBC/IESNA Standard 189.1-2009 (companion change to Chapter 16); (6) add definition for orientations (companion change to Chapter 13); (7) add definitions of sensible cooling panel, sensible heating panel, thermally effective panel surface, and thermally ineffective panel surface per addendum ae to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14); (8) add definition of visible transmittance per addendum bm to ASHRAE/IESNA Standard 90.1-2007; (9) clarify definition of building entrance to specifically mention elevator doors and one-way exit doors; (10) clarify definition of glazing as it applies to other than residential spaces, and add definition for fenestration area to parallel the glazing area definition used for residential spaces; (11) clarify definition of indirectly conditioned space to specifically address elevator shafts

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and stair enclosures; (12) clarify definition of mechanical system to specifically mention industrial facilities and processes; (13) retain existing note about nominal R-value and existing definition of person; (14) add cross-references to the Building Code for the definition of existing building and story; and (15) change definitions to refer to the Seattle codes.

- Table 3-1 Outdoor Design Temperatures: Specify Seattle design conditions for consistency with Section 1431.2.
- 303 Mechanical Ventilation: (1) Revise reference to cite Seattle codes; (2) provide cross-reference to mechanical ventilation requirements for other spaces.
- 502.1.1 Building Envelope, General: Add note to provide information.
- 502.1.4.1 Building Envelope, General: Revise reference to cite Seattle code.
- 502.1.4.2 Insulation Materials: Revise reference to cite Seattle code.
- 502.1.4.5 Roof/Ceiling Insulation: Revise reference to cite Seattle code.
- 502.2.1 UA Calculations: Add note to highlight DPD procedural requirement.
- 503.10.3 Sealing: Revise reference to cite Seattle code.
- 503.10.4 Dampers: Revise reference to cite Seattle code.
- 602.7.2 Glazing U-Factor: Add note to highlight DPD procedural requirement.
- Chapter 7 Standards: (1) Update Seattle EnvStd to 2009 version; (2) add cross-references to RS-35 (advanced criteria) and RS-36 (2030 Challenge) that are included at the end.
- 901 Additional Residential Energy Efficiency Requirements: (1) Provide informative note; (2) add notes to highlight DPD procedural requirement; and (3) revise references to cite Seattle code.
- Table 10-A R-Value of Fiberglass Batts Compressed within Various Depth Cavities: Expand options to include R-25 which fits in nominal 2 x 8 framing.
- Table 10-B Default R-Values for Building Materials: Retain existing Seattle amendment, but revise information for brick to reflect typical face brick and add footnote with reference for other heat capacities.
- 1005.3 Component Description: Revise descriptions for metal building walls for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.
- Table 10-5A U-Factors for Overall Assembly Metal Stud Walls, Effective R-Values for Metal Framing and Cavity Only, and Default Metal Building U-Factors: Expand default options for metal stud walls in Table 10-5A(1); revise and expand default options for metal building walls in Table 10-5A(3) for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.
- Table 10-5B Default U-Factors for Concrete and Masonry Walls: (1) Table 10-5B(1) retain existing Seattle numbering for tables; (2) Table 10-5B(2): expand default options for peripheral edges of intermediate concrete floors; (3) Table 10-5B(3): retain existing

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Seattle amendment with default options for mass walls and revise for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

- 1006 Default U-Factors for Fenestration, Glazing, and Doors: Revise terminology for consistency with 2009 WSEC.
- Table 10-6 Default U-Factors for Vertical Fenestration, Skylights, and Opaque Doors: Clarify default U-factors for revolving doors and vestibules.
- 1007.2 Component Description: Revise descriptions for metal building roofs for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.
- Table 10-7F Default U-Factors for Metal Building Roofs: Revise and expand default options for metal building roofs in Table 10-7F for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.
- Table 10-7G Assembly U-Factors for Roofs with Insulation Entirely Above Deck (Uninterrupted by Framing): Expand default options for roofs with insulation entirely above deck.
- 1009.1 Mass, General: Add cross-reference to Table 10-B for brick, concrete, and concrete masonry used in other than single-family residential projects.
- 1100 Title: Clarify that the requirements apply to multifamily residential spaces.
- 1105 Applicability to Multifamily Residential Spaces: Specify transition for multifamily residential spaces.
- 1110 Purpose and Intent: Clarify that the requirements apply to all buildings, systems, and processes.
- 1120 Scope: More explicitly state the application to commercial and industrial processes.
- 1132.1 Building Envelope: Clarify application of vestibule requirements to existing buildings.
- 1132.2 Mechanical Systems: Add specification that mechanical system alterations are not to decrease the energy efficiency of the building.
- 1132.3 Lighting and Motors: (1) Expand application of requirements for lighting alterations per addendum av to ASHRAE/IESNA Standard 90.1, (2) add specification that lighting system alterations are not to decrease the energy efficiency of the building.
- 1133 Change of Occupancy or Use or Space Conditioning: (1) Explicitly cite changes of space conditioning in the title; (2) retain existing Seattle amendment, with minor change to delete heating equipment capacity.
- 1135 Commissioning: Delete HVAC limitations, thereby retaining application of commissioning requirements to all buildings per existing Seattle Energy Code requirements.
- 1141.2 Details: Companion change to Table 13-1.

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- 1141.4 Systems Analysis Approach for the Entire Building: Companion change to RS-29 Section 1.2.
- 1143.2 Required Inspections: Revise reference to cite Seattle code.
- 1144 Violations and Penalties: Revise to reflect current procedures.
- 1150 Conflicts with Other Codes: Clarify applicability.
- 1162 Liability: Revise to reflect current procedures.
- Table 11-1 Economizer Compliance Options for Mechanical Alterations: Retain existing Seattle amendments, with minor companion change for consistency with Chapter 14.
- Chapter 12 Energy Metering and Energy Consumption Management: Revise (1) to be no less stringent than ASHRAE/USGBC/IESNA Standard 189.1-2009, (2) to clarify intent.
- Figure 13A Building Envelope Compliance Options: Modify to add new sections.
- 1310.1 Conditioned Spaces: Companion change to Section 1335.
- 1310.3 Cold Storage and Refrigerated Spaces: (1) Revise to be no less stringent than changes to Table 13-1, and (2) add assembly U-factors for Target UA compliance option.
- 1311.5 Slab-on-Grade Floor: Revise to correspond with Section 502.1.4.8 of the 2009 WSEC.
- 1312 Fenestration and Doors: Revise terminology for consistency.
- 1312.2 Solar Heat Gain Coefficient and Visible Transmittance: (1) Retain existing Seattle amendments; (2) add exception 3 for dynamic glazing for SHGC per addendum c1 to ASHRAE/IESNA Standard 90.1-2007.
- 1313.2 Roof/Ceiling Assemblies: Revise reference to cite Seattle code.
- 1314.2 Fenestration and Doors: Clarify meaning of field fabricated per ASHRAE Standard 90.1-2007, Section 5.4.3.2 interpretation.
- 1314.6 Continuous Air Barrier: Revise (1) to apply requirement for building air leakage testing to all buildings; (2) to specify confidence interval; (3) to more carefully specify test pressures and ranges; and (4) to add another reference to the informative note.
- 1314.7 Vestibules: Retain existing Seattle amendment, but (1) provide exemptions for semi-heated spaces and for elevator lobbies in parking garages; and (2) add informative note to clarify intent.
- 1321 Prescriptive Building Envelope Option, General: Clarify that compliance is to be done separately for nonresidential and residential spaces for consistency with ASHRAE/IESNA Standard 90.1-2007, Section 5.2.1.
- 1322 Opaque Envelope: (1) Add descriptions of alternate compliance options for assemblies with thermal bridges; (2) add cross-reference to Section 1332 for calculation of U-factors for assemblies with metal framing; (3) retain existing Seattle exception, but

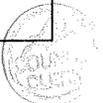
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modify to correspond with changes to Table 13-1; and (4) add procedural note to clarify application to elevator shafts and stairwells.

- 1323 Fenestration: Revise as follows: (1) Section 1323: add statement of intent for fenestration orientation, retain existing Seattle amendment for the Seattle Land Use Code, incorporate parking lot attendant booths into exception (previously in Section 1301), add allowance for revolving doors and vestibules, revise visible transmittance criteria; (2) Section 1323.1: retain limits on the area of below-grade walls included in the fenestration area calculation from the 2006 WSEC; (3) Section 1323.3: add option for shading credit for open louvers and non-opaque overhangs per ASHRAE/IESNA Standard 90.1-2007, Section 5.5.4.4.1; and (4) Section 1323.4: add criteria for minimum visible transmittance for projects with fenestration areas over 30% of the gross wall area.
- 1331 Component Performance Building Envelope Option, General: Revise as follows: (1) clarify that compliance is to be done separately for nonresidential and residential spaces for consistency with ASHRAE/IESNA Standard 90.1-2007, Section 5.2.1, and as has been required for previous versions of the Seattle and Washington State Energy Codes; (2) update reference to Seattle EnvStd (companion change to Sections 1322 and 1323 and Table 13-1); and (3) retain existing Seattle amendment allowing prescriptive compliance for street-level retail.
- 1332 Component U-Factors: Add alternate for determining U-factor for envelope assemblies containing metal framing.
- 1333 UA Calculations: Retain existing Seattle amendment, and add a procedural note.
- 1334 Solar Heat Gain Coefficient Rate Calculations: Clarify that the baseline for trade-offs is SHGC without the projection factors.
- 1335 Visible Transmittance Calculations: Add procedure for visible transmittance trade-offs (companion change to Table 13-1).
- Equations 13-1 Target UA, 13-2 Proposed UA, 13-3 Target SHGCA, 13-4 Proposed SHGCA: Revise terminology for consistency.
- Equations 13-5 Target VTA & 13-6 Proposed VTA: Companion change to Section 1335.
- Table 13-1 Building Envelope Requirements: Revise opaque envelope and fenestration requirements to achieve greater energy efficiency using the criteria from ASHRAE/IESNA Standard 90.1-2007 and addenda, and ASHRAE/USGBC/IESNA Standard 189.1-2009: (1) Roofs: revise so that the U-factor criteria is comparable for all classes of roofs; (2) Walls above grade: revise so that the U-factor criteria is comparable for all classes of walls but with mass walls slightly higher, revise insulation for metal building walls per ASHRAE/USGBC/IESNA Standard 189.1-2009, revise insulation for other walls per addendum bb to ASHRAE/IESNA Standard 90.1, provide alternate compliance options for otherwise continuous insulation with limited isolated metal penetrations; (3) Walls below grade: revise to be no less stringent than the 2006 SEC; (4) Floors over unconditioned space: revise insulation for wood-framed floors per addendum bb to ASHRAE/IESNA Standard 90.1; (5) Slab-on-grade floors: revise insulation for unheated slab floors per addendum bb to ASHRAE/IESNA Standard 90.1; (6) Opaque doors: require insulated doors per new default values in Table 10-6C; (7)

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Vertical fenestration: set maximum baseline prescriptive fenestration area at 30% of the wall area per addendum bb to ASHRAE/IESNA Standard 90.1; revise U-factor for nonmetal framing per ASHRAE/USGBC/IESNA Standard 189.1-2009 and to match 2010 Energy Star criteria, revise U-factor for metal framing by comparable amount, add alternate U-factor criteria for revolving doors and vestibules, and retain existing 2006 SEC SHGC criteria; and require additional improvements for prescriptive fenestration area in excess of the 30% of the wall area allowed by addendum bb to ASHRAE/IESNA Standard 90.1; require 5-7% further improvement in fenestration U-factor and SHGC criteria and establish minimum VT criteria for 30-40% fenestration area; allow higher U-factor for a limited area of operable vertical fenestration with metal framing; (8) Skylights: revise U-factor for skylights without curb per ASHRAE/USGBC/IESNA Standard 189.1-2009, revise U-factor for skylights with curb to match 2010 Energy Star criteria, revise SHGC for all per ASHRAE/USGBC/IESNA Standard 189.1-2009; require 5-10% further improvement in fenestration U-factor and SHGC criteria for 30-40% fenestration area.

- Figure 14A Mechanical Systems Compliance Path: Modify to add new sections.
- 1410 General Requirements: Companion change to Sections 1470 and 1475.
- 1411 Mechanical Equipment Performance Requirements: Clarify that the requirements apply to all mechanical systems.
- 1411.1 General: (1) Add requirement for minimum efficiency for computer room equipment covered by ASHRAE Standard 127 as listed in Table 14-1A(2) per addendum bu of ASHRAE/IESNA Standard 90.1-2007; (2) Add requirement for minimum efficiency for variable refrigerant flow systems covered by AHRI Standard 1230 as listed in Tables 14-1A(3) and 14-1A(4) per addendum cp of ASHRAE/IESNA Standard 90.1-2007; (3) retain existing Seattle amendment, modified so that condenser water return requirements apply to all cooling towers with chilled water systems with an exception for replacement towers where there are space constraints; (4) retain existing Seattle amendment, modified so that single-pass cooling is only allowed for icemakers and use of medical equipment during an emergency.
- 1411.4 Electric Heating and Cooling Equipment: Retain existing Seattle amendment, but modify to address cooling only equipment with electric heat in the main supply duct.
- 1412.4 Setback and Shut-Off: Retain existing Seattle amendment, and add note clarifying application of exception for relief dampers per ASHRAE Standard 90.1-2007, Section 6.5.1.1.5.
- 1412.5 Heat Pump Controls: Revise to correspond with Section 503.8.3.5 of the 2009 WSEC.
- 1412.8 Demand Control Ventilation: (1) Change reference to Seattle Mechanical Code; (2) Modify to achieve further fan energy savings, and associated heating and cooling energy savings, in laboratory spaces.
- 1412.9 Enclosed Loading Dock, Parking Garage, and Motor Vehicle Repair Garage Exhaust Ventilation System Control: Modify for consistency with the Seattle Mechanical Code and to achieve further fan energy savings.

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- 1412.10 Single Zone Variable-Air-Volume Controls: Add requirement for variable speed drive for single-zone systems per addendum n to ASHRAE/IESNA Standard 90.1-2007.
- 1413.1 Operation: Clarify definition of design supply air per ASHRAE Standard 90.1-2007 User's Manual, page 6-67.
- 1413.3 Integrated Operation: Delete exceptions per addendum cy to ASHRAE/IESNA Standard 90.1-2007.
- 1414.1 Duct Sealing and Testing: (1) Require testing of ductwork located outdoors per addendum cq to ASHRAE/IESNA Standard 90.1-2007, (2) require testing of most sections of high-pressure duct work.
- 1415.2 Radiant Systems: Add requirement for insulating the back side of radiant heating systems per addendum ae to ASHRAE/IESNA Standard 90.1-2007, and also apply requirements to radiant cooling systems.
- 1416 Commissioning and Completion Requirements: (1) Retain application of commissioning requirements to all buildings; (2) add metering system to the list of equipment to be commissioned.
- Figure 14B Commissioning Compliance Checklist: Revise reference to cite Seattle code.
- 1431.3 Hydronic System Design: Add requirement for hydronic system piping design per addendum af and cc to ASHRAE/IESNA Standard 90.1-2007.
- 1432.2 Systems Temperature Reset Controls: Require variable speed pump control at same threshold as Section 1438.
- 1433 Economizers: (1) Clarify that requirements also apply to redundant equipment; (2) Exception 1: clarify treatment of redundant units in calculations; clarify meaning of initial tenant improvement; add option b for very high efficiency equipment with improvement per addendum cy to ASHRAE/IESNA Standard 90.1-2007; and retain existing Seattle note about limits to use of the exception; (3) Exception 2: retain capacity limits from existing Seattle amendment; (4) Exception 3: add chilled floors as an option, clarify the DOAS systems that accompany chilled floor, chilled beam, and chilled ceiling space cooling systems must still comply with the air economizer requirements; (5) Exception 7: retain existing Seattle amendment; (6) Exception 8: clarify that the capacity ratings are based on the outside unit; (7) Exception 9: clarify that the text reference is to air economizers, limit Option 9a to 54,000 Btuh, require dedicated waterside economizer for Options 9b and 9c; (8) Exception 10: clarify that heat recovery is required for all units, and that spaces with large internal loads are limited to 20% of the floor area to qualify for this exception.
- 1435 Simultaneous heating and cooling: (1) Clarify that simultaneous heating and cooling is prohibited for ground-coupled systems regardless of whether they actually use ground water; (2) Exception 2, clarify the reset requirements in Section 1432.2 are always applicable; (3) Exception 4, revise to indicate that this exception is not applicable to computer rooms per addendum bu to ASHRAE/IESNA Standard 90.1-2007.

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- 1436 Energy Recovery: (1) Revise title for consistency with ASHRAE/IESNA Standard 90.1; (2) add informative note to clarify that the heat recovery requirements are applicable to industrial facilities and processes.
- 1436.1 Fan Systems: (1) Require energy recovery, rather than heat recovery alone (companion change to Section 1436); (2) delete exception for laboratory VAV systems; (3) add note to clarify heat recovery effectiveness criteria for Seattle; and (4) add cross-reference to additional laboratory requirements in Section 1439.2.
- 1436.2 Condensate Systems: Clarify applicable systems for condensate recovery.
- 1436.3 Heat Recovery for Service Water Heating: Add note indicating typical systems to which heat recovery is applicable.
- 1436.4 Condenser Heat Recovery: Clarify the basis for the calculations and the minimum heat recovery required.
- 1437 Electric Motor Efficiency: (1) Require electronically-commutated motors for fans in fan-coil units; and (2) add informative note to clarify that the motor efficiency requirements are applicable to industrial facilities and processes.
- 1438 System Criteria: (1) Change threshold to 5 hp; (2) clarify that the requirements are applicable to parking garage ventilation fans; (3) retain existing Seattle note; (4) add cross-reference to requirements in elevator code; and (5) revise exception for greater consistency with addendum u to ASHRAE/IESNA Standard 90.1-2007.
- 1439.2 Laboratory Exhaust Systems: Add cross-reference to additional laboratory requirements in Section 1436.1.
- 1444 Conservation of Water and Pumping Energy: Establish requirements for all service water pressure booster systems per addendum cv to ASHRAE/IESNA Standard 90.1-2007.
- 1452 Pool Water Heaters: (1) Retain existing Seattle amendment; and (2) update environmental conditions and rating standard per addendum y to ASHRAE/IESNA Standard 90.1-2007.
- 1470 Compressed Air and Vacuum Pumps: Add requirements for air compressors.
- 1475 Commercial Food Service: Add requirements for commercial food service equipment to be Energy Star per Section 7.4.7.3 of ASHRAE/USGBC/IESNA Standard 189.1-2009.
- Table 14-1A(1) Unitary Air Conditioners and Condensing Units, Electrically Operated, Minimum Efficiency Requirements: Revise EER and IEER values and establish separate criteria for water-cooled and evaporatively-cooled units per addendum co to ASHRAE/IESNA Standard 90.1-2007.
- Table 14-1A(2) Air Conditioners and Condensing Units Serving Computer Rooms, Minimum Efficiency Requirements: Establish requirements for computer room equipment subject to ASHRAE Standard 127 per addendum bu to ASHRAE/IESNA Standard 90.1-2007.

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- Tables 14-1A(3) and 14-1A(4) Electrically Operated Variable Refrigerant Flow Air Conditioners, Minimum Efficiency Requirements, and Air-to-Air and Applied Heat Pumps, Minimum Efficiency Requirements: Establish requirements for variable refrigerant flow air conditioners per addendum cp to ASHRAE/IESNA Standard 90.1-2007.
- Table 14-1B Unitary and Applied Heat Pumps, Electrically Operated, Minimum Efficiency Requirements: Add minimum efficiencies for water-to-water heat pumps per addendum bg to ASHRAE/IESNA Standard 90.1-2007.
- Table 14-1C Water Chilling Packages, Minimum Efficiency Requirements: (1) Retain existing Seattle minimum efficiencies for chillers; (2) add minimum efficiencies for heat recovery chillers.
- Table 14-1D Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps, Electrically Operated, Minimum Efficiency Requirements: Revise minimum efficiencies for PTAC and PTHP units per addendum bw to ASHRAE/IESNA Standard 90.1-2007.
- Table 14-1G Performance Requirements for Heat Rejection Equipment: Provide higher equipment efficiency tables per addendum to ASHRAE /IESNA Standard 90.1-2007.
- Table 14-3 Piping System Design Maximum Flow Rate in GPM: Add requirement for hydronic system piping design per addendum af and cc to ASHRAE/IESNA Standard 90.1-2007 (companion change to Section 1431.3).
- Table 14-6 Minimum Pipe Insulation Thickness: Revise requirements for pipe insulation for heating and hot water systems per addendum bi to ASHRAE/IESNA Standard 90.1-2007.
- 1510 General Requirements: Retain existing Seattle amendment requiring that parking garage lighting be calculated separately (formerly in Section 1531).
- 1511 Electric Motors: Add informative note to clarify that the motor efficiency requirements are applicable to industrial facilities and processes.
- 1513.3 Daylight Zone Control: (1) Include parking garages; (2) add minor clarifications to the exception that separate circuiting is required for all daylight zones, and restaurants are treated like retail.
- 1513.5 Automatic Shut-Off Controls, Interior: Provide more direction on shut-off during off-hours per addendum cd to ASHRAE/IESNA Standard 90.1-2007.
- 1513.6 Automatic Shut-Off Controls, Interior: Revise as follows: (1) Section 1513.6: clarify that lighting with dual functionality be equipped with automatic lighting controls to shut off lights during unoccupied hours per addendum cu to ASHRAE/IESNA Standard 90.1-2007; (2) Section 1513.6: expand use of occupancy sensor controls per addenda x (storage spaces), and bp, to ASHRAE/IESNA Standard 90.1-2007; (3) Section 1513.6: require reduction in lighting power for lighting often on for 24-hours when spaces are unoccupied per addenda cf (stairwells) to ASHRAE/IESNA Standard 90.1-2007; (4) Section 1513.6: require reduction in lighting power for parking garages per addenda cz to ASHRAE/IESNA Standard 90.1-2007; (5) Section 1513.6.1: require

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manual ON for occupancy sensors to eliminate unnecessary lighting consumption per addenda aa to ASHRAE/IESNA Standard 90.1-2007; and (6) Section 1513.6.2: change automatic control zone maximum to 2,500 ft² per Section 9.4.1.2 of Standard 90.1-2007.

- 1521 Prescriptive Interior Lighting Requirements: Revise to correspond with changes to Section 1531.
- 1531 Interior Lighting Power Allowance: (1) Retain existing Seattle amendment requiring that parking garage lighting be calculated separately (formerly in Section 1532); (2) add informative note with reference back to trading limitations in Section 1510.
- 1532 Exterior Lighting Power Allowance: (1) Retain existing Seattle light pollution criteria; (2) add limits in Table 15-2B for signs.
- 1540 Transformers: Revise criteria for transformers per addendum o of ASHRAE/IESNA Standard 90.1-2007.
- Table 15-1 Unit Lighting Power Allowance: (1) Revise lighting power allowances to achieve greater energy efficiency per addendum by to ASHRAE/IESNA Standard 90.1-2007; (2) add aircraft maintenance and pharmacies; (3) delete footnotes that are not referenced in the table (and therefore are not applicable).
- Table 15-2A Exterior Lighting Zones & Table 15-2B Lighting Power Densities for Building Exteriors: (1) Revise to merge the two highest lighting categories into zone 3; (2) editorial change to display all values to the same number of decimal places.
- Table 15-3 Minimum Nominal Efficiency Levels for NEMA Class I Low Voltage Dry-Type Distribution Transformers: Revise criteria for transformers per addendum o of ASHRAE/IESNA Standard 90.1-2007 (companion change to Section 1540).
- Chapter 16 On-Site Renewable Energy Systems: Add requirements for on-site renewable energy systems from ASHRAE/USGBC/IESNA Standard 189.1-2009, format for installed capacity from Section 7.4.1.1, but with much less-stringent criteria - only 1/12 as stringent with minimum annual energy production equivalent of 500 Btu/ft² of gross conditioned floor area (instead of minimum annual energy production equivalent of 6,000 Btu/ft² of gross conditioned floor area); requirement does not take effect until DPD develops Director's Rule with alternate means of compliance.
- RS-29 Nonresidential and Multifamily Residential Building Design by Systems Analysis: (1) Modify title to specifically include multifamily residential buildings; and (2) revise reference to cite Seattle code.
- RS-29, 1.1 General: Revise to reference Seattle Energy Code.
- RS-29, 1.2 Performance Rating: (1) Revise for consistency with other changes (companion change to Chapters 12 and 14); (2) carry over existing criteria from Director's Rule 27-2005.
- RS-29, 1.3 Trade-Off Limits: Revise for consistency with other changes (companion change to Chapter 16).

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- RS-29, 1.4 Documentation Requirements: Carry over existing criteria from Director's Rule 27-2005.
- RS-29, 2.3 Climatic Data: Carry over existing criteria from Director's Rule 27-2005.
- RS-29, 2.4 Energy Conversion: Companion change to Chapter 16.
- RS-29, 2.5 Exceptional Calculation Methods: Revise criteria for exceptional calculation method per addendum r of ASHRAE/IESNA Standard 90.1-2007.
- RS-29, 3.1 Building Performance Calculations: (1) Carry over existing criteria from Director's Rule 27-2005; (2) clarify that the baseline building must comply with the prescriptive requirements.
- RS-29, 3.1.2.2 Equipment Capacities: Revise so that the proposed design does not provide less comfort than the standard design through more hours of unmet loads.
- RS-29, 3.1.2.9 System Fan Power: Revise criteria for fans systems per addendum ca of ASHRAE/IESNA Standard 90.1-2007.
- RS-29, Table 3-1 Modeling Requirements for Calculating Proposed and Baseline Building Performance: Revise for greater consistency with Chapters 11-16 as follows: (1) In 3, Space Use Classification: eliminate extra text that is not applicable; (2) In 5, Building Envelope: provide guidance on modeling air leakage, require that uninsulated components be separately modeled; (3) In 6, Lighting: clarify that interior and exterior lighting cannot be traded.
- RS-29, Table 3.3 Schedules: Revise for consistency with other requirements such as for occupancy sensors within conditioned spaces and within parking garages (companion change to Chapter 15).
- RS-29, 5 Reporting Format: Carry over existing criteria from Director's Rule 27-2005.
- RS-35, Advanced Criteria for Other Programs: Carry over existing criteria from Director's Rule 27-2005.
- RS-36, Illustrative Goals for the 2030 Challenge in Seattle: Provide illustrative goals for the 2030 Challenge in Seattle.

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CHAPTER 1 ADMINISTRATION AND ENFORCEMENT

101.1 Title and Applicability.

Discussion: Clarify applicability to and transition for single-family residential spaces.

Proposal: Amend 2009 WSEC as follows -

101.1 Title and Applicability

101.1.1 Title: This Code, including provisions of the 2009 Washington Energy Code as they apply without Seattle Amendments, may be referred to as the "Seattle Energy Code" or the "2009 Seattle Energy Code". References herein to "this Code" mean the entire Seattle Energy Code or the provisions thereof that are applicable to the type of structure or space involved, as the context may require.

Chapters 1 through 10 of this Code, as they apply to single-family residential spaces, shall be known as the "~~(Washington State)~~Seattle Single-Family Residential Energy Code" and may be cited as such. Any reference to the "Seattle Energy Code" in the Seattle Municipal Code or any Seattle ordinance, to the extent applicable to those spaces, shall include the Seattle Single-Family Residential Energy Code. ~~(; and will be referred to herein as "this Code.")~~

101.1.2 Applicability to Single-Family Residential Spaces: Until the effective date of the 2009 Washington State Energy Code, the 2006 Washington State Energy Code, as filed in Seattle City Clerk's File 308938, and the amendments thereto adopted by Ordinance 122530, constitute the Seattle Energy Code for single-family residential spaces. Effective upon the date when the 2009 Washington State Energy Code takes effect, Chapters 1 through 10 of the 2009 Washington State Energy Code, with the Seattle Amendments only to Chapter 1, constitute the Seattle Energy Code for single-family residential spaces.

EXCEPTION: Sections 1133, 1140, 1141.1, 1141.2, 1144, and 1162 of Chapter 11 of this Code, which relate to procedure, administration and enforcement, including Seattle Amendments to those sections, and the procedural requirements in all chapters, apply to all spaces and occupancies both before and after effectiveness of the 2009 Washington State Energy Code.

101.2 Purpose and Intent.

Discussion: Clarify that purpose is for single-family residential spaces.

Proposal: Amend 2009 WSEC as follows -

101.2 Purpose and Intent: The purpose of the Seattle Single-Family Residential Energy Code ~~((this Code))~~ is to provide minimum standards for new or altered buildings and structures or portions thereof to achieve efficient use and conservation of energy.

The purpose of the Seattle Single-Family Residential Energy Code ~~((this Code))~~ is not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by its terms ~~((the terms of this Code))~~. It is intended that these provisions provide flexibility to permit the use of innovative approaches and techniques to achieve efficient use and conservation of energy. These provisions are

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structured to permit compliance with the intent of the Seattle Single-Family Residential Energy Code~~((this Code))~~ by any one of the following three paths of design:

1. A systems analysis approach for the entire building and its energy-using sub-systems which may utilize renewable energy sources; Chapters 4 and 9.
2. A component performance approach for various building elements and mechanical systems and components; Chapters 5 and 9.
3. A prescriptive requirements approach; Chapters 6 and 9.

Compliance with any one of these approaches meets the intent of the Seattle Single-Family Residential Energy Code~~((this Code))~~. The Seattle Single-Family Residential Energy Code~~((This Code))~~ is not intended to abridge any safety or health requirements required under any other applicable codes or ordinances. The provisions of the Seattle Single-Family Residential Energy Code~~((this Code))~~ do not consider the efficiency of various energy forms as they are delivered to the building envelope. A determination of delivered energy efficiencies in conjunction with the Seattle Single-Family Residential Energy Code~~((this Code))~~ will provide the most efficient use of available energy in new building construction.

101.3 Scope.

Discussion: Clarify the scope for single-family residential spaces and other spaces.

Proposal: Amend 2009 WSEC as follows -

101.3 Scope: The Seattle Single-Family Residential Energy Code~~((This Code))~~ sets forth, among other things, minimum requirements for the design of new buildings and structures that provide facilities or shelter for residential occupancies by regulating their exterior envelopes and the selection of their mechanical systems, domestic water systems, electrical distribution and illuminating systems, and equipment for efficient use and conservation of energy. Buildings that are subject to the Seattle Single-Family Residential Energy Code shall be designed to comply with the requirements of~~((either))~~ Chapter 4, 5 or 6 of this Code and the additional energy efficiency requirements included in Chapter 9 of this Code.

Spaces within the scope of Section R101.2 of the ~~((International))~~Seattle Residential Code shall comply with Chapters 1 through 10 of this Code. All other spaces, including other Group R Occupancies, shall comply with Chapters 11 through 16~~((20))~~ of this Code as specified in Section 1105. Chapter 2 (Definitions), Chapter 3 (Design Conditions), Chapter 7 (Standards) and Chapter 10 (Default heat loss coefficients) are applicable to all building types.

105.2.1 Required Inspections.

Discussion: Revise reference to cite Seattle codes.

Proposal: Amend 2009 WSEC as follows -

105.2.1 Required Inspections: The building official, upon notification, shall make the following inspection in addition to those inspections required in ~~((Section 109.3 of the International))~~the Seattle Building Code or Seattle Residential Code:

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1. **Wall Insulation Inspection:** To be made after all wall insulation and air vapor retarder sheet or film materials are in place, but before any wall covering is placed.

106 Violations and Penalties.

Discussion: Companion change to Section 1144.

Proposal: Amend 2009 WSEC as follows -

SECTION 106 — VIOLATIONS AND PENALTIES

It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the ~~((state))~~city of Seattle, or allow the same to be done, contrary to or in violation of any of the provisions of this Code. Other violations are set forth in Section 1144 of this Code. Provisions for notices, enforcement proceedings and penalties specified in Section 103 of the Seattle Building Code apply to violations of this Code, as set forth in Section 1144 of this Code.

107 Liability.

Discussion: Revise reference to cite City of Seattle.

Proposal: Amend 2009 WSEC as follows -

SECTION 107 — LIABILITY

Nothing contained in this Code is intended to be nor shall be construed to create or form the basis for any liability on the part of ~~((any city or county))~~the City of Seattle or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this Code.

108 Conflicts with Other Codes.

Discussion: Revise references to cite Seattle codes.

Proposal: Amend 2009 WSEC as follows -

SECTION 108 — CONFLICTS WITH OTHER CODES

In addition to the requirements of this Code, all occupancies shall conform to the provisions included in the Seattle Building Code or Seattle Residential Code, as applicable, and other applicable codes~~((State Building Code (Chapter 19.27 RCW)))~~. In case of conflicts among Codes enumerated in RCW 19.27.031 subsections (1), (2), (3) and (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 ~~((State))~~Seattle Mechanical Code ~~((Chapter 51-52 WAC))~~, the duct insulation requirements of this Code~~((code, or where applicable, a local jurisdiction's energy code))~~ shall govern.

Where, in any specific case, different sections of this Code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there

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is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. (~~Wherever in this Code reference is made to the appendix, the provisions in the appendix shall not apply unless specifically adopted.~~)

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CHAPTER 2 DEFINITIONS

201.1 Application of Terms.

Discussion: Revise as follows:

- (1) add definition of computer room per addendum bu to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14);
- (2) add definition of daylighted zone in parking garages per addendum cz to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 15);
- (3) add definition of dynamic glazing per addendum cl to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 13);
- (4) add definition for integrated energy efficiency ratio per addendum s to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14);
- (5) add definitions for types of on-site renewable energy systems (with a modification to include ground-source and groundwater-source heat pumps), and geothermal energy, per ASHRAE/USGBC/IESNA Standard 189.1-2009 (companion change to Chapter 16);
- (6) add definition for orientations (companion change to Chapter 13);
- (7) add definitions of sensible cooling panel, sensible heating panel, thermally effective panel surface, and thermally ineffective panel surface per addendum ae to ASHRAE/IESNA Standard 90.1-2007 (companion change to Chapter 14);
- (8) add definition of visible transmittance per addendum bm to ASHRAE/IESNA Standard 90.1-2007;
- (9) clarify definition of building entrance to specifically mention elevator doors and one-way exit doors;
- (10) clarify definition of glazing as it applies to other than residential spaces, and add definition for fenestration area to parallel the glazing area definition used for residential spaces;
- (11) clarify definition of indirectly conditioned space to specifically address elevator shafts and stair enclosures;
- (12) clarify definition of mechanical system to specifically mention industrial facilities and processes;
- (13) retain existing note about nominal R-value and existing definition of person;
- (14) add cross-references to the Building Code for the definition of existing building and story; and
- (15) change definitions to refer to the Seattle codes.

Proposal: Amend 2009 WSEC as follows -

Section 201.1 Application of Terms: For the purposes of this Code, certain abbreviations, terms, phrases, words and their derivatives, shall be as set forth in this chapter. Where terms are not defined, they shall have their ordinary accepted meanings within the context with which they are used. In the event there is a question about the definition of a term, the definitions for terms in the codes enumerated in RCW 19.27.031 and the edition of Webster's dictionary referenced therein shall be considered as the sources for providing ordinarily accepted meanings.

ADDITION: See the (~~Washington State~~)Seattle Building Code.

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...

AHRI STANDARD 1160: AHRI's Standard 1160, Performance Rating of Heat Pump Pool Heaters, 2008.

...

AMCA: Air Movement and Control Association.

AMCA STANDARD 500: AMCA's Standard 500, Laboratory Methods of Testing Dampers for Rating, 1997.

...

ASHRAE STANDARD 127: ASHRAE's Standard 127, Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners, 2007.

...

BUILDING, EXISTING: An existing structure, as defined in the Seattle Building Code. (See Existing Structure in the ((Washington State))Seattle Building Code.)

BUILDING ENTRANCE: Any doorway, set of doors (including elevator doors such as in parking garages), turnstile, vestibule, or other form of portal that is ordinarily used to gain access to the building by its users and occupants. Where buildings have separate one-way doors to enter and to leave, this also includes any doors ordinarily used to leave the building.

...

BUILDING OFFICIAL: The ((official authorized to act in behalf of a jurisdiction code enforcement agency or its))Director of the Seattle Department of Planning and Development, or his or her authorized representative.

...

COMPUTER ROOM: a room whose primary function is to house electronic equipment for the processing and storage of electronic data and that has a design electronic data equipment power density exceeding 20 watts/ft² of conditioned floor area (215 watts/m²).

...

CONTINUOUS INSULATION (c.i.): Insulation that is continuous across all structural members without thermal bridges other than fasteners (i.e. screws and nails) and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope. For the purposes of this definition of continuous insulation, only screws and nails are considered fasteners. Insulation installed between metal studs, z-girts, z-channels, shelf angles, or insulation with penetrations by brick ties and offset brackets, or any other similar framing is not considered continuous insulation, regardless of whether the metal is continuous or occasionally discontinuous or has thermal break material. (See Section 1332 for determination of U-factors for assemblies that include metal other than screws and nails.)

Informative Note: Even small clips degrade the performance of insulation. For mass walls, Table 13-1 contains a prescriptive compliance option for mass walls with 1-inch clips. This corresponds with the category of "1 in Metal Clips at 24 in. on center horizontally and 16 in. vertically" in Table 10-5B(3), Default U-factor for Concrete and Masonry. However, note

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that this is not considered continuous insulation. There is a separate listing in Table 10-5B(3) for insulation that qualifies as continuous insulation.

Metal studs, z-girts or any other repetitive continuous metal framing can decrease the effective R-value of insulation by more than 50%. However, occasional continuous metal framing members such as shelf angles are also significant thermal bridges around the insulation. Discontinuous metal elements, such as stand-off brackets are better, but still are a thermal bridging element. Calculations on a stand-off system utilizing 6-inch brackets showed that the brackets mounted at 24 inches on center vertically and 16 inches on center horizontally decreased the effective R-value of the assembly by 25% and the brackets mounted at 48 inches on center vertically and 16 inches on center horizontally decreased the effective R-value of the assembly by 14%. Even isolated discontinuous metal elements such as brick ties have a thermal impact that is too large to be ignored.

...

DAYLIGHTED ZONE:

a. **Under skylights**~~((overhead glazing))~~: the area under a skylight~~((overhead glazing))~~ whose horizontal dimension, in each direction, is equal to the skylight's~~((overhead glazing))~~ dimension in that direction plus either 70 percent of the floor to ceiling height or the dimension to a ceiling height opaque partition or to a partition which is more than 50% opaque, or one-half the distance to an adjacent skylight~~((overhead))~~ or vertical fenestration~~((glazing))~~, whichever is least.

b. **At vertical fenestration**~~((glazing))~~: the area adjacent to vertical fenestration~~((glazing))~~ which receives daylighting from the glazing. For purposes of this definition and unless more detailed daylighting analysis is provided, the primary daylighted zone depth extends into the space a distance equal to the window head height and the secondary daylighted zone extends from the edge of the primary zone to a distance equal to two times the window head height, or to the nearest ceiling height opaque partition or to a partition which is more than 50% opaque, whichever is least~~((less))~~. The daylighting zone width is assumed to be the width of the window plus either two feet on each side (or the lesser distance to an opaque partition) or one-half the distance to adjacent skylights~~((overhead))~~ or vertical fenestration~~((glazing))~~, whichever is least.

c. **In parking garages**: the area within 20 feet of any portion of a perimeter wall that has a net opening to wall ratio of at least 40% and no exterior obstructions within 20 feet.

...

DOMESTIC WATER SYSTEM: Supply of hot water and cold water for domestic, ~~((or))~~ commercial, or industrial purposes, including commercial and industrial processes, other than comfort heating and cooling.

Informative Note: As indicated in Section 1120, the Energy Code applies to industrial facilities, as well as commercial and industrial processes. Thus, the domestic water requirements apply to industrial facilities, as well as systems and equipment used in commercial and industrial processes.

...

DPD: the Seattle Department of Planning and Development and any successor department responsible for administration of this Code.

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DWELLING UNIT: See the ((Washington State))Seattle Building Code.

DYNAMIC GLAZING: any fenestration product that has the fully reversible ability to change its performance properties, including U-factor, SHGC, or VT

...
EAST: (See **Orientation**.)

...
ENERGY STAR PROGRAM REQUIREMENTS FOR COMMERCIAL DISHWASHERS: Energy Star Program Requirements for Commercial Dishwashers, Version 1.1, October 11, 2007.

ENERGY STAR PROGRAM REQUIREMENTS FOR COMMERCIAL FRYERS: Energy Star Program Requirements for Commercial Fryers, Version 1.0, August 15, 2003.

ENERGY STAR PROGRAM REQUIREMENTS FOR COMMERCIAL STEAM COOKERS: Energy Star Program Requirements for Commercial Steam Cookers, Version 1.0, August 1, 2003.

ENERGY STAR PROGRAM REQUIREMENTS FOR HOT FOOD HOLDING CABINETS: Energy Star Program Requirements for Hot Food Holding Cabinets, Version 1.0, August 15, 2003.

...
FENESTRATION AREA: Total area of the fenestration measured using the rough opening, and including the glazing, sash and frame. For doors where the daylight opening area is less than 50 percent of the door area, the fenestration area is the daylight opening area. For all other doors, the fenestration area is the door area.

...
GEOTHERMAL ENERGY: heat extracted from the Earth's interior and used to produce electricity or mechanical power or provide thermal energy for heating buildings, water, or processes. Geothermal energy does not include systems that use energy independent of the geothermal source to raise the temperature of the extracted heat, such as heat pumps.

...
GLAZING: For residential spaces, ((All))all areas, including the frames, in the shell of a conditioned space that let in natural light including windows, clerestories, skylights, sliding or swinging glass doors and glass block walls. For other spaces, that portion of the fenestration that lets in natural light. (See **Fenestration**.)

Informative Note: The terminology used for single-family residential (in Chapters 1-10) differs from that used for other spaces (in Chapters 2 and 10-16). For single-family residential, the term "glazing" is used to apply to the overall product including the frame. However, for other spaces (nonresidential and multifamily residential), the term "fenestration" is used for the overall product including the frame, and "glazing" means only the portion of the product that lets in natural light.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



GUEST ROOM: See the ((Washington State))Seattle Building Code.

...

INDIRECTLY CONDITIONED SPACE: an enclosed space within a building that is not a heated or cooled space, whose area weighted heat transfer coefficient to heated or cooled spaces exceeds that to the outdoors or to unconditioned spaces; or through which air from heated or cooled spaces is transferred at a rate exceeding three air changes per hour. Enclosed corridors between conditioned spaces shall be considered as indirectly conditioned space. Unless demonstrated otherwise, all portions of elevator shafts and stair enclosures located in the interior of the building are considered indirectly conditioned space, including those portions of elevator shafts and stair enclosures that extend above the roof and those portions that extend down below the floor into the parking garage. (See **Conditioned Space, Heated Space, Cooled Space, and Unconditioned Space.**)

Informative Note: For elevator shafts and stair enclosures, unless the space they enclose is demonstrated not to be conditioned space, the walls and roofs of elevator shafts and stair enclosures that extend above the roof are subject to the building envelope requirements for conditioned space, and the walls of elevator shafts and stair enclosures that extend down below the floor into the parking garage are subject to the building envelope requirements for conditioned space.

...

INTERNATIONAL BUILDING CODE (IBC): (See ((Washington State))Seattle Building Code.)

INTERNATIONAL MECHANICAL CODE (IMC): (See ((Washington State Building))Seattle Mechanical Code.)

INTEGRATED ENERGY EFFICIENCY RATIO (IEER): a single-number figure of merit expressing cooling part-load EER efficiency for commercial unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

...

MECHANICAL SYSTEM: equipment and components that provide heating, cooling, and ventilation for any purpose, including commercial and industrial processes, other than domestic water systems.

Informative Note: As indicated in Section 1120, the Energy Code applies to industrial facilities, as well as commercial and industrial processes. Thus, the mechanical system requirements apply to industrial facilities, as well as systems and equipment used in commercial and industrial processes.

...

NOMINAL R-VALUE: the thermal resistance of insulation alone as determined in accordance with the U.S. Federal Trade Commission R-value rule (CFR Title 16, Part 460) in units of h·ft²·°F/Btu at a mean temperature of 75°F. Nominal R-value refers to the thermal resistance of the added insulation in framing cavities or insulated sheathing only and does not include the thermal resistance of other building materials or air films.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.

Procedural Requirement: For products not labeled in accordance with the FTC rule, the R-value is to be determined by a report from the ICC Evaluation Service (ICC-ES).

...

NORTH: (See **Orientation.**)

...

OCCUPANCY: See the ((Washington State))Seattle Building Code.

...

ON-SITE RENEWABLE ((ENERGY))ELECTRIC POWER SYSTEM: a photovoltaic, solar thermal, geothermal energy, ((and))or wind system((s)), used to generate electrical power and located on the building site. (See **Geothermal Energy.**)

ON-SITE RENEWABLE ENERGY SYSTEM: an on-site renewable electric power system or on-site renewable thermal energy system. (See **On-Site Renewable Electric Power System and On-Site Renewable Thermal Energy System.**)

ON-SITE RENEWABLE THERMAL ENERGY SYSTEM: a solar water-heating, geothermal energy, ground-source heat pump, or groundwater-source heat pump system, used to generate thermal energy and located on the building site. (See **Geothermal Energy.**)

...

ORIENTATION:

East: oriented less than 45 degrees of true east.

North: oriented less than or equal to 45 degrees of true north.

South: oriented less than or equal to 45 degrees of true south.

West: oriented less than 45 degrees of true west.

...

PERSON: Any individual, receiver, administrator, executor, assignee, trustee in bankruptcy, trust, estate, firm, partnership, joint venture, club, company, joint stock company, business trust, municipal or quasi-municipal corporation, state or instrumentality thereof, political subdivision of the State of Washington, corporation, limited liability company, association, society or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United States or any instrumentality thereof.

...

READILY ACCESSIBLE: See the ((Washington State))Seattle Mechanical Code.

...

RESIDENTIAL: The following two categories comprise all residential spaces for the purposes of this Code:

- a. Single-family: All spaces within the scope of Section R101.2 of the ((International))Seattle Residential Code.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



b. Multifamily:

- i. All Group R Occupancy not falling under the scope of Section 101.2 of the ((International))Seattle Residential Code including, but not limited to, dwelling units, hotel/motel guest rooms, dormitories, fraternity/sorority houses, hostels, prisons, and fire stations;
- ii. All sleeping areas in Group I Occupancy including, but not limited to, assisted living facilities, nursing homes, patient rooms in hospitals, prisons, and fire stations; and
- iii. All sleeping areas in other occupancies including, but not limited to, fire stations.

...

SENSIBLE COOLING PANEL: a panel designed for sensible cooling of an indoor space through heat transfer to the thermally effective panel surfaces from the occupants and/or indoor space by thermal radiation and natural convection.

SENSIBLE HEATING PANEL: a panel designed for sensible heating of an indoor space through heat transfer from the thermally effective panel surfaces to the occupants and/or indoor space by thermal radiation and natural convection.

...

SERVICE WATER HEATING: Supply of hot water for domestic or commercial or industrial purposes other than comfort heating.

Informative Note: As indicated in Section 1120, the Energy Code applies to industrial facilities, as well as commercial and industrial processes. Thus, the service water heating requirements apply to industrial facilities, as well as systems and equipment used in commercial and industrial processes.

...

SOUTH: (See Orientation.)

...

STORY: (See the Seattle Building Code.)

...

THERMALLY EFFECTIVE PANEL SURFACE: any exterior surface of a panel that is intended to transfer heat between the panel and the occupants and/or the indoor space.

THERMALLY INEFFECTIVE PANEL SURFACE: any exterior surface of a panel that is not intended to transfer heat between the panel and the occupants and/or the indoor space.

...

VISIBLE TRANSMITTANCE (VT): The ratio of visible radiation entering the space through the fenestration product to the incident visible radiation, determined as the spectral transmittance of the total fenestration system, weighted by the photopic response of the eye and integrated into a single dimensionless value.

...

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



WEST: (See Orientation.)

...

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



**CHAPTER 3
DESIGN CONDITIONS**

Table 3-1 Outdoor Design Temperatures.

Discussion: Specify Seattle design conditions for consistency with Section 1431.2.

Proposal: Amend 2009 WSEC as follows -

**TABLE 3-1
OUTDOOR DESIGN TEMPERATURES**

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)	Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)	Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Aberdeen 20 NNE	25	83	Hoquiam AP	26	79	Rainier, Longmire	15	85
Anacortes	24	72	Inchelium 2 NW	0	92	Paradise RS	8	71
Anatone	-4	89	John Day Dam	19	100	Raymond	28	81
Auburn	25	84	Kent	21	85	Redmond	17	83
Battleground	19	91	Kirkland	17	83	Republic	-9	87
Bellevue	24	83	La Grande	23	88	Richland	11	101
Bellingham 2 N	19	78	Leavenworth	-3	93	Ritzville	6	99
Blaine	17	73	Little Goose Dam	22	101	Satus Pass	10	90
Bremerton	29	83	Long Beach 3 NNE	25	77	<u>Seattle</u>	<u>24</u>	<u>82 db/66 wb</u>
Burlington	19	77	Longview	24	87	Seattle: Sea-Tac AP	24	83
Chehalis	21	87	Lower Granite Dam	14	98	Sedro Woolley 1 E	19	78
Chelan	10	89	Lower Monument Dam	18	103	Sequim	23	78
Cheney	4	94	Marysville	23	79	Shelton	23	85
Chesaw	-11	81	Metaline Falls	-1	89	Smyrna	8	102
Clarkston	10	94	Methow 2 W	1	89	Snohomish	21	81
Cle Elum	1	91	Nespelem 2 S	-4	93	Snoqualmie Pass	6	80
Colfax 1 NW	2	94	Newhalem	19	89	Spokane AP	4	92
Colville AP	-2	92	Newport	-5	92	Spokane CO	10	96
Concrete	19	83	Northport	2	92	Stampede Pass	7	76
Connell 4 NNW	6	100	Oak Harbor	16	74	Stehekin 3 NW	12	85
Cougar 5 E	25	93	Odessa	7	100	Stevens Pass	6	77
Dallesport AP	14	99	Olga 2 SE	24	71	Tacoma CO	29	82

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)	Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)	Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Darrington RS	13	85	Olympia, AP	17	85	Tatoosh Island	31	63
Davenport	5	92	Omak 2 NW	3	90	Toledo AP	17	84
Edmonds	24	82	Oroville	5	93	Vancouver	22	88
Ellensburg AP	2	90	Othello	9	98	Vashon Island	28	78
Elma	24	88	Packwood	16	90	Walla Walla AP	6	96
Ephrata AP	7	97	Plain	-3	89	Waterville	1	88
Everett Paine AFB	21	79	Pleasant View	16	98	Wellpinit	1	93
Forks 1 E	23	81	Pomeroy	3	95	Wenatchee CO	10	92
Glacier RS	13	82	Port Angeles	28	75	Whidbey Island	11	71
Glenoma (Kosmos)	18	89	Port Townsend	25	76	Willapa Harbor	26	81
Goldendale	7	94	Prosser	12	97	Wilson Creek	3	96
Grays River Hatchery	24	86	Puyallup	19	86	Winthrop 1 WSW	-12	91
Greenwater	1.4	84	Quilcene 2 SW	23	83	Yakima AP	11	94
Grotto	21	84	Quinault RS	25	84			

303 Mechanical Ventilation.

Discussion: (1) Revise reference to cite Seattle codes; (2) provide cross-reference to mechanical ventilation requirements for other spaces.

Proposal: Amend 2009 WSEC as follows -

SECTION 303 — MECHANICAL VENTILATION

For single-family residential spaces, the((The)) minimum requirements for ventilation shall comply with Section M1508 of the ((Washington State Residential Code (WAC 51-51))) Seattle Residential Code. For other spaces, see Section 1402.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



CHAPTER 5 BUILDING DESIGN BY COMPONENT PERFORMANCE APPROACH

502.1.1 Building Envelope, General.

Discussion: Add note to provide information.

Proposal: Amend 2009 WSEC as follows -

502.1.1: The stated U- or F-factor of any component assembly, listed in Table 5-1, such as roof/ceiling, opaque wall or opaque floor may be increased and the U-factor for other components decreased, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from compliance to the U-factors specified in this section.

The U-factors for typical construction assemblies are included in Chapter 10. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Chapter 10, values shall be calculated in accordance with Chapters 16 through 18 and 25 through 27 in Standard RS-1 listed in Chapter 7, using the framing factors listed in Chapter 10 where applicable.

For envelope assemblies containing metal framing, the U-factor shall be determined by one of the following methods:

1. Results of laboratory measurements according to acceptable methods of test.
2. Standard RS-1, listed in Chapter 7, where the metal framing is bonded on one or both sides to a metal skin or covering.
3. The zone method as provided in Chapter 27 of Standard RS-1, listed in Chapter 7.
4. Results of parallel path correction factors for effective framing/cavity R-values as provided in Table 10-5A: Effective R-Values for Metal Framing and Cavity Only for metal stud walls and roof/ceilings.

Informative Note: Effective framing/cavity R-values are provided in Table 10-5A(2).

502.1.4.1 Building Envelope, General.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

502.1.4.1 General: All insulating materials shall comply with Sections 2603 and/or 719 of the ((International))Seattle Building Code. Substantial contact of the insulation with the surface being insulated is required. All insulation materials shall be installed according to the manufacturer's instructions to achieve proper densities and maintain uniform R-values and shall be installed in a manner which will permit inspection of the manufacturer's R-value identification mark. To the maximum extent possible, insulation shall extend over the full component area to the intended R-value.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



The thickness of roof/ceiling insulation that is either blown in or spray-applied shall be identified by inches of thickness, density and R-value markers installed at least one for every 300 square feet (28 m²) through the attic and/or ceiling space. In attics, the markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum 1.0 inch (25 mm) in height. Each marker shall face the attic access. The thickness of installed attic insulation shall meet or exceed the minimum initial installed thickness shown by the marker.

502.1.4.2 Insulation Materials.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

502.1.4.2 Insulation Materials: All insulation materials including facings such as vapor barriers or breather papers installed within floor/ceiling assemblies, roof/ceiling assemblies, walls, crawl spaces, or attics shall have a flame spread rating of less than 25 and a smoke density not to exceed 450 when tested in accordance with ASTM E84-01.

EXCEPTIONS:

1. Foam plastic insulation shall comply with Section 2603 of the ((International))Seattle Building Code.
2. When such materials are installed in concealed spaces of Types III, IV and V construction, the flame spread and smoke developed limitations do not apply to facing, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
3. Cellulose insulation shall comply with Section 719 of the ((International))Seattle Building Code.

502.1.4.5 Roof/Ceiling Insulation.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

502.1.4.5 Roof/Ceiling Insulation: Where two or more layers of rigid board insulation are used in a roof assembly, the vertical joints between each layer shall be staggered. Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge. When eave vents are installed, baffling of the vent openings shall be provided so as to deflect the incoming air above the surface of the insulation. Baffles shall be rigid material, resistant to wind driven moisture. Requirements for baffles for ceiling insulation shall meet the ((International))Seattle Building Code Section 1203.2 for minimum ventilation requirements. When feasible, the baffles shall be installed from the top of the outside of the exterior wall, extending inward, to a point 6 inches vertically above the height of noncompressed insulation, and 12 inches vertically above loose fill insulation.

502.2.1 UA Calculations.

Discussion: Add note to highlight DPD procedural requirement.

Proposal: Amend 2009 WSEC as follows -

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets; and amendments to administrative and enforcement provisions, apply to all projects.



502.2.1 UA Calculations: The proposed UA as calculated using Equations 2 and 3 shall not exceed the target UA as calculated using Equation 1. For the purpose of determining equivalent thermal performance, the glazing area for the target UA shall be calculated using values in Table 5-1. The opaque door area shall be the same in the target UA and the proposed UA. When showing compliance with Table 9-1 using options 3a, 3b or 3c, the proposed design shall be less than the target UA by the fraction noted in the table.

EXCEPTION: Log and solid timber walls that have a minimum average thickness of 3.5" and with space heat type other than electric resistance, are exempt from wall target UA and proposed UA calculations.

Procedural Requirement: The plans shall contain a glazing and opaque door schedule.
The glazing schedule shall include all vertical glazing and overhead glazing (windows, sliding and swinging glass doors and glazed roll-up doors, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors.
For all projects, the glazing and opaque door schedule shall include the manufacturer and model number for all products regardless of U-factor.
The glazing and opaque door schedules shall include the product type, size, number of each type, the U-factor and whether the U-factor is NFRC-certified or default.
If the product is claimed to be NFRC-certified, the NFRC Certified Products Directory (CPD) number shall be provided. A specification sheet that states "determined in accordance with NFRC 100" does not suffice.
If a default U-factor from Chapter 10 is used for unrated products in lieu of NFRC certification, the glazing and opaque door schedule shall include a description of the key energy-efficiency features that are necessary to achieve that default U-factor (indicating whether the glazing product is fixed or operable, frame material type, thermal break description, number of glazing layers, emissivity of low-e coatings, gap width, gas fill, spacer type, etc.).

503.10.3 Sealing.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

503.10.3 Sealing: All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3 of the ((International))Seattle Residential Code or Section 603.9 of the ((International))Seattle Mechanical Code. Duct tightness testing shall be conducted to verify that the ducts are sealed. A signed affidavit documenting the test results shall be provided to the jurisdiction having authority by the testing agent. When required by the building official, the test shall be conducted in the presence of department staff. Duct tightness shall be verified by either of the following:

1. Post-construction test: Leakage to outdoors shall be less than or equal to 6 cfm per 100 square feet of conditioned floor area or a total leakage less than or equal to 8 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pascals) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 6 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pascals) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is

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not installed at the time of the test, total leakage shall be less than or equal to 4 cfm per 100 square feet of conditioned floor area.

EXCEPTIONS:

1. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.
2. Duct tightness test is not required if the furnace is a nondirect vent type combustion appliance installed in an unconditioned space. A maximum of six feet of connected ductwork in the unconditioned space is allowed. All additional supply and return ducts shall be within the conditioned space. Ducts outside the conditioned space shall be sealed with a mastic type duct sealant and insulated on the exterior with R-8 insulation for above grade ducts and R-5 water resistant insulation when within a slab or earth.

503.10.4 Dampers.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

503.10.4 Dampers: Requirements for automatic or manual dampers are found in Chapter 15 of the ~~((Washington State Residential Code (WAC 51-51)))~~ Seattle Residential Code.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



CHAPTER 6 BUILDING DESIGN BY PRESCRIPTIVE REQUIREMENTS APPROACH

602.7.2 Glazing U-Factor.

Discussion: Add note to highlight DPD procedural requirement.

Proposal: Amend 2009 WSEC as follows –

602.7.2 Glazing U-Factor: The total glazing area as defined in Chapter 2 shall have an area weighted average U-factor not to exceed that specified in Table 6-1 or 6-2. U-factors for glazing shall be determined in accordance with Section 502.1.5. These areas and U-factors shall also include any doors using the exception of Section 602.6.

If the U-factors for all vertical and overhead glazing products are below the appropriate U-factor specified, then no calculations are required. If compliance is to be achieved through an area weighted calculation, then the areas and U-factors shall be included in the plans submitted with a building permit application.

EXCEPTION: Double glazed garden windows with a wood or vinyl frame shall be exempt from the U-factor calculations but shall have its area tripled and shall be included in the percentage of the total glazing area as allowed for in Table 6-1 or 6-2. The maximum area (before tripling) allowed for the total of all garden windows is one percent of the floor area or 20 square feet, whichever is less.

Procedural Requirement: The plans shall contain a glazing and opaque door schedule.

The glazing schedule shall include all vertical glazing and overhead glazing (windows, sliding and swinging glass doors and glazed roll-up doors, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors.

For all projects, the glazing and opaque door schedule shall include the manufacturer and model number for all products regardless of U-factor.

The glazing and opaque door schedules shall include the product type, size, number of each type, the U-factor and whether the U-factor is NFRC-certified or default.

If the product is claimed to be NFRC-certified, the NFRC Certified Products Directory (CPD) number shall be provided. A specification sheet that states “determined in accordance with NFRC 100” does not suffice.

If a default U-factor from Chapter 10 is used for unrated products in lieu of NFRC certification, the glazing and opaque door schedule shall include a description of the key energy-efficiency features that are necessary to achieve that default U-factor (indicating whether the glazing product is fixed or operable, frame material type, thermal break description, number of glazing layers, emissivity of low-e coatings, gap width, gas fill, spacer type, etc.).

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



**CHAPTER 7
STANDARDS**

701 Scope.

Discussion: (1) Update Seattle EnvStd to 2009 version; (2) add cross-references to RS-35 (advanced criteria) and RS-36 (2030 Challenge) that are included at the end.

Proposal: Amend 2009 WSEC as follows -

701 Scope. The following standards shall apply to Chapters 1 through ~~16~~(20). The standards and portions thereof, which are referred to in various parts of this Code (~~shall be part of the Washington State Energy Code and~~) are hereby declared to be a part of this Code.

**CODE
STANDARD**

NO. TITLE AND SOURCE

RS-1	((2005)) 2009 ASHRAE Fundamentals Handbook.
RS-2	Super Good Cents Technical Reference (Builder's Field Guide)
RS-3:	(Reserved.)
RS-4	ASHRAE Standard 55-2004 Thermal Environmental Conditions for Human Occupancy.
RS-5	2006 ASHRAE Refrigeration Handbook.
RS-6	(Reserved.)
RS-7	SMACNA, HVAC Duct Construction Standards, Metal and Flexible, 2005.
RS-8:	(Reserved.)
RS-9	ASHRAE/IESNA Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings.
RS-10	2008 ASHRAE Systems and Equipment Handbook.
RS-11	2007 ASHRAE HVAC Applications Handbook.
RS-12 – RS-28:	(Reserved.)
RS-29	Nonresidential Building Design by Systems Analysis (<u>included in compilation of this Code</u>).
RS-30	Title 10, Code of Federal Regulations (CFR), Part 430 (March 14, 1988).
RS-31	National Fenestration Rating Council (NFRC) Standard 100-2004.
RS-32	Seattle EnvStd ((2006)) <u>2009</u> .*
RS-33	Duct Testing Standard for New and Existing Construction, Washington State University Extension Energy Program Publication #WSUEEP 09-008.
RS-34	Optional Acceptance Requirements for Nonresidential Buildings, SBCC 2009.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



RS-35 Advanced Criteria for Other Programs (included in Seattle Amendments).

RS-36 Illustrative Goals for the 2030 Challenge in Seattle (included in Seattle Amendments).

* The Director of DPD is authorized to develop and adopt by rule a 2009 version of the Seattle EnvStd software, which in substance shall consist of Seattle EnvStd 2006 with a baseline updated to correspond with Table 13-1 of this Code and having a minimum VT/SHGC ratio of 1.50 for vertical fenestration and skylights with glazing made of glass and 1.42 for skylights with glazing made of plastic. That 2009 version shall constitute RS-32 from and after the effective date of the rule adopting it. Prior to that date references in this Code to the RS-32 option are not effective.

ACCREDITED AUTHORITATIVE AGENCIES

AHRI refers to the Air-Conditioning, Heating and Refrigeration Institute, ((4301 N. Fairfax Dr., Suite 425))
2111 Wilson Blvd, Suite 500, Arlington, VA 22201 ((22203))
Phone (703) 524-8800 fax (703) 528-3816, internet ((www.ari.org)) www.ahrinet.org

ANSI refers to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036
Phone (212) 642-4900 fax (212) 398-0023, internet www.ansi.org

ASHRAE refers to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329
Phone (404) 636-8400 fax (404) 321-5478, internet www.ashrae.org

ASTM refers to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
Phone (610) 832-9585 fax (610) 832-9555, internet www.astm.org

CTI refers to the Cooling Tower Institute, 530 Wells Fargo Drive, Suite 218, Houston, TX 77090
Phone (281) 583-4087 fax (281) 537-1721, internet www.cti.org

IESNA refers to the Illuminating Engineering Society of North America, 120 Wall Street, Floor 17, New York, NY 10005-4001
Phone (212) 248-5000 fax (212) 248-5017, internet www.iesna.org

NFRC refers to the National Fenestration Rating Council, Inc., 8484 Georgia Avenue, Suite 320, Silver Spring, Maryland 20910
Phone (301) 589-1776 fax (301) 589-3884, internet www.nfrc.org

SBCC refers to the Washington State Building Code Council, P.O. Box 42525, Olympia, WA 98504-2525
Phone 360-725-2990 fax 360-586-9383, internet www.sbcc.wa.gov

SMACNA refers to the Sheet Metal and Air Conditioning Contractors National Association, Inc., 4201 Lafayette Center Drive, P.O. Box 221230, Chantilly, VA 20153-1230
Phone (703) 803-2980 fax (703) 803-3732, internet www.smacna.org

WSU refers to the Washington State University Extension Energy Program, 905 Plum Street S.E., Building #3, P.O. Box 43165, Olympia, WA 98506-3166
Phone 360-956-2000 fax 360-956-2217, internet www.energy.wsu.edu

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**CHAPTER 9
ADDITIONAL SINGLE-FAMILY RESIDENTIAL
ENERGY EFFICIENCY REQUIREMENTS**

901 Additional Residential Energy Efficiency Requirements.

Discussion: (1) Provide informative note; (2) add notes to highlight DPD procedural requirement; and (3) revise references to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

901 Additional Residential Energy Efficiency Requirements. Dwelling units permitted under this Code shall comply with all provisions of Chapter 5 of this Code and develop one credit from Table 9-1.

EXCEPTION: Buildings complying using Chapter 4 Building Design by Systems Analysis shall meet this provision of this section by demonstrating that the proposed building energy use is 16 percent less than the target building energy use.

Informative Note: Per "option" 7, all dwelling units exceeding 5000 square feet of gross floor area are assigned a negative 1.0 points and therefore need to achieve a positive 2.0 points in other options in order to comply.

**TABLE 9-1
ENERGY CREDITS (DEBITS)**

OPTION	DESCRIPTION	CREDIT(S)
1a	<p>HIGH EFFICIENCY HVAC EQUIPMENT 1:</p> <p>Gas, propane or oil-fired furnace or boiler with minimum AFUE of 92%, or Air-source heat pump with minimum HSPF of 8.5.</p> <p><u>[Procedural Requirement: 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.</u></p> <p><u>It is recommended that projects apply for a mechanical permit prior to the building permit application and paste a copy of the mechanical permit on the building permit drawings.]</u></p>	1.0

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OPTION	DESCRIPTION	CREDIT(S)
1b	<p>HIGH EFFICIENCY HVAC EQUIPMENT 2: Closed-loop ground source heat pump; with a minimum COP of 3.3.</p> <p><u>[Procedural Requirement: 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.</u> It is recommended that projects apply for a mechanical permit prior to the building permit application and paste a copy of the mechanical permit on the building permit drawings.]</p>	2.0
1c	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3: DUCTLESS SPLIT SYSTEM HEAT PUMPS, ZONAL CONTROL: In home where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to at least one zone of the housing unit.</p> <p><u>[Procedural Requirement: 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.</u> It is recommended that projects apply for an electrical permit prior to the building permit application and paste a copy of the electrical permit on the building permit drawings.]</p>	1.0
2	<p>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:¹</p> <p>All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion.</p> <p>Locating system components in conditioned crawl spaces is not permitted under this option.</p> <p>Electric resistance heat is not permitted under this option.</p> <p>Direct combustion heating equipment with AFUE less than 80% is not permitted under this option.</p> <p><u>[Procedural Requirement: To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and shall show the location of the heating and cooling equipment and all the ductwork.</u> It is recommended that projects apply for a mechanical permit prior to the building permit application and paste a copy of the mechanical permit on the building permit drawings.]</p>	1.0

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OPTION	DESCRIPTION	CREDIT(S)
3a	<p>EFFICIENT BUILDING ENVELOPE 1:</p> <p>Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U = 0.28 floor R-38, slab on grade R-10 full, below grade slab R-10 full.</p> <p>or</p> <p>Component performance compliance: Reduce the Target UA from Table 5-1 by 5%, as determined using EQUATION 1.¹</p> <p><u>[Procedural Requirement: To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the location and R-value of all insulation.</u></p> <p><u>For glazing U-factors</u></p> <p>- for Prescriptive compliance, see procedural requirement under Section 602.7.2. - for Component performance compliance, see procedural requirement under Section 502.2.1.]</p>	0.5
3b	<p>EFFICIENT BUILDING ENVELOPE 2:</p> <p>Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U = 0.25 and wall R-21 plus R-4 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full, and R-21 plus R-5 below grade basement walls.</p> <p>or</p> <p>Component performance compliance: Reduce the Target UA from Table 5.1 by 15%, as determined using EQUATION 1.¹</p> <p><u>[Procedural Requirement: To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the location and R-value of all insulation.</u></p> <p><u>For glazing U-factors</u></p> <p>- for Prescriptive compliance, see procedural requirement under Section 602.7.2. - for Component performance compliance, see procedural requirement under Section 502.2.1.]</p>	1.0
3c	<p>SUPER-EFFICIENT BUILDING ENVELOPE 3:</p> <p>Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U = 0.22 and wall R-21 plus R-12 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full and R-21 plus R-12 below grade basement walls and R-49 advanced ceiling and vault.</p> <p>or</p> <p>Component performance compliance: Reduce the Target UA from Table 5.1 by 30%, as determined using EQUATION 1.¹</p> <p><u>[Procedural Requirement: To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the location and R-value of all insulation.</u></p> <p><u>For glazing U-factors</u></p> <p>- for Prescriptive compliance, see procedural requirement under Section 602.7.2. - for Component performance compliance, see procedural requirement under Section 502.2.1.]</p>	2.0

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OPTION	DESCRIPTION	CREDIT(S)
4a	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:</p> <p>Envelope leakage reduced to SLA of 0.00020 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00020 when tested with a blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.</p> <p>and</p> <p>All whole house ventilation requirements as determined by Section M1508 of the ((Washington State))Seattle Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.</p> <p><u>[Procedural Requirement: 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.]</u></p>	0.5
4b	<p>ADDITIONAL AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:</p> <p>Envelope leakage reduced to SLA of 0.00015 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00015 when tested with a blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.</p> <p>and</p> <p>All whole house ventilation requirements as determined by Section M1508 of the ((Washington State))Seattle Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.</p> <p><u>[Procedural Requirement: 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.]</u></p>	1.0
5a	<p>EFFICIENT WATER HEATING:¹</p> <p>Water heating system shall include one of the following:</p> <p>Gas, propane or oil water heater with a minimum EF of 0.62.</p> <p>or</p> <p>Electric Water Heater with a minimum EF of .93.</p> <p>and for both cases</p> <p>All showerhead and kitchen sink faucets installed in the house shall meet be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.²</p> <p><u>[Procedural Requirement: 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 shall specify the maximum flow rates for all showerheads, kitchen sink faucets, and other lavatory faucets.</u></p> <p><u>It is recommended that projects apply for a plumbing permit prior to the building permit application and paste a copy of the plumbing permit on the building permit drawings.]</u></p>	0.5

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OPTION	DESCRIPTION	CREDIT(S)
5b	<p>HIGH EFFICIENCY WATER HEATING:¹</p> <p>Water heating system shall include one of the following:</p> <p>Gas, propane or oil water heater with a minimum EF of 0.82.</p> <p>or</p> <p>Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems.</p> <p>or</p> <p>Electric heat pump water heater with a minimum EF of 2.0.</p> <p><u>[Procedural Requirement: 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.</u></p> <p><u>It is recommended that projects apply for a plumbing permit prior to the building permit application and paste a copy of the plumbing permit on the building permit drawings.]</u></p>	1.5
6	<p>SMALL DWELLING UNIT 1:¹</p> <p>Dwelling units less than 1500 square feet in floor area with less than 300 square feet of window + door area. Additions to existing building that are less than 750 square feet of heated floor area.</p> <p><u>[Procedural Requirement: To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall include a calculation of the gross floor area and a calculation of the window plus door area.]</u></p>	1.0
7	<p>LARGE DWELLING UNIT 1:¹</p> <p>Dwelling units exceeding 5000 square feet of floor area shall be assessed a deduction for purposes of complying with Section 901 of this Code.</p>	-1.0

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OPTION	DESCRIPTION	CREDIT(S)
8	<p>RENEWABLE ELECTRIC ENERGY:</p> <p>For each 1200 kWh of electrical generation provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows:</p> <p>For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTS. Documentation noting solar access shall be included on the plans.</p> <p>For wind generation projects designs shall document annual power generation based on the following factors:</p> <p>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.</p> <p><u>[Procedural Requirement: 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.</u></p> <p><u>It is recommended that projects apply for an electrical permit prior to the building permit application and paste a copy of the electrical permit on the building permit drawings.]</u></p>	0.5

Footnotes:

1. Interior Duct Placement: Ducts included as Option 2 of Table 9-1 shall be placed wholly within the heated envelope of the housing unit. The placement shall be inspected and certified to receive the credits associated with this option.

EXCEPTION: Ducts complying with this section may have up to 5% of the total linear feet of ducts located in the exterior cavities or buffer spaces of the dwelling. If this exception is used the ducts will be tested to the following standards:

Post-construction test: Leakage to outdoors shall be less than or equal to 1 CFM per 100 ft² 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.
2. Plumbing Fixtures Flow Ratings. Low flow plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following requirements:
 - (a) Residential bathroom lavatory sink faucets: Maximum flow rate - 3.8 L/min (1.0 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
 - (b) Residential kitchen faucets: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
 - (c) Residential showerheads: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.

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CHAPTER 10 DEFAULT HEAT LOSS COEFFICIENTS

Section 1001 General.

Discussion: No Seattle changes (retain existing Seattle amendment).

Proposal: Amend 2009 WSEC as follows -

SECTION 1001 — GENERAL

1001.1 Scope: The following defaults shall apply to Chapters 1 through ~~16~~(20). This chapter includes tables of seasonal average heat loss coefficients for specified nominal insulation. The heat loss coefficients may also be used for heating system sizing.

1001.2 Description: These coefficients were developed primarily from data and procedures from Standard RS-1, and taken specifically from Standard RS-2, listed in Chapter 7.

Coefficients not contained in this chapter may be computed using the procedures listed in these references if the assumptions in the following sections and Standard RS-2, listed in Chapter 7, are used, along with data from the sources referenced above.

1001.3 (~~Air Films: Default R-values used for air films shall be as follows:~~

R-Value Condition

0.17 — All exterior surfaces

0.61 — Interior horizontal surfaces, heat flow up

0.92 — Interior horizontal surfaces, heat flow down

0.68 — Interior vertical surfaces)) Reserved.

1001.4 Compression of Insulation: Insulation which is compressed shall be rated in accordance with Table 10-A or reduction in value may be calculated in accordance with the procedures in Standard RS-1, listed in Chapter 7.

1001.5 Building Materials: Default R-values used for building materials shall be as shown in Table 10-B.

Table 10-A R-Value of Fiberglass Batts Compressed within Various Depth Cavities.

Discussion: Expand options to include R-25 which fits in nominal 2 x 8 framing.

Proposal: Amend 2009 WSEC as follows -

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**TABLE 10-A
R-VALUE OF FIBERGLASS BATTS COMPRESSED
WITHIN VARIOUS DEPTH CAVITIES**

Insulation R-Values at Standard Thickness

Insulation R-Value at Standard Thickness													
Rated R-Value	82	71	60	49	38	30	<u>25</u>	22	21	19	15	13	11
Standard Thickness, in.	26.0	22.5	19.0	15.5	12	9.5	<u>7.25</u>	6.5	5.5	6	3.5	3.5	3.5
Nominal Lumber Size, in.	Actual Depth of Cavity, in.	Effective Insulation R-Values when Installed in a Confined Cavity											
Truss	26.0	82	—	—	—	—	—	—	—	—	—	—	—
Truss	22.5	—	71	—	—	—	—	—	—	—	—	—	—
Truss	19.0	—	—	60	—	—	—	—	—	—	—	—	—
Truss	15.5	—	—	—	49	—	—	—	—	—	—	—	—
Truss	12.0	—	—	—	—	38	—	—	—	—	—	—	—
2 x 12	11.25	—	—	—	—	37	—	—	—	—	—	—	—
2 x 10	9.25	—	—	—	—	32	30	—	—	—	—	—	—
2 x 8	7.25	—	—	—	—	27	26	<u>25</u>	22	21	19	—	—
2 x 6	5.5	—	—	—	—	—	21	<u>20</u>	20	21	18	—	—
2 x 4	3.5	—	—	—	—	—	—	—	14	—	13	15	13
	2.5	—	—	—	—	—	—	—	—	—	—	—	9.8
	1.5	—	—	—	—	—	—	—	—	—	—	—	6.3
													6

Table 10-B Default R-Values for Building Materials.

Discussion: Retain existing Seattle amendment, but revise information for brick to reflect typical face brick and add footnote with reference for other heat capacities.

Proposal: Amend 2009 WSEC as follows –

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TABLE 10-B DEFAULT R-VALUES FOR BUILDING MATERIALS

Material	Nominal Size (in.)	Actual Size (in.)	R-Value (Heat Capacity ³)
Air cavity (unventilated), between metal studs at 16 inches on center ¹	-	-	0.79
Air cavity (unventilated), all other depths and framing materials ¹	-	-	0.91
Air film, exterior surfaces ²	-	-	0.17
Air film, interior horizontal surfaces, heat flow up ²	-	-	0.61
Air film, interior horizontal surfaces, heat flow down ²	-	-	0.92
Air film, interior vertical surfaces ²	-	-	0.68
Brick at R-0.12/in. (face brick, 75% solid/25% core area, 130 lbs/ft ³)	4	3.5	0.32 (5.9)
Carpet and rubber pad	-	-	1.23
Concrete at R-0.0625/in., heavyweight (144 lbs/ft ³)	-	2	0.13 (HC-4.8)
	-	4	0.25 (HC-9.6)
	-	6	0.38 (HC-14.4)
	-	8	0.50 (HC-19.2)
	-	10	0.63 (HC-24.0)
	-	12	0.75 (HC-28.8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	6	-	0.80 (HC-11.4)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	6	-	0.51 (HC-13.2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	6	-	1.33 (HC-6.7)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	6	-	0.82 (HC-9.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	8	-	1.05 (HC-15.5)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	8	-	0.69 (HC-17.9)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	8	-	1.44 (HC-9.6)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	8	-	0.98 (HC-12.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	10	-	1.30 (HC-19.7)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	10	-	0.87 (HC-22.6)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	10	-	1.61 (HC-11.9)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	10	-	1.11 (HC-14.8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	12	-	1.53 (HC-23.9)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	12	-	1.06 (HC-27.2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	12	-	1.75 (HC-14.2)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	12	-	1.23 (HC-17.5)
Flooring, wood subfloor	-	0.75	0.94
Gypsum board	-	0.5	0.45
	-	0.625	0.56
Metal deck	-	-	0
Roofing, built-up	-	0.375	0.33
Sheathing, vegetable fiber board, 0.78 in.	-	0.78	2.06
Soil at R-0.104/in.	-	12	1.25

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<u>Material</u>	<u>Nominal Size (in.)</u>	<u>Actual Size (in.)</u>	<u>R-Value (Heat Capacity³)</u>
<u>Steel, mild</u>		<u>1</u>	<u>0.0031807</u>
<u>Stucco</u>	<u>-</u>	<u>0.75</u>	<u>0.08</u>

¹ Air cavities, within building assemblies, that are open to outside air are assigned an R-value of 0.

² The R-values for air films do not apply to air cavities within an assembly.

³ For heat capacity for concrete and concrete masonry materials with densities other than the values listed in Table 10-B, see Tables A3.1B and A3.1C in RS-9.

1005.3 Component Description.

Discussion: Revise descriptions for metal building walls for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

1005.3 Component Description: Default coefficients for the following types of walls are listed: Single-stud walls, strap walls, double-stud walls, log walls, stress-skin panels, metal stud walls, and metal building walls.

Single-Stud Wall, Tables 10-5(1) through 10-5(8): Assumes either 2x4 or 2x6 studs framed on sixteen or twenty-four inch centers. Headers are solid for 2x4 walls and double 2x for 2x6 walls, with either dead-air or rigid-board insulation in the remaining space.

Strap Wall, Table 10-5(9): Assumes 2x6 studs framed on sixteen or twenty-four inch centers. 2x3 or 2x4 strapping is run horizontally along the interior surface of the wall to provide additional space for insulation.

Double-Stud Wall, Tables 10-5(10) and 10-5(11): Assumes an exterior structural wall and a separate interior, nonstructural wall. Insulation is placed in both wall cavities and in the space between the 2 walls. Stud spacing is assumed to be on 24 inch centers for both walls.

Log Wall, Table 10-5(12).

Stress-Skin Panel, Table 10-5(13).

Metal Stud Wall, Overall Assembly U-Factors, Table 10-5A(1): Assumes metal studs spaced on 16- or 24-inch centers with insulation installed to fill wall cavities. Continuous rigid board insulation is applied without creating uninsulated voids in the wall assembly.

Metal Stud Wall, Effective R-Values for Metal Framing and Cavity Only, Table 10-5A(2): These values may be used for the metal-framing/cavity layers in walls with metal studs spaced on 16- or 24-inch centers with insulation installed to fill wall cavities in lieu of using the zone method provided in Chapter 25 of Standard RS-1 listed in Chapter 7.

Metal Building Wall, Table 10-5A(3): A wall whose structure consists of metal spanning panels supported by steel structural members (does not include spandrel glass or metal panels in curtain wall systems). These values may be used for assemblies where the average girt spacing is at least 52 in. The first nominal R-value is for insulation compressed between metal

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wall panels and the steel structure. ~~((For double-layer installations, the second-rated R-value of insulation is for insulation installed from the inside, covering the girts. For continuous insulation (e.g., insulation boards) it is assumed that the insulation boards are))~~ For assemblies with continuous insulation, the continuous insulation is installed on the outside or inside of the girts, uncompressed and uninterrupted by the framing members. Insulation exposed to the conditioned space, ~~((or))~~ including a semi-heated space, shall have a facing, and all insulation seams shall be continuously sealed ~~((to provide a continuous air barrier))~~. U-factors for metal building wall assemblies with average girt spacing less than 52 in. shall be determined in accordance with Section A9.2 of RS-9.

Concrete and Masonry Walls, Table 10-5B(1) Single-Family and Multifamily Residential.

Peripheral Edges of Intermediate Concrete Floors, Table 10-5B(2) Single-Family and Multifamily Residential, and Nonresidential.

Concrete and Masonry Walls, Table 10-5B(3) Nonresidential.

Table 10-5A U-Factors for Overall Assembly Metal Stud Walls, Effective R-Values for Metal Framing and Cavity Only, and Default Metal Building U-Factors.

Discussion: Expand default options for metal stud walls in Table 10-5A(1); revise and expand default options for metal building walls in Table 10-5A(3) for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

Metal Stud Walls: The nominal R-values in Table 10-5A may be used for purposes of calculating metal stud wall section U-factors in lieu of the ASHRAE zone calculation method as provided in Chapter 27 of Standard RS-1.

**TABLE 10-5A
DEFAULT U-FACTORS FOR OVERALL ASSEMBLY METAL STUD WALLS,
EFFECTIVE R-VALUES FOR METAL FRAMING AND CAVITY ONLY,
AND DEFAULT METAL BUILDING U-FACTORS**

**TABLE 10-5A(1)
Overall Assembly U-Factors for Metal Stud Walls**

Metal Framing	R-Value of Continuous Foam Board Insulation	R-Value of Foam Board Insulation with <u>< 0.04%</u> Metal Penetrations	R-Value of Foam Board Insulation with <u>> 0.04%</u> and <u>≤ 0.08%</u> Metal Penetrations	Cavity Insulation						
				R-0	R-11 (4" nom)	R-13 (4" nom)	R-15 (4" nom)	R-19 (6" nom)	R-21 (6" nom)	R-25 (8" nom)
16" o.c.	R-0 (none)	<u>R-0 (none)</u>	<u>R-0 (none)</u>	U-0.352	U-0.132	U-0.124	U-0.118	U-0.109	U-0.106	<u>U-0.102</u>
	R-1	<u>R-1.3</u>	<u>R-1.5</u>	U-0.260	U-0.117	U-0.111	U-0.106	U-0.099	U-0.096	<u>U-0.092</u>

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Metal Framing	R-Value of Continuous Foam Board Insulation	R-Value of Foam Board Insulation with < 0.04% Metal Penetrations	R-Value of Foam Board Insulation with > 0.04% and < 0.08% Metal Penetrations	Cavity Insulation						
				R-0	R-11 (4" nom)	R-13 (4" nom)	R-15 (4" nom)	R-19 (6" nom)	R-21 (6" nom)	R-25 (8" nom)
	R-2	R-2.5	R-3.0	U-0.207	U-0.105	U-0.100	U-0.096	U-0.090	U-0.087	U-0.084
	R-3	R-3.8	R-4.5	U-0.171	U-0.095	U-0.091	U-0.087	U-0.082	U-0.080	U-0.078
	R-4	R-5.0	R-6.0	U-0.146	U-0.087	U-0.083	U-0.080	U-0.076	U-0.074	U-0.072
	R-5	R-6.3	R-7.5	U-0.128	U-0.080	U-0.077	U-0.074	U-0.071	U-0.069	U-0.067
	R-6	R-7.5	R-9.0	U-0.113	U-0.074	U-0.071	U-0.069	U-0.066	U-0.065	U-0.063
	R-7	R-8.8	R-10.5	U-0.102	U-0.069	U-0.066	U-0.065	U-0.062	U-0.061	U-0.059
	R-8	R-10.0	R-12.0	U-0.092	U-0.064	U-0.062	U-0.061	U-0.058	U-0.057	U-0.056
	R-9	R-11.3	R-13.5	U-0.084	U-0.060	U-0.059	U-0.057	U-0.055	U-0.054	U-0.053
	R-10	R-12.5	R-15.0	U-0.078	U-0.057	U-0.055	U-0.054	U-0.052	U-0.051	U-0.050
	R-11	R-13.8	R-16.5	U-0.072	U-0.054	U-0.052	U-0.051	U-0.050	U-0.049	U-0.048
	R-12	R-15.0	R-18.0	U-0.067	U-0.051	U-0.050	U-0.049	U-0.047	U-0.047	U-0.046
	R-13	R-16.3	R-19.5	U-0.063	U-0.049	U-0.048	U-0.047	U-0.045	U-0.045	U-0.044
	R-14	R-17.5	R-21.0	U-0.059	U-0.046	U-0.045	U-0.045	U-0.043	U-0.043	U-0.042
	R-15	R-18.8	R-22.5	U-0.056	U-0.044	U-0.043	U-0.043	U-0.041	U-0.041	U-0.040
	R-20	R-25.0	R-30.0	U-0.044	U-0.036	U-0.036	U-0.035	U-0.034	U-0.034	U-0.034
24" o.c.	R-0 (none)	R-0 (none)	R-0 (none)	U-0.338	U-0.116	U-0.108	U-0.102	U-0.094	U-0.090	U-0.086
	R-1	R-1.3	R-1.5	U-0.253	U-0.104	U-0.098	U-0.092	U-0.086	U-0.083	U-0.079
	R-2	R-2.5	R-3.0	U-0.202	U-0.094	U-0.089	U-0.084	U-0.079	U-0.077	U-0.073
	R-3	R-3.8	R-4.5	U-0.168	U-0.086	U-0.082	U-0.078	U-0.073	U-0.071	U-0.068
	R-4	R-5.0	R-6.0	U-0.144	U-0.079	U-0.075	U-0.072	U-0.068	U-0.066	U-0.064
	R-5	R-6.3	R-7.5	U-0.126	U-0.073	U-0.070	U-0.067	U-0.064	U-0.062	U-0.060
	R-6	R-7.5	R-9.0	U-	U-	U-	U-	U-	U-	U-

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Metal Framing	R-Value of Continuous Foam Board Insulation	R-Value of Foam Board Insulation with < 0.04% Metal Penetrations	R-Value of Foam Board Insulation with > 0.04% and < 0.08% Metal Penetrations	Cavity Insulation						
				R-0	R-11 (4" nom)	R-13 (4" nom)	R-15 (4" nom)	R-19 (6" nom)	R-21 (6" nom)	R-25 (8" nom)
				0.112	0.068	0.066	0.063	0.060	0.059	0.057
	R-7	R-8.8	R-10.5	U-0.100	U-0.064	U-0.062	U-0.059	U-0.057	U-0.055	U-0.054
	R-8	R-10.0	R-12.0	U-0.091	U-0.060	U-0.058	U-0.056	U-0.054	U-0.052	U-0.051
	R-9	R-11.3	R-13.5	U-0.084	U-0.057	U-0.055	U-0.053	U-0.051	U-0.050	U-0.048
	R-10	R-12.5	R-15.0	U-0.077	U-0.054	U-0.052	U-0.050	U-0.048	U-0.048	U-0.046
	R-11	R-13.8	R-16.5	U-0.072	U-0.051	U-0.049	U-0.048	U-0.046	U-0.045	U-0.044
	R-12	R-15.0	R-18.0	U-0.067	U-0.048	U-0.047	U-0.046	U-0.044	U-0.043	U-0.042
	R-13	R-16.3	R-19.5	U-0.063	U-0.046	U-0.045	U-0.044	U-0.042	U-0.042	U-0.041
	R-14	R-17.5	R-21.0	U-0.059	U-0.044	U-0.043	U-0.042	U-0.041	U-0.040	U-0.039
	R-15	R-18.8	R-22.5	U-0.056	U-0.042	U-0.041	U-0.040	U-0.039	U-0.038	U-0.038
	R-20	R-25.0	R-30.0	U-0.044	U-0.035	U-0.034	U-0.034	U-0.033	U-0.032	U-0.032

TABLE 10-5A(2)
Effective R-Values for Metal Framing and Cavity Only

	Cavity		Insulation		
	Nominal Depth, Inches	Actual Depth, Inches	Nominal R-Value	Effective R-Value	
				16" O.C.	24" O.C.
Air Cavity	Any	Any	R-0.91 (air)	0.79	0.91
Wall	4	3-1/2	R-11	5.5	6.6
	4	3-1/2	R-13	6.0	7.2
	4	3-1/2	R-15	6.4	7.8
	6	5-1/2	R-19	7.1	8.6
	6	5-1/2	R-21	7.4	9.0
Roof		Insulation is uncompressed	R-25	7.8	9.6
			R-11	5.5	6.1
			R-19	7.0	9.1
			R-30	9.3	11.4

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TABLE 10-5A(3)
Default Metal Building Wall U-Factors

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Wall Assembly	Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (Uninterrupted by Framing)									
			Rated R-Value of Continuous Insulation									
			R-6.5	R-9.8	R-13	R-15.8	R-19 ((R-19.5))	R-22.1	R-25 ((R-26))	R-32 ((R-32.5))	R-38 ((R-39))	
Single Layer of Mineral Fiber	None	1.180	0.136	0.094	0.072	0.060	0.050 ((0.049))	0.044	0.039 ((0.037))	0.030	0.026 ((0.025))	
	R-10	0.186	0.084	0.066	0.054	0.047	0.041 ((0.040))	0.036	0.033 ((0.032))	0.027 ((0.026))	0.023	
	R-11	0.185	0.084	0.066	0.054	0.047	0.041 ((0.040))	0.036	0.033 ((0.032))	0.027 ((0.026))	0.023	
	R-13	0.162	0.079	0.063	0.052	0.046	0.040 ((0.039))	0.035	0.032 ((0.031))	0.026	0.023 ((0.022))	
	R-16	0.155	0.077	0.062	0.051	0.045	0.039	0.035	0.032 ((0.031))	0.026	0.022	
	R-19	0.147	0.075	0.060	0.050	0.044	0.039 ((0.038))	0.035	0.031 ((0.030))	0.026 ((0.025))	0.022	

Table 10-5B Default U-Factors for Concrete and Masonry Walls.

Discussion: (1) Table 10-5B(1): retain existing Seattle numbering for tables; (2) Table 10-5B(2): expand default options for peripheral edges of intermediate concrete floors; (3) Table 10-5B(3): retain existing Seattle amendment with default options for mass walls and revise for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

Concrete Masonry Walls: The nominal R-values in Table 10-5B may be used for purposes of calculating concrete masonry wall section U-factors in lieu of the ASHRAE isothermal planes calculation method as provided in Chapter 27 of Standard RS-1.

TABLE 10-5B(1)
SINGLE-FAMILY AND MULTIFAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR CONCRETE AND MASONRY WALLS

TABLE 10-5B(1a) Single-Family and Multifamily Residential:
8" Concrete Masonry

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Block, Both Sides	0.40	0.23	0.24	0.43
R-5 Interior Insulation, Wood Furring	0.14	0.11	0.12	0.15

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WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
Perlite		Vermiculite		
R-6 Interior Insulation, Wood Furring	0.14	0.11	0.11	0.14
R-10.5 Interior Insulation, Wood Furring	0.11	0.09	0.09	0.11
R-8 Interior Insulation, Metal Clips	0.11	0.09	0.09	0.11
R-6 Exterior Insulation	0.12	0.10	0.10	0.12
R-10 Exterior Insulation	0.08	0.07	0.07	0.08
R-9.5 Rigid Polystyrene Integral Insulation, Two Webbed Block	0.11	0.09	0.09	0.12

**TABLE 10-5B(1b) Single-Family and Multifamily Residential:
12" Concrete Masonry**

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
Perlite		Vermiculite		
Exposed Block, Both Sides	0.35	0.17	0.18	0.33
R-5 Interior Insulation, Wood Furring	0.14	0.10	0.10	0.13
R-6 Interior Insulation, Wood Furring	0.13	0.09	0.10	0.13
R-10.5 Interior Insulation, Wood Furring	0.11	0.08	0.08	0.10
R-8 Interior Insulation, Metal Clips	0.10	0.08	0.08	0.09
R-6 Exterior Insulation	0.11	0.09	0.09	0.11
R-10 Exterior Insulation	0.08	0.06	0.06	0.08
R-9.5 Rigid Polystyrene Integral Insulation, Two Webbed Block	0.11	0.08	0.09	0.12

**TABLE 10-5B(1c) Single-Family and Multifamily Residential:
8" Clay Brick**

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
Perlite		Vermiculite		
Exposed Block, Both Sides	0.50	0.31	0.32	0.56
R-5 Interior Insulation, Wood Furring	0.15	0.13	0.13	0.16
R-6 Interior Insulation, Wood Furring	0.15	0.12	0.12	0.15
R-10.5 Interior Insulation, Wood Furring	0.12	0.10	0.10	0.12
R-8 Interior Insulation, Metal Clips	0.11	0.10	0.10	0.11
R-6 Exterior Insulation	0.12	0.11	0.11	0.13
R-10 Exterior Insulation	0.08	0.08	0.08	0.09

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**TABLE 10-5B(1d) Single-Family and Multifamily Residential:
6" Concrete Poured or Precast**

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Concrete, Both Sides	NA	NA	NA	0.61
R-5 Interior Insulation, Wood Furring	NA	NA	NA	0.16
R-6 Interior Insulation, Wood Furring	NA	NA	NA	0.15
R-10.5 Interior Insulation, Wood Furring	NA	NA	NA	0.12
R-8 Interior Insulation, Metal Clips	NA	NA	NA	0.12
R-6 Exterior Insulation	NA	NA	NA	0.13
R-10 Exterior Insulation	NA	NA	NA	0.09

Notes for Default Table 10-5B(1)

1. Grouted cores at 40" x 48" on center vertically and horizontally in partial grouted walls.
2. Interior insulation values include 1/2" gypsum board on the inner surface.
3. Furring and stud spacing is 16" on center. Insulation is assumed to fill furring space and is not compressed.
4. Intermediate values may be interpolated using this table. Values not contained in this table may be computed using the procedures listed in Standard RS-1.

**TABLE 10-5B(2) Single-Family and Multifamily Residential, and Nonresidential:
Default U-Factors for Peripheral Edges of Intermediate Concrete Floors**

SLAB EDGE TREATMENT	AVERAGE THICKNESS OF WALL ABOVE AND BELOW			
	6 inches	8 inches	10 inches	12 inches
Exposed Concrete	0.816	0.741	0.678	0.625
R-5 Exterior Insulation	0.161	0.157	0.154	0.152
R-6 Exterior Insulation	0.138	0.136	0.134	0.132
R-7 Exterior Insulation	0.122	0.120	0.118	0.116
R-8 Exterior Insulation	0.108	0.107	0.106	0.104
R-9 Exterior Insulation	0.098	0.097	0.095	0.094
R-10 Exterior Insulation	0.089	0.088	0.087	0.086
R-11 Exterior Insulation	0.082	0.081	0.080	0.079
R-12 Exterior Insulation	0.076	0.075	0.074	0.074
R-13 Exterior Insulation	0.070	0.070	0.069	0.068
R-14 Exterior Insulation	0.066	0.065	0.065	0.064
R-15 Exterior Insulation	0.062	0.061	0.061	0.060
R-16 Exterior Insulation	0.058	0.058	0.057	0.057
R-17 Exterior Insulation	0.055	0.054	0.054	0.054
R-18 Exterior Insulation	0.052	0.052	0.051	0.051
R-19 Exterior Insulation	0.049	0.049	0.049	0.049
R-20 Exterior Insulation	0.047	0.047	0.047	0.046
R-21 Exterior Insulation	0.045	0.045	0.044	0.044
R-22 Exterior Insulation	0.043	0.043	0.043	0.042
R-23 Exterior Insulation	0.041	0.041	0.041	0.041
R-24 Exterior Insulation	0.040	0.039	0.039	0.039
R-25 Exterior Insulation	0.038	0.038	0.038	0.038

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**TABLE 10-5B(3) Nonresidential:
Default U-Factors for Concrete and Masonry Walls**

<u>Framing Type and Depth</u>	<u>Rated R-Value of Insulation Alone</u>	<u>Assembly U-Factors for Solid Concrete Walls</u>	<u>Assembly U-Factors for Concrete Block Walls: Solid Grouted</u>	<u>Assembly U-Factors for Concrete Block Walls: Partially Grouted (cores uninsulated except where specified)</u>
Base Wall only				
No Framing	R- 0	U- 0.740	U- 0.580	U- 0.480
	UngROUTED Cores Filled with Loose-Fill Insulation	N.A.	N.A.	U- 0.350
Continuous Wood Framing				
0.75 in.	R- 3.0	U- 0.247	U- 0.226	U- 0.210
1.5 in.	R- 6.0	U- 0.160	U- 0.151	U- 0.143
2.0 in.	R- 10.0	U- 0.116	U- 0.111	U- 0.107
3.5 in.	R- 11.0	U- 0.094	U- 0.091	U- 0.088
3.5 in.	R- 13.0	U- 0.085	U- 0.083	U- 0.080
3.5 in.	R- 15.0	U- 0.079	U- 0.077	U- 0.075
5.5 in.	R- 19.0	U- 0.060	U- 0.059	U- 0.058
5.5 in.	R- 21.0	U- 0.057	U- 0.055	U- 0.054
Continuous Metal Framing at 24 in. on center horizontally				
1.0 in.	R- 0.0	U- 0.414	U- 0.359	U- 0.318
1.0 in.	R- 3.8	U- 0.325	U- 0.290	U- 0.263
1.0 in.	R- 5.0	U- 0.314	U- 0.281	U- 0.255
1.0 in.	R- 6.5	U- 0.305	U- 0.274	U- 0.249
1.5 in.	R- 11.0	U- 0.267	U- 0.243	U- 0.223
2.0 in.	R- 7.6	U- 0.230	U- 0.212	U- 0.197
2.0 in.	R- 10.0	U- 0.219	U- 0.202	U- 0.188
2.0 in.	R- 13.0	U- 0.210	U- 0.195	U- 0.182
3.0 in.	R- 11.4	U- 0.178	U- 0.167	U- 0.157
3.0 in.	R- 15.0	U- 0.168	U- 0.158	U- 0.149
3.0 in.	R- 19.0	U- 0.161	U- 0.152	U- 0.144
3.5 in.	R- 11.0	U- 0.168	U- 0.158	U- 0.149
3.5 in.	R- 13.0	U- 0.161	U- 0.152	U- 0.144
3.5 in.	R- 15.0	U- 0.155	U- 0.147	U- 0.140
4.5 in.	R- 17.1	U- 0.133	U- 0.126	U- 0.121
4.5 in.	R- 22.5	U- 0.124	U- 0.119	U- 0.114
4.5 in.	R- 25.2	U- 0.122	U- 0.116	U- 0.112
5.0 in.	R- 19.0	U- 0.122	U- 0.117	U- 0.112
5.0 in.	R- 25.0	U- 0.115	U- 0.110	U- 0.106
5.0 in.	R- 28.0	U- 0.112	U- 0.107	U- 0.103
5.0 in.	R- 32.0	U- 0.109	U- 0.105	U- 0.101
5.5 in.	R- 19.0	U- 0.118	U- 0.113	U- 0.109
5.5 in.	R- 20.9	U- 0.114	U- 0.109	U- 0.105
5.5 in.	R- 21.0	U- 0.113	U- 0.109	U- 0.105
5.5 in.	R- 27.5	U- 0.106	U- 0.102	U- 0.099
5.5 in.	R- 30.8	U- 0.104	U- 0.100	U- 0.096
6.0 in.	R- 22.8	U- 0.106	U- 0.102	U- 0.098
6.0 in.	R- 30.0	U- 0.099	U- 0.095	U- 0.092
6.0 in.	R- 33.6	U- 0.096	U- 0.093	U- 0.090
6.5 in.	R- 24.7	U- 0.099	U- 0.096	U- 0.092
7.0 in.	R- 26.6	U- 0.093	U- 0.090	U- 0.087
7.5 in.	R- 28.5	U- 0.088	U- 0.085	U- 0.083

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Summary of Proposed 2009 Seattle Energy Code, 18 August 2010

<u>Framing Type and Depth</u>	<u>Rated R-Value of Insulation Alone</u>	<u>Assembly U-Factors for Solid Concrete Walls</u>	<u>Assembly U-Factors for Concrete Block Walls: Solid Grouted</u>	<u>Assembly U-Factors for Concrete Block Walls: Partially Grouted (cores uninsulated except where specified)</u>
8.0 in.	R- 30.4	U- 0.083	U- 0.081	U- 0.079
1 in Metal Clips at 24 in. on center horizontally and 16 in. vertically (also, where allowed by Section 1332, for assemblies with a ratio of metal penetration area/ mass wall area of <0.0004 (<0.04% of the mass wall area) ⁵				
1.0 in.	R- 3.8	U- 0.210	U- 0.195	U- 0.182
1.0 in.	R- 5.0	U- 0.184	U- 0.172	U- 0.162
1.0 in.	R- 5.6	U- 0.174	U- 0.163	U- 0.154
1.5 in.	R- 5.7	U- 0.160	U- 0.151	U- 0.143
1.5 in.	R- 7.5	U- 0.138	U- 0.131	U- 0.125
1.5 in.	R- 8.4	U- 0.129	U- 0.123	U- 0.118
2.0 in.	R- 7.6	U- 0.129	U- 0.123	U- 0.118
2.0 in.	R- 10.0	U- 0.110	U- 0.106	U- 0.102
2.0 in.	R- 11.2	U- 0.103	U- 0.099	U- 0.096
2.5 in.	R- 9.5	U- 0.109	U- 0.104	U- 0.101
2.5 in.	R- 12.5	U- 0.092	U- 0.089	U- 0.086
2.5 in.	R- 14.0	U- 0.086	U- 0.083	U- 0.080
3.0 in.	R- 11.4	U- 0.094	U- 0.090	U- 0.088
3.0 in.	R- 15.0	U- 0.078	U- 0.076	U- 0.074
3.0 in.	R- 16.8	U- 0.073	U- 0.071	U- 0.069
3.5 in.	R- 13.3	U- 0.082	U- 0.080	U- 0.077
3.5 in.	R- 17.5	U- 0.069	U- 0.067	U- 0.065
3.5 in.	R- 19.6	U- 0.064	U- 0.062	U- 0.061
4.0 in.	R- 15.2	U- 0.073	U- 0.071	U- 0.070
4.0 in.	R- 20.0	U- 0.061	U- 0.060	U- 0.058
4.0 in.	R- 22.4	U- 0.057	U- 0.056	U- 0.054
5.0 in.	R- 28.0	U- 0.046	U- 0.046	U- 0.045
6.0 in.	R- 33.6	U- 0.039	U- 0.039	U- 0.038
7.0 in.	R- 39.2	U- 0.034	U- 0.034	U- 0.033
8.0 in.	R- 44.8	U- 0.030	U- 0.030	U- 0.029
9.0 in.	R- 50.4	U- 0.027	U- 0.027	U- 0.026
10.0 in.	R- 56.0	U- 0.024	U- 0.024	U- 0.024
11.0 in.	R- 61.6	U- 0.022	U- 0.022	U- 0.022
Continuous Insulation Uninterrupted by Framing				
No Framing	R- 1.0	U- 0.425	U- 0.367	U- 0.324
	R- 2.0	U- 0.298	U- 0.269	U- 0.245
	R- 3.0	U- 0.230	U- 0.212	U- 0.197
	R- 4.0	U- 0.187	U- 0.175	U- 0.164
	R- 5.0	U- 0.157	U- 0.149	U- 0.141
No Framing	R- 6.0	U- 0.136	U- 0.129	U- 0.124
	R- 7.0	U- 0.120	U- 0.115	U- 0.110
	R- 8.0	U- 0.107	U- 0.103	U- 0.099
	R- 9.0	U- 0.097	U- 0.093	U- 0.090
	R- 10.0	U- 0.088	U- 0.085	U- 0.083
No Framing	R- 11.0	U- 0.081	U- 0.079	U- 0.076
	R- 12.0	U- 0.075	U- 0.073	U- 0.071
	R- 13.0	U- 0.070	U- 0.068	U- 0.066
	R- 14.0	U- 0.065	U- 0.064	U- 0.062
	R- 15.0	U- 0.061	U- 0.060	U- 0.059
No Framing	R- 16.0	U- 0.058	U- 0.056	U- 0.055
	R- 17.0	U- 0.054	U- 0.053	U- 0.052
	R- 18.0	U- 0.052	U- 0.051	U- 0.050
	R- 19.0	U- 0.049	U- 0.048	U- 0.047

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<u>Framing Type and Depth</u>	<u>Rated R-Value of Insulation Alone</u>	<u>Assembly U-Factors for Solid Concrete Walls</u>	<u>Assembly U-Factors for Concrete Block Walls: Solid Grouted</u>	<u>Assembly U-Factors for Concrete Block Walls: Partially Grouted (cores uninsulated except where specified)</u>
	R- 20.0	U- 0.047	U- 0.046	U- 0.045
<u>No Framing</u>	R- 21.0	U- 0.045	U- 0.044	U- 0.043
	R- 22.0	U- 0.043	U- 0.042	U- 0.042
	R- 23.0	U- 0.041	U- 0.040	U- 0.040
	R- 24.0	U- 0.039	U- 0.039	U- 0.038
	R- 25.0	U- 0.038	U- 0.037	U- 0.037
<u>No Framing</u>	R- 30.0	U- 0.032	U- 0.032	U- 0.031
	R- 35.0	U- 0.028	U- 0.027	U- 0.027
	R- 40.0	U- 0.024	U- 0.024	U- 0.024
	R- 45.0	U- 0.022	U- 0.021	U- 0.021
	R- 50.0	U- 0.019	U- 0.019	U- 0.019
	R- 55.0	U- 0.018	U- 0.018	U- 0.018
	R- 60.0	U- 0.016	U- 0.016	U- 0.016
Brick cavity wall with continuous insulation				
<u>No Framing</u>	R- 0.0	U- 0.337	U- 0.299	U- 0.270
<u>No Framing</u>	R- 3.8	U- 0.148	U- 0.140	U- 0.133
<u>No Framing</u>	R- 5.0	U- 0.125	U- 0.120	U- 0.115
<u>No Framing</u>	R- 6.5	U- 0.106	U- 0.102	U- 0.098
<u>No Framing</u>	R- 7.6	U- 0.095	U- 0.091	U- 0.088
<u>No Framing</u>	R- 10.0	U- 0.077	U- 0.075	U- 0.073
<u>No Framing</u>	R- 10.5	U- 0.079	U- 0.077	U- 0.075
<u>No Framing</u>	R- 11.4	U- 0.070	U- 0.068	U- 0.066
<u>No Framing</u>	R- 15.0	U- 0.056	U- 0.055	U- 0.053
<u>No Framing</u>	R- 16.5	U- 0.054	U- 0.053	U- 0.052
<u>No Framing</u>	R- 19.0	U- 0.046	U- 0.045	U- 0.044
<u>No Framing</u>	R- 22.5	U- 0.041	U- 0.040	U- 0.039
<u>No Framing</u>	R- 28.5	U- 0.033	U- 0.032	U- 0.032
Continuous Insulation Uninterrupted by Framing with Stucco and Continuous Metal Framing at 24 in. on center horizontally				
1.0 in.	R- 0.0 + R-19 c.i.	U- 0.047	U- 0.046	U- 0.045
1.0 in.	R- 3.8 + R-19 c.i.	U- 0.045	U- 0.044	U- 0.044
1.0 in.	R- 5.0 + R-19 c.i.	U- 0.045	U- 0.044	U- 0.043
1.0 in.	R- 6.5 + R-19 c.i.	U- 0.045	U- 0.044	U- 0.043
1.5 in.	R- 11.0 + R-19 c.i.	U- 0.044	U- 0.043	U- 0.043
2.0 in.	R- 7.6 + R-19 c.i.	U- 0.043	U- 0.042	U- 0.041
2.0 in.	R- 10.0 + R-19 c.i.	U- 0.042	U- 0.041	U- 0.041
2.0 in.	R- 13.0 + R-19 c.i.	U- 0.042	U- 0.041	U- 0.041
3.0 in.	R- 11.4 + R-19 c.i.	U- 0.041	U- 0.040	U- 0.039
3.0 in.	R- 15.0 + R-19 c.i.	U- 0.040	U- 0.039	U- 0.039
3.0 in.	R- 19.0 + R-19 c.i.	U- 0.040	U- 0.039	U- 0.038
3.5 in.	R- 11.0 + R-19 c.i.	U- 0.040	U- 0.039	U- 0.039
3.5 in.	R- 13.0 + R-19 c.i.	U- 0.040	U- 0.039	U- 0.038
5.0 in.	R- 19.0 + R-19 c.i.	U- 0.037	U- 0.036	U- 0.036
5.0 in.	R- 25.0 + R-19 c.i.	U- 0.036	U- 0.035	U- 0.035
5.0 in.	R- 32.5 + R-19 c.i.	U- 0.035	U- 0.035	U- 0.034
5.5 in.	R- 19.0 + R-19 c.i.	U- 0.036	U- 0.036	U- 0.035
5.5 in.	R- 21.0 + R-19 c.i.	U- 0.035	U- 0.035	U- 0.035

Notes for Default Table 10-5B(3)

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



1. It is acceptable to use the U-factors in Table 10-5B(3) for all concrete and masonry walls, provided that the grouting is equal to or less than that specified.
 - For ungrouted walls, use the partially-grouted column.
 - For metal studs and z-furring, use the continuous-metal-framing category.
 - For discontinuous metal clips 1 inch square or smaller, use the metal-clip category.
 - For insulation that is attached without any framing members (e.g. glued), use the continuous-insulation-uninterrupted-by-framing category. Continuous insulation may be installed on the interior or exterior of masonry walls, or between stand-alone walls in multi-layer masonry walls, or on the interior or exterior of the concrete.
2. For Table 10-5B(3), the U-factor includes R-0.17 for exterior air film and R-0.68 for interior air film - vertical surfaces. For insulated walls, the U-factor also includes R-0.45 for 0.5 in. gypsum board. U-factors are provided for the following configurations:
 - (a) Concrete wall: 8-in. normal weight concrete wall with a density of 145 lb/ft³.
 - (b) Solid grouted concrete block wall: 8-in. medium weight ASTM C90 concrete block with a density of 115 lb/ft³ and solid grouted cores.
 - (c) Partially grouted concrete block wall: 8-in. medium weight ASTM C90 concrete block with a density of 115 lb/ft³ having reinforcing steel every 32 in. vertically and every 48 in. horizontally, with cores grouted in those areas only. Other cores are filled with insulating material only if there is no other insulation.
3. For walls with insulation contained in a framing layer, the U-factors in Table 10-5B(3) assume contact (and thermal bridging) between the mass wall and other framing. For wall assemblies with multiple layers where the wood or metal framing layer does not contact the concrete or masonry layer (i.e. walls with an airspace between the stud wall layer and the mass wall layer), it is acceptable to use the appropriate wood or metal frame wall default U-factors in Tables 10-5 or 10-5A. Note, it is acceptable to use this approach where the insulation extends beyond the framing and is in contact with the mass wall layer (e.g. a nominal four-inch metal stud containing insulation that is nominally six inches thick and therefore extends two inches beyond the back of the metal stud).
4. Except for wall assemblies qualifying for note 3, if not taken from Table 10-5B(3), mass wall U-factors shall be determined in accordance with RS-9, Appendix A, Section A3.1 and Tables A3.1A to A3.1D, or Section A9.4. If not taken from Table 10-9, heat capacity for mass walls shall be taken from RS-9, Appendix A, Table A3.1B or A3.1C.
5. See Section 1332 for determination of U-factors for assemblies that include metal other than screws and nails.

1006 Default U-Factors for Fenestration, Glazing, and Doors.

Discussion: Revise terminology for consistency with 2009 WSEC.

Proposal: Amend 2009 WSEC as follows -

SECTION 1006 — DEFAULT U-FACTORS FOR FENESTRATION, GLAZING, AND DOORS

1006.1 Fenestration, Glazing and Doors Without NFRC Certification: Fenestration, glazing, ((Glazing)) and doors that do not have NFRC Certification shall be assigned the following U-factors.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Table 10-6 Other than Single-Family Residential: Default U-Factors for Vertical Fenestration, Skylights, and Opaque Doors.

Discussion: Clarify default U-factors for revolving doors and vestibules.

Proposal: Amend 2009 WSEC as follows -

**TABLE 10-6
OTHER THAN SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR VERTICAL FENESTRATION((GLAZING)),
SKYLIGHTS((OVERHEAD GLAZING)) AND OPAQUE DOORS**

Vertical Fenestration((Glazing))	U-Factor		
	Any Frame	Aluminum W/Thermal Break ^a	Vinyl/Wood/Fiberglass Frame
Single (see below for revolving doors & vestibules) ^b	1.45	1.45	1.45
Double	0.90	0.85	0.75
1/2 Inch Air, Fixed/Operable	0.75/0.90	0.70/0.84	0.60/0.72
1/2 Inch Air, Low-e ^(0.40) , Fixed/Operable	0.70/0.84	0.60/0.72	0.50/0.60
1/2 Inch Air, Low-e ^(0.10) , Fixed/Operable	0.65/0.78	0.55/0.66	0.45/0.54
1/2 Inch Argon, Low-e ^(0.10) , Fixed/Operable	0.60/0.72	0.50/0.60	0.40/0.48
Triple	0.75	0.55	0.50
1/2 Inch Air, Fixed/Operable	0.55/0.66	0.50/0.60	0.45/0.54
1/2 Inch Air, Low-e ^(0.20) , Fixed/Operable	0.50/0.60	0.45/0.54	0.40/0.48
1/2 Inch Air, 2 Low-e ^(0.10) , Fixed/Operable	0.45/0.54	0.35/0.42	0.30/0.36
1/2 Inch Argon, Low-e ^(0.10) , Fixed/Operable	0.40/0.48	0.30/0.36	0.25/0.30

a. The category for aluminum frame with a thermal break is as defined in footnote 7 to Table 10-6A.

b. For revolving doors and vestibules that are fenestration:

- i. Revolving doors shall use the default U-factors in Table 10-6C that corresponds most closely to the configuration (3-wing or 4-wing) and size of the rough opening for the revolving door.
- ii. Vestibules shall use the default U-factor for 4-wing revolving doors in Table 10-6C that corresponds most closely to the size of the rough opening for the vestibule.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



((Overhead Glazing))Skylights: Sloped Glazing (Including Frame)			
	U-Factor		
	Any Frame	Aluminum W/Thermal Break	Vinyl/Wood/Fiberglass Frame
Single	1.74	1.74	1.74
Double	1.08	1.02	0.90
1/2 Inch Air, Fixed	0.90	0.84	0.72
1/2 Inch Air, Low-e ^(0.40) , Fixed	0.84	0.72	0.60
1/2 Inch Air, Low-e ^(0.10) , Fixed	0.78	0.66	0.54
1/2 Inch Argon, Low-e ^(0.10) , Fixed	0.72	0.60	0.48
Triple	0.90	0.66	0.60
1/2 Inch Air, Fixed	0.66	0.60	0.54
1/2 Inch Air, Low-e ^(0.20) , Fixed	0.60	0.54	0.48
1/2 Inch Air, 2 Low-e ^(0.10) , Fixed	0.54	0.42	0.36
1/2 Inch Argon, 2 Low-e ^(0.10) , Fixed	0.48	0.36	0.30

This default table is applicable to sloped glazing only. (Sloped glazing is a multiple-lite glazed system (similar to a curtain wall) that is mounted at a slope greater than 15° from the vertical plane.) Other ((overhead glazing))skylights shall use the defaults in Table 10-6E.

Opaque Doors	
	U-Factor
Uninsulated Metal	1.20
Insulated Metal (Including Fire Door and Smoke Vent)	0.60
Wood	0.50
Other Doors	See Table 10-6C

1007.2 Component Description.

Discussion: Revise descriptions for metal building roofs for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

1007.2 Component Description: The ((four)) types of ceilings are characterized as follows:

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Ceilings Below a Vented Attic: Attic insulation is assumed to be blown-in, loose-fill fiberglass with a K-value of $2.6 \text{ h}\cdot\text{ft}^2\cdot\text{°F}/\text{Btu}$ per inch. Full bag count for specified R-value is assumed in all cases. Ceiling dimensions for flat ceiling calculations are forty-five by thirty feet, with a gabled roof having a 4/12 pitch. The attic is assumed to vent naturally at the rate of three air changes per hour through soffit and ridge vents. A void fraction of 0.002 is assumed for all attics with insulation baffles. Standard-framed, un baffled attics assume a void fraction of 0.008.

Attic framing is either standard or advanced. Standard framing assumes tapering of insulation depth around the perimeter with resultant decrease in thermal resistance. An increased R-value is assumed in the center of the ceiling due to the effect of piling leftover insulation. Advanced framing assumes full and even depth of insulation extending to the outside edge of exterior walls. Advanced framing does not change from the default value.

U-factors for flat ceilings below vented attics with standard framing may be modified with the following table:

Roof Pitch	U-Factor for Standard Framing	
	R-30	R-38
4/12	.036	.031
5/12	.035	.030
6/12	.034	.029
7/12	.034	.029
8/12	.034	.028
9/12	.034	.028
10/12	.033	.028
11/12	.033	.027
12/12	.033	.027

Vented scissors truss attics assume a ceiling pitch of 2/12 with a roof pitch of either 4/12 or 5/12. Un baffled standard framed scissors truss attics are assumed to have a void fraction of 0.016.

Vaulted Ceilings: Insulation is assumed to be fiberglass batts installed in roof joist cavities. In the vented case, at least 1.5-inches between the top of the batts and the underside of the roof sheathing is left open for ventilation in each cavity. A ventilation rate of 3.0 air changes per hour is assumed. In the unvented or dense pack case, the ceiling cavity is assumed to be fully packed with insulation, leaving no space for ventilation.

EXCEPTION: Where spray polyurethane foam meets the requirements of Section 502.1.6.3 or 1313.2, the cavity shall be filled to the depth to achieve R-value requirements.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Roof Decks: Rigid insulation is applied to the top of roof decking with no space left for ventilation. Roofing materials are attached directly on top of the insulation. Framing members are often left exposed on the interior side.

Metal Truss Framing: Overall system tested values for the roof/ceiling U_o for metal framed truss assemblies from approved laboratories shall be used, when such data is acceptable to the building official.

Alternatively, the U_o for roof/ceiling assemblies using metal truss framing may be obtained from Tables 10-7A, 10-7B, 10-7C, 10-7D and 10-7E.

Steel Truss Framed Ceiling, Table 10-7A.

Steel Truss Framed Ceiling with R-3 Sheathing, Table 10-7B.

Steel Truss Framed Ceiling with R-5 Sheathing, Table 10-7C.

Steel Truss Framed Ceiling with R-10 Sheathing, Table 10-7D.

Steel Truss Framed Ceiling with R-15 Sheathing, Table 10-7E.

Metal Building Roof, Table 10-7F: The base assembly is a roof where the insulation is compressed when installed beneath metal roof panels attached to the steel structure (purlins). Additional assemblies include continuous insulation, uncompressed and uninterrupted by framing. Insulation exposed to a conditioned space shall have a facing, and all insulation seams shall be continuously sealed.

Single Layer. The rated R-value of insulation is for insulation installed perpendicular to and draped over purlins and then compressed when the metal roof panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

Double Layer. The first rated R-value of insulation is for insulation installed perpendicular to and draped over purlins. The second rated R-value of insulation is for unfaced insulation installed above the first layer and parallel to the purlins and then compressed when the metal roof panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

Continuous Insulation. For assemblies with continuous insulation, the continuous insulation is installed above or below the purlins, uncompressed and uninterrupted by framing members. ((For continuous insulation (e.g., insulation boards or blankets), it is assumed that the insulation is installed below the purlins and is uninterrupted by framing members. Insulation exposed to the conditioned space or semiheated space shall have a facing, and all insulation seams shall be continuously sealed to provide a continuous air barrier.))

Liner System (Ls). A continuous membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. For multilayer installations, the last rated R-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.

Filled Cavity. ((The first rated R-value of insulation is for faced insulation installed parallel to the purlins. The second rated R-value of insulation is for unfaced insulation installed above the first layer, parallel to and between the purlins and compressed when the metal roof panels are attached. The facer of the first layer of insulation is of sufficient width to be continuously sealed to the top flange of the purlins and to accommodate the full thickness of the second layer of insulation. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of the second layer of insulation being installed above it.)) The first rated R-value of insulation represents faced or unfaced insulation installed between the purlins. The second rated R-value of insulation represents unfaced insulation installed above the first layer, perpendicular to the purlins and compressed where the metal roof panels are attached. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of insulation. A minimum R-5 (R-0.9) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

U-factors for Metal Building Roofs. U-factors for metal building roofs shall be taken from Table 10-7F, provided the average purlin spacing is at least 52 in. and the R-value of the thermal spacer block is greater than or equal to the thermal spacer block R-value indicated in Table 10-7F for the assembly. It is not acceptable to use the U-factors in Table 10-7F if additional insulated sheathing is not continuous. U-factors for metal building roof assemblies with average purlin spacing less than 52 in. shall be determined in accordance with Section A9.2 of RS-9.

Roofs with Insulation Entirely Above Deck (uninterrupted by framing), Table 10-7G: The base assembly is continuous insulation over a structural deck. Added insulation is continuous and uninterrupted by framing. For the insulation, the first column lists the R-value for continuous insulation with a uniform thickness; the second column lists the comparable area-weighted average R-value for continuous insulation provided that the insulation thickness is never less than R-5 (except at roof drains) and that the slope is no greater than 1/4 inch per foot.

Table 10-7F Default U-Factors for Metal Building Roofs.

Discussion: Revise and expand default options for metal building roofs in Table 10-7F for consistency with addendum bb to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

TABLE 10-7F
Default U-Factors for Metal Building Roofs

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (Uninterrupted by Framing)								
			Rated R-Value of Continuous Insulation								
			R-6.5	R-9.8	R-13	R-15.8	R-19 ((R-19.5))	R-22.1	R-25 ((R-26))	R-32 ((R-32.5))	R-38 ((R-39))
Standing Seam Roofs with Thermal Spacer Blocks ^{a,b}											
Single Layer	None	1.280	0.137	0.095	0.073	0.060	0.051 ((0.049))	0.044	0.039 ((0.037))	0.031 ((0.030))	0.026 ((0.025))

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.

Summary of Proposed 2009 Seattle Energy Code, 18 August 2010

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (Uninterrupted by Framing)								
			Rated R-Value of Continuous Insulation								
			R-6.5	<u>R-9.8</u>	R-13	<u>R-15.8</u>	<u>R-19</u> ((R-19.5))	<u>R-22.1</u>	<u>R-25</u> ((R-26))	<u>R-32</u> ((R-32.5))	<u>R-38</u> ((R-39))
	R-10	0.115	0.066	<u>0.054</u>	0.046	<u>0.041</u>	<u>0.036</u> ((0.035))	<u>0.032</u>	<u>0.030</u> ((0.029))	<u>0.025</u> ((0.024))	0.021
	R-11	0.107	0.063	<u>0.052</u>	0.045	<u>0.040</u>	<u>0.035</u>	<u>0.032</u>	<u>0.029</u> ((0.028))	0.024	0.021
	R-13	0.101	0.061	<u>0.051</u>	0.044	<u>0.039</u>	<u>0.035</u> ((0.034))	<u>0.031</u>	<u>0.029</u> ((0.028))	0.024	<u>0.021</u> ((0.020))
	R-16	0.096	0.059	<u>0.049</u>	0.043	<u>0.038</u>	<u>0.034</u> ((0.033))	<u>0.031</u>	<u>0.028</u> ((0.027))	<u>0.024</u> ((0.023))	<u>0.021</u> ((0.020))
	R-19	0.082	0.053	<u>0.045</u>	0.040	<u>0.036</u>	<u>0.032</u> ((0.038))	<u>0.029</u>	<u>0.027</u> ((0.026))	<u>0.023</u> ((0.022))	0.020
Double Layer	R-10 + R-10	0.088	0.056	<u>0.047</u>	0.041	<u>0.037</u>	<u>0.033</u> ((0.032))	<u>0.030</u>	<u>0.028</u> ((0.027))	0.023	0.020
	R-10 + R-11	0.086	0.055	<u>0.047</u>	0.041	<u>0.036</u>	<u>0.033</u> ((0.032))	<u>0.030</u>	0.027	0.023	0.020
	R-11 + R-11	0.085	0.055	<u>0.046</u>	0.040	<u>0.036</u>	<u>0.033</u> ((0.032))	<u>0.030</u>	<u>0.027</u> ((0.026))	0.023	0.020
	R-10 + R-13	0.084	0.054	<u>0.046</u>	0.040	<u>0.036</u>	0.032	<u>0.029</u>	<u>0.027</u> ((0.026))	0.023	0.020
	R-11 + R-13	0.082	0.053	<u>0.045</u>	0.040	<u>0.036</u>	0.032	<u>0.029</u>	<u>0.027</u> ((0.026))	<u>0.023</u> ((0.022))	0.020
	R-13 + R-13	0.075	0.050	<u>0.043</u>	0.038	<u>0.034</u>	<u>0.031</u> ((0.030))	<u>0.028</u>	<u>0.026</u> ((0.025))	0.022	0.019
	R-10 + R-19	0.074	0.050	<u>0.043</u>	0.038	<u>0.034</u>	<u>0.031</u> ((0.030))	<u>0.028</u>	<u>0.026</u> ((0.025))	0.022	0.019
	R-11 + R-19	0.072	0.049	<u>0.042</u>	0.037	<u>0.034</u>	0.030	<u>0.028</u>	<u>0.026</u> ((0.025))	0.022	0.019
	R-13 + R-19	0.068	0.047	<u>0.041</u>	0.036	<u>0.033</u>	<u>0.030</u> ((0.029))	<u>0.027</u>	0.025	0.021	0.019
	R-16 + R-19	0.065	0.046	<u>0.040</u>	0.035	<u>0.032</u>	0.029	<u>0.027</u>	<u>0.025</u> ((0.024))	0.021	<u>0.019</u> ((0.018))
	R-19 + R-19	0.060	0.043	<u>0.038</u>	0.034	<u>0.031</u>	0.028	<u>0.026</u>	<u>0.024</u> ((0.023))	<u>0.021</u> ((0.020))	0.018
	Liner System	R-19 + R-11	0.035								
R-25 + R-11		0.031									
R-30 + R-11		0.029									
R-25 + R-11 + R-11		0.026									
<u>R-30 + R-11 + R-11</u>		<u>0.024</u>									
Filled Cavity with Thermal Spacer Blocks ^c											
	R-10 + R-19	<u>0.041</u>	<u>0.032</u>	<u>0.029</u>	<u>0.027</u>	<u>0.025</u>	<u>0.023</u>	<u>0.022</u>	<u>0.020</u>	<u>0.018</u>	<u>0.016</u>

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (Uninterrupted by Framing)								
			Rated R-Value of Continuous Insulation								
			R-6.5	<u>R-9.8</u>	R-13	<u>R-15.8</u>	<u>R-19</u> ((R-19.5))	<u>R-22.1</u>	<u>R-25</u> ((R-26))	<u>R-32</u> ((R-32.5))	<u>R-38</u> ((R-39))
		((0.057))	((0.042))	((0.033))		((0.027))	((0.023))	((0.020))	((0.018))		
Standing Seam Roofs without Thermal Spacer Blocks											
Liner System	R-19 + R-11	0.040									
Thru-Fastened Roofs without Thermal Spacer Blocks											
	R-10	0.184	<u>0.084</u>	<u>0.066</u>	<u>0.054</u>	<u>0.047</u>	<u>0.041</u>	<u>0.036</u>	<u>0.033</u>	<u>0.027</u>	<u>0.023</u>
	R-11	0.182	<u>0.083</u>	<u>0.065</u>	<u>0.054</u>	<u>0.047</u>	<u>0.041</u>	<u>0.036</u>	<u>0.033</u>	<u>0.027</u>	<u>0.023</u>
	R-13	0.174	<u>0.082</u>	<u>0.064</u>	<u>0.053</u>	<u>0.046</u>	<u>0.040</u>	<u>0.036</u>	<u>0.033</u>	<u>0.026</u>	<u>0.023</u>
	R-16	0.157	<u>0.078</u>	<u>0.062</u>	<u>0.052</u>	<u>0.045</u>	<u>0.039</u>	<u>0.035</u>	<u>0.032</u>	<u>0.026</u>	<u>0.023</u>
	R-19	0.151	<u>0.076</u>	<u>0.061</u>	<u>0.051</u>	<u>0.045</u>	<u>0.039</u>	<u>0.035</u>	<u>0.032</u>	<u>0.026</u>	<u>0.022</u>
Liner System	R-19 + R-11	0.044									

(Multiple R-values are listed in order from inside)

- A standing seam roof clip that provides a minimum 1.5 in. distance between the top of the purlins and the underside of the metal roof panels is required.
- A minimum R-3 thermal spacer block is required.
- A minimum R-5 thermal spacer block is required.

Table 10-7G Assembly U-Factors for Roofs with Insulation Entirely Above Deck (Uninterrupted by Framing).

Discussion: Expand default options for roofs with insulation entirely above deck.

Proposal: Amend 2009 WSEC as follows -

**TABLE 10-7G
ASSEMBLY U-FACTORS FOR ROOFS WITH INSULATION ENTIRELY ABOVE DECK
(UNINTERRUPTED BY FRAMING)**

Rated R-Value of Insulation Alone: Minimum Throughout, Unslotted	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
R-0	Not allowed	U-1.282
R-1	Not allowed	U-0.562
R-2	Not allowed	U-0.360
R-3	Not allowed	U-0.265
R-4	Not allowed	U-0.209

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Summary of Proposed 2009 Seattle Energy Code, 18 August 2010

Rated R-Value of Insulation Alone: Minimum Throughout, Unsloned	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
R-5	Not allowed	U-0.173
R-6	R-7	U-0.147
R-7	R-8	U-0.129
R-8	R-9	U-0.114
R-9	R-10	U-0.102
R-10	R-12	U-0.093
R-11	R-13	U-0.085
R-12	R-15	U-0.078
R-13	R-16	U-0.073
R-14	R-18	U-0.068
R-15	R-20	U-0.063
R-16	R-22	U-0.060
R-17	R-23	U-0.056
R-18	R-25	U-0.053
R-19	R-27	U-0.051
R-20	R-29	U-0.048
R-21	R-31	U-0.046
R-22	R-33	U-0.044
R-23	R-35	U-0.042
R-24	R-37	U-0.040
R-25	R-39	U-0.039
R-26	R-41	U-0.037
R-27	R-43	U-0.036
R-28	R-46	U-0.035
R-29	R-48	U-0.034
R-30	R-50	U-0.032
<u>R-31</u>	<u>R-52</u>	<u>U-0.031</u>
<u>R-32</u>	<u>R-54</u>	<u>U-0.031</u>
<u>R-33</u>	<u>R-56</u>	<u>U-0.030</u>
<u>R-34</u>	<u>R-59</u>	<u>U-0.029</u>
R-35	R-61	U-0.028
<u>R-36</u>	<u>R-63</u>	<u>U-0.027</u>
<u>R-37</u>	<u>R-66</u>	<u>U-0.026</u>
<u>R-38</u>	<u>R-68</u>	<u>U-0.026</u>
<u>R-39</u>	<u>R-71</u>	<u>U-0.025</u>
R-40	R-73	U-0.025

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Rated R-Value of Insulation Alone: Minimum Throughout, Unsloned	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
<u>R-41</u>	<u>R-75</u>	<u>U-0.024</u>
<u>R-42</u>	<u>R-78</u>	<u>U-0.023</u>
<u>R-43</u>	<u>R-80</u>	<u>U-0.023</u>
<u>R-44</u>	<u>R-83</u>	<u>U-0.022</u>
R-45	R-86	U-0.022
<u>R-46</u>	<u>R-88</u>	<u>U-0.021</u>
<u>R-47</u>	<u>R-90</u>	<u>U-0.021</u>
<u>R-48</u>	<u>R-93</u>	<u>U-0.021</u>
<u>R-49</u>	<u>R-96</u>	<u>U-0.020</u>
R-50	R-99	U-0.020
R-55	R-112	U-0.018
R-60	R-126	U-0.016

1009.1 Mass, General.

Discussion: Add cross-reference to Table 10-B for brick, concrete, and concrete masonry used in other than single-family residential projects.

Proposal: Amend 2009 WSEC as follows -

1009.1 General: Tables 10-9 and 10-10 list default mass values for concrete masonry construction for residential. Calculations are based on standard ASHRAE values for heat-storage capacity as listed in Standard RS-1, Chapter 26. For heat capacity values for brick, concrete, and concrete masonry materials used in other projects, see Table 10-B.

Thermal capacity of furniture is ignored, as is heat storage beyond the first four inches of mass thickness. All mass is assumed to be in direct contact with the conditioned space. Concrete separated from the heated volume by other materials must multiply the listed concrete mass value by the result of the following formula:

$$\text{Ln}(\text{R-value}) \times (-.221) + 0.5$$

Where:

Ln = Natural log

R-value = R-value of material covering concrete

Note: All default values for covered concrete slabs have been adjusted according to this procedure.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



CHAPTER 11 ADMINISTRATION AND ENFORCEMENT

1100 Title.

Discussion: Clarify that the requirements apply to multifamily residential spaces.

Proposal: Amend 2009 WSEC as follows -

SECTION 1100 — TITLE

Chapters 11 through ~~16~~(20) of this Code shall be known as the "~~(Washington State)~~ Seattle Nonresidential and Multifamily Residential Energy Code" and may be cited as such. Any reference to the "Seattle Energy Code" in the Seattle Municipal Code or any Seattle ordinance, to the extent applicable to those spaces, shall include the Seattle Nonresidential and Multifamily Residential Energy Code. (~~and will be referred to herein as "this Code."~~)

1105 Applicability to Multifamily Residential Spaces.

Discussion: Specify transition for multifamily residential spaces.

Proposal: Amend 2009 WSEC as follows -

SECTION 1105 — APPLICABILITY TO MULTIFAMILY RESIDENTIAL SPACES

Until the effective date of the 2009 Washington State Energy Code, the 2006 Washington State Energy Code, as filed in Seattle City Clerk's File 308938, and the amendments thereto adopted by Ordinance 122530, constitute the Seattle Energy Code for multifamily residential spaces. Effective upon the date when the 2009 Washington State Energy Code takes effect, the 2009 Washington State Energy Code, with the Seattle Amendments only to Chapter 1, constitutes the Seattle Energy Code for multifamily residential spaces.

EXCEPTION: Sections 1133, 1140, 1141.1, 1141.2, 1144, and 1162 of Chapter 11 of this Code, which relate to procedure, administration and enforcement, including Seattle Amendments to those sections, and the procedural requirements in all chapters, apply to all spaces and occupancies both before and after effectiveness of the 2009 Washington State Energy Code.

For purposes of this Section: (1) Prior to the effective date of the 2009 Washington State Energy Code, "multifamily residential spaces" are defined as spaces within the definition of "Group R" occupancy in Chapter 3 of the 2006 Seattle Building Code and not falling within the scope of Section 101.2 of the 2006 Seattle Residential Code, and (2) effective upon the date when the 2009 Washington State Energy Code takes effect, "multifamily residential spaces" are defined as set forth in Chapter 2 of this Code under "RESIDENTIAL".

Informative Note: Prior to the effective date of the 2009 Washington State Energy Code no spaces in Group I occupancy are classified as "residential," therefore all Seattle Amendments to sections relevant to those spaces apply to all such spaces.

1110 Purpose and Intent.

Discussion: Clarify that the requirements apply to all buildings, systems, and processes.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Proposal: Amend 2009 WSEC as follows -

SECTION 1110 — PURPOSE AND INTENT

The purpose of this Code is to provide minimum standards for new or altered buildings and structures or portions thereof, including systems and equipment used for commercial and industrial processes contained therein, to achieve efficient use and conservation of energy. It is intended that these provisions provide flexibility to permit the use of innovative approaches and techniques to achieve efficient use and conservation of energy.

The purpose of this Code is not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this Code. This Code is not intended to abridge any safety or health requirements required under any other applicable codes or ordinances.

The provisions of this Code do not consider the efficiency of various energy forms as they are delivered to the building envelope.

Informative Note: As indicated in Section 1120, the Energy Code applies to industrial facilities, as well as commercial and industrial processes. Thus, the purpose and the intent is that requirements apply to industrial facilities, as well as systems and equipment used in commercial and industrial processes.

1120 Scope.

Discussion: More explicitly state the application to commercial and industrial processes.

Proposal: Amend 2009 WSEC as follows -

SECTION 1120 — SCOPE

This Code sets forth minimum requirements for the design and commissioning of new or altered buildings and structures or portions thereof that provide facilities or shelter for public assembly, educational, business, mercantile, institutional, storage, factory, industrial, and multifamily residential occupancies by regulating their exterior envelopes and the selection of their mechanical systems, domestic water systems, electrical distribution and illuminating systems, and equipment for efficient use and conservation of energy, including systems and equipment used for commercial and industrial processes contained therein.

EXCEPTION: The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits.

—Temporary growing structure means a structure that has the sides and roof covered with polyethylene, polyvinyl, or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this Code.

1132.1 Building Envelope.

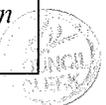
Discussion: Clarify application of vestibule requirements to existing buildings.

Proposal: Amend 2009 WSEC as follows -

1132.1 Building Envelope: Alterations or repairs shall comply with Chapter 13, including the nominal R-values and ((glazing))fenestration requirements in Table 13-1 or 13-2.

EXCEPTIONS:

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Summary of Proposed 2009 Seattle Energy Code, 18 August 2010

1. Storm windows installed over existing glazing.
2. Glass replaced in existing sash and frame provided that glazing is of equal or lower U-factor.
3. For solar heat gain coefficient compliance, glazing with a solar heat gain coefficient equal to or lower than that of the other existing glazing.
4. Existing roof/ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Sections 1311 and 1313.
5. Existing walls and floors without framing cavities, provided that any new cavities added to existing walls and floors comply with Exception 4.
6. Existing roofs where the roof membrane is being replaced and
 - a. The roof sheathing or roof insulation is not exposed; or
 - b. If there is existing roof insulation below the deck.
7. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided that the rough opening and the door size does not change, and provided that any existing vestibule or revolving door that separates a conditioned space from the exterior shall not be removed.

In no case shall the energy efficiency of the building be decreased.

1132.2 Mechanical Systems.

Discussion: Add specification that mechanical system alterations are not to decrease the energy efficiency of the building.

Chapter 14 contains requirements for mechanical systems that are applicable to all projects, new buildings as well as alterations to existing buildings. Chapter 11 provides some alternates for existing buildings. Alterations that comply with Chapter 14 do not need to comply with the provisions in Chapter 11. Thus, while alterations of the mechanical systems are not allowed to decrease the energy efficiency under Chapter 11, mechanical systems which are more efficient than required by Chapter 14 of the current code are allowed to decrease energy efficiency as long as the mechanical system still complies with Chapter 14 after the mechanical system alteration is completed.

Proposal: Amend 2009 WSEC as follows -

1132.2 Mechanical Systems: Those parts of systems which are altered or replaced shall comply with Chapter 14 of this Code. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.

All new systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Chapter 14.

Where mechanical cooling is added to a space that was not previously cooled, the mechanical cooling system shall comply with Sections 1413 and either 1423 or 1433.

EXCEPTIONS: These exceptions only apply to situations where mechanical cooling is added to a space that was not previously cooled.

1. Water-cooled refrigeration equipment provided with a water economizer meeting the requirements of Section 1413 need not comply with 1423 or 1433. This exception shall not be used for RS-29 analysis.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



2. Alternate designs that are not in full compliance with this Code may be approved when the building official determines that existing building or occupancy constraints make full compliance impractical or where full compliance would be economically impractical.

Alterations to existing mechanical cooling systems shall not decrease economizer capacity unless the system complies with Sections 1413 and either 1423 or 1433. In addition, for existing mechanical cooling systems that do not comply with Sections 1413 and either 1423 or 1433, including both the individual unit size limits and the total building capacity limits on units without economizer, other alterations shall comply with Table 11-1.

When space cooling equipment is replaced, controls shall be installed to provide for integrated operation with economizer in accordance with Section 1413.3.

Existing equipment currently in use may be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

In no case shall the energy efficiency of the building be decreased.

1132.3 Lighting and Motors.

Discussion: (1) Expand application of requirements for lighting alterations per addendum av to ASHRAE/IESNA Standard 90.1, (2) add specification that lighting system alterations are not to decrease the energy efficiency of the building.

Chapter 15 contains requirements for lighting, motors, and transformers that are applicable to all projects, new buildings as well as alterations to existing buildings. Chapter 11 provides some alternates for existing buildings. Alterations that comply with Chapter 15 do not need to comply with the provisions in Chapter 11. Thus, while alterations of the lighting systems are not allowed to decrease the energy efficiency under Chapter 11, lighting systems which are more efficient than required by Chapter 15 of the current code are allowed to decrease energy efficiency as long as the lighting system still complies with Chapter 15 after the lighting system alteration is completed.

Proposal: Amend 2009 WSEC as follows -

1132.3 Lighting and Motors: Where the use in a space changes from one use in Table 15-1 to another use in Table 15-1, the installed lighting wattage shall comply with Section 1521 or 1531.

Other tenant improvements, alterations or repairs where ~~((60))~~ 20 percent or more of the fixtures, or of the lamps plus ballasts alone, in a space enclosed by walls or ceiling-height partitions are ~~((new))~~ altered, added, or replaced shall comply with Sections 1531 and 1532. (Where this threshold is triggered, the areas of the affected spaces may be combined for lighting code compliance calculations.) Where less than ~~((60))~~ 20 percent of the fixtures in a space enclosed by walls or ceiling-height partitions are new, the installed lighting wattage shall be maintained or reduced. Where ~~((60))~~ 20 percent or more of the lighting fixtures in a suspended ceiling are new, and the existing insulation is on the suspended ceiling, the roof/ceiling assembly shall be insulated according to the provisions of Chapter 13, Section 1311.2.

Any new lighting control devices shall comply with the requirements of Section 1513. Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections 1513.1 through 1513.5 and, as applicable,

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1513.8. In addition, office areas less than 300 ft² enclosed by walls or ceiling-height partitions, and all meeting and conference rooms, and all school classrooms, shall be equipped with occupancy sensors that comply with Section 1513.6 and 1513.8. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Sections 1513.6 through 1513.8.

Where new walls or ceiling-height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections 1513.1 through 1513.2, 1513.4, and 1513.6 through 1513.8.

Those motors which are altered or replaced shall comply with Section 1511.

In no case shall the energy efficiency of the building be decreased.

1133 Change of Occupancy or Use or Space Conditioning.

Discussion: (1) Explicitly cite changes of space conditioning in the title; (2) retain existing Seattle amendment, with minor change to delete heating equipment capacity.

Proposal: Amend 2009 WSEC as follows -

1133 Change of occupancy or use or space conditioning. Changes of occupancy or use or space conditioning shall comply with the following requirements:

- a. Any unconditioned space that is altered to become semi-heated, cooled, or fully heated, or any semi-heated space that is altered to become cooled or fully heated space shall be required to be brought into full compliance with this Code. Existing warehouses and repair shops are considered unconditioned space unless they are indicated as conditioned space in DPD records or they were built after 1980 and they comply with the building envelope requirements for conditioned space in effect at the time of construction. (See the Seattle Mechanical Code for requirements for combustion appliances.)
- b. Any nonresidential space which is converted to multifamily residential space shall be brought into full compliance with this Code.
- c. Any multifamily residential space which is converted to nonresidential space shall be required to comply with all of the provisions of Sections 1130 through 1132 of this Code.

1135 Commissioning.

Discussion: Delete HVAC limitations, thereby retaining application of commissioning requirements to all buildings per existing Seattle Energy Code requirements.

Proposal: Amend 2009 WSEC as follows -

1135 Commissioning. Commissioning in compliance with Sections 1416 and 1513.8 shall be required for new systems or modified portions of systems (~~(, with a heating capacity of 600,000 Btu/h or a cooling capacity of 40 tons or more)~~).

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1141.2 Details.

Discussion: Companion change to Table 13-1.

Proposal: Amend 2009 WSEC as follows -

1141.2 Details: The plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems as herein governed including, but not limited to: design criteria; exterior envelope component materials, U-factors of the envelope systems, R-values of insulating materials; U-factors and solar heat gain coefficients and visible transmittance of fenestration or shading coefficients of glazing; area weighted U-factor calculations; efficiency, economizer, size and type of apparatus and equipment; fan system horsepower; equipment and systems controls; lighting fixture schedule with wattages and controls narrative; commissioning requirements for HVAC equipment, HVAC controls, and lighting controls, and other pertinent data to indicate compliance with the requirements of this Code.

1141.4 Systems Analysis Approach for the Entire Building.

Discussion: Companion change to RS-29 Section 1.2.

Proposal: Amend 2009 WSEC as follows -

1141.4 Systems Analysis Approach for the Entire Building: In lieu of using Chapters 12 through ~~16~~(20), compliance may be demonstrated using the systems analysis option in Standard RS-29. When using systems analysis, the proposed ~~((building))~~design, as defined in Standard RS-29, shall provide ~~((equal or))~~ better conservation of energy~~((than))~~, to the extent required by Section 1.2 of Standard RS-29 than the ~~((standard design))~~baseline building design, as defined in Standard RS-29, that would comply with this Code without reference to this Section 1141.4. If required by the building official, all energy comparison calculations submitted under the provisions of Standard RS-29 shall be stamped and authenticated by an engineer or architect licensed to practice by the state of Washington.

1143.2 Required Inspections.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

1143.2 Required Inspections: The building official, upon notification, shall make the inspection required in this section, in addition to or as part of those inspections required in Section 109.3 of the ~~((International))~~Seattle Building Code. Inspections may be conducted by special inspection pursuant to Section 1704 of the ~~((International))~~Seattle Building Code. Where applicable, inspections shall include at least:

1143.2.1 Envelope

- a. Wall Insulation Inspection: To be made after all wall insulation and air vapor retarder sheet or film materials are in place, but before any wall covering is placed.
- b. ~~((Glazing))~~Fenestration Inspection: To be made after ~~((glazing))~~fenestration materials are installed in the building.

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- c. Exterior Roofing Insulation: To be made after the installation of the roof insulation, but before concealment.
- d. Slab/Floor Insulation: To be made after the installation of the slab/floor insulation, but before concealment.

1143.2.2 Mechanical

- a. Mechanical Equipment Efficiency and Economizer: To be made after all equipment and controls required by this Code are installed and prior to the concealment of such equipment or controls.
- b. Mechanical Pipe and Duct Insulation: To be made after all pipe and duct insulation is in place, but before concealment.

1143.2.3 Lighting and Motors

- a. Lighting Equipment and Controls: To be made after the installation of all lighting equipment and controls required by this Code, but before concealment of the lighting equipment.
- b. Motor Inspections: To be made after installation of all equipment covered by this Code, but before concealment.

1144 Violations and Penalties.

Discussion: Revise to reflect current procedures.

Proposal: Amend 2009 WSEC as follows -

1144 Violations and Penalties(~~(: It shall be a violation of this Code for any person, firm or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to any of the provisions of this Code.))~~)

1144.1 Violations: It is a violation of this Code for anyone to:

1. erect, construct, enlarge, repair, move, improve, remove, convert, demolish, equip, occupy, operate, inspect or maintain any building or structure in the City, contrary to or in violation of any of the provisions of this Code;
2. knowingly aid, abet, counsel, encourage, hire, commend, induce or otherwise procure another to violate or fail to comply with this Code;
3. use any material or to install any device, appliance or equipment that does not comply with the applicable standards of this Code, or that has not been approved by the building official if that approval is required;
4. violate or fail to comply with any final order issued by the building official pursuant to the provisions of this Code or with any requirements of this Code;
5. remove, mutilate, destroy or conceal any notice or order issued or posted by the building official pursuant to the provisions of this Code, or any notice or order issued or posted by the building official in response to a natural disaster or other emergency; or

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



6. make or submit any false or misleading statement or information as part of or in connection with any application for any permit or approval under this Code.

1144.2 Notices, Review and Enforcement: The provisions of Section 103 of the Seattle Building Code regarding notices of violation, orders, recording, review, and legal proceedings apply under this Code. Section 103 of the Seattle Building Code, as adopted by SMC Section 22.100.010, is incorporated in this Section by this reference. Nothing in this Section 1144 shall be deemed to limit or preclude any action or proceeding pursuant to the Seattle Building Code or any other ordinance, and nothing in this section shall be deemed to obligate or require the building official to issue a notice of violation prior to the imposition of civil or criminal penalties.

1144.3 Penalties and Remedies: Any person violating or failing to comply with the provisions of this Code or an order of the building official under this Code shall be subject to the same civil and criminal penalties as provided for a violation of the Seattle Building Code under Section 103 of that code. The provisions for additional remedies in Section 103 of the Seattle Building Code apply under this Code.

1150 Conflicts with Other Codes.

Discussion: Clarify applicability.

Proposal: Amend 2009 WSEC as follows -

1150 Conflicts with Other Codes. In case of conflicts among Codes enumerated in RCW 19.27.031 subsections (1), (2), (3) and (4) and this Code, the first named Code shall govern. The duct insulation requirements in this Code (~~or a local jurisdiction's energy code, whichever is more stringent,~~) supersede the requirements in the Mechanical Code.

Informative Note: Additional efficiency standards for electrical energy use may also appear in Seattle City Light service requirements, which should be consulted.

Where, in any specific case, different sections of this Code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

1162 Liability.

Discussion: Revise to reflect current procedures.

Proposal: Amend 2009 WSEC as follows -

1162 Liability: Nothing contained in this Code is intended to be nor shall be construed to create or form the basis for any liability on the part of (~~any city or county~~) the City or its officers, employees or agents for any injury or damage resulting from the failure of a building or any fixture or equipment to conform to the provisions of this Code, or by reason of or in consequence of any inspection, notice, order, certificate, permission of approval authorized or

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issued or done in connection with the implementation or enforcement of this Code, or by reason of any action or inaction on the part of the City or by its officers or agents related in any manner to the enforcement of this Code. This Code shall not be construed to lessen or relieve the responsibility of any person owning, operating or controlling any building or structure for any damages to persons or property caused by defects, nor shall DPD or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this Code or any permits or certificates issued under this Code.

Table 11-1 Economizer Compliance Options for Mechanical Alterations.

Discussion: Retain existing Seattle amendments, with minor companion change for consistency with Chapter 14.

Proposal: Amend 2009 WSEC as follows -

**TABLE 11-1:
ECONOMIZER COMPLIANCE OPTIONS FOR MECHANICAL ALTERATIONS**

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
1. Packaged Units	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ^{2,3}	Efficiency: min. ¹ Economizer: 1433 ^{2,3}	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
2. Split Systems	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: shall not decrease existing economizer capability	Only for new units < 54,000 Btuh replacing unit installed prior to 1991 (one of two): Efficiency: + 10/5% ⁵ Economizer: 50% ⁶	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
			For units > 54,000 Btuh or any units installed after 1991: Option A	
2a. Equipment within the scope of ASHRAE Std 127	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²
3. Water Source Heat Pump	Efficiency: min. ¹ Economizer: 1433 ²	(two of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶	(three of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶ (except for certain pre-1991 systems ⁸)	Efficiency: min. ¹ Economizer: 1433 ^{2,4} (except for certain pre-1991 systems ⁸)
4. Hydronic Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: shall not decrease existing economizer capacity	Option A	Efficiency: min. ¹ Economizer: 1433 ^{2,4}

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



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	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
4a. Hydronic Economizer using equipment within the scope of ASHRAE Std 127	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: min. ¹ Economizer: 1433 ²
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min. ¹ Economizer: 1433 ²	Economizer: 1433 ² for equipment installed outdoors or in a mechanical room adjacent to the outdoors, otherwise shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸)	Option A (except for certain pre-1991 systems ⁸)
6. Air- Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller ¹⁰	Efficiency: min. ¹ Economizer: 1433 ²	Economizer: 1433 ² for equipment installed outdoors or in a mechanical room adjacent to the outdoors, otherwise shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸ and certain 1991-2009 ((2004)) systems ⁹ .)	Efficiency: min. ¹ Economizer: 1433 ^{2,4} (except for certain pre-1991 systems ⁸ and certain 1991-2009 ((2004)) systems ⁹)
7. Cooling Tower	Efficiency: min. ¹ Economizer: 1433 ²	No requirements	Option A	Option A
8. Air-Cooled Chiller	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 5% ¹¹ Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 10% ¹² and (2) multistage Economizer: shall not decrease existing economizer capacity	Efficiency: min.1 Economizer: 1433 ^{2,4}
9. Water-Cooled Chiller	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency (one of two): (1) + 10% ¹³ or (2) plate frame heat exchanger ¹⁵ Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 15% ¹⁴ and (2) plate-frame heat exchanger ¹⁵ Economizer: shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
10. Boiler	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 8% ¹⁶ Economizer: shall not decrease existing economizer capacity	Efficiency: + 8% ¹⁶ Economizer: shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: 1433 ^{2,4}

1. Minimum equipment efficiency shall comply with Section 1411.1 and Tables 14-1A through G((M)).
2. System and building shall comply with Section 1433 (including both the individual unit size limits and the total building capacity limits on units without economizer). It is acceptable to comply using one of the exceptions to Section 1433.

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3. All equipment replaced in an existing building shall have air economizer complying with Sections 1413 and 1433 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1433.
4. All separate new equipment added to an existing building shall have air economizer complying with Sections 1413 and 1433 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1433.
5. Equipment shall have a capacity-weighted average cooling system efficiency:
 - a. for units with a cooling capacity below 54,000 Btuh, a minimum of 10% greater than the requirements in Tables 14-1A and 14-1B (1.10 x values in Tables 14-1A and 14-1B).
 - b. for units with a cooling capacity of 54,000 Btuh and greater, a minimum of 5% greater than the requirements in Tables 14-1A and 14-1B (1.05 x values in Tables 14-1A and 14-1B).
6. Minimum of 50% air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be capable of providing this additional outside air and equipped with economizer control.
7. Have flow control valve to eliminate flow through the heat pumps that are not in operation with variable speed pumping control complying with Section 1432.2.2 for that heat pump.
 - When the total capacity of all units with flow control valves exceeds 15% of the total system capacity, a variable frequency drive shall be installed on the main loop pump.
 - As an alternate to this requirement, have a capacity-weighted average cooling system efficiency that is 5% greater than the requirements in note 5 (i.e. a minimum of 15%/10% greater than the requirements in Tables 14-1A and 14-1B (1.15/1.10 x values in Tables 14-1A and 14-1B)).
8. Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btuh.
9. Economizer not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and ~~(June 2004)~~ the effective date of the 2009 Seattle Energy Code, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.
10. For water-cooled process equipment where the manufacturers specifications require colder temperatures than available with waterside economizer, that portion of the load is exempt from the economizer requirements.
11. The air-cooled chiller shall have an IPLV efficiency that is a minimum of 5% greater than the IPLV requirements in EER in Table 14-1C (1.05 x IPLV values in EER in Table 14-1C).
12. The air-cooled chiller shall:
 - a. have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in EER in Table 14-1C (1.10 x IPLV values in EER in Table 14-1C), and
 - b. be multistage with a minimum of two compressors.
13. The water-cooled chiller shall have an ~~((NPLV))~~ IPLV efficiency that is at least 10% lower ~~((a minimum of 10% greater))~~ than the ~~((NPLV))~~ IPLV requirements in kW/ton in ~~((Table 14-1K, Table 14-1L, or Table 14-1M))~~ Table 14-1C (1.10 x ~~((NPLV))~~ IPLV values in kW/ton in ~~((Table 14-1K, Table 14-1L, or Table 14-1M))~~ Table 14-1C). Water cooled centrifugal chillers designed for non-standard conditions shall have an NPLV efficiency that is at least 10% lower than the adjusted maximum NPLV rating in kW/ton defined in paragraph 1411.2.1 (1.10 x NPLV).
14. The water-cooled chiller shall have an ~~((NPLV))~~ IPLV efficiency that is at least 15% lower ~~((a minimum of 15% greater))~~ than the ~~((NPLV))~~ IPLV requirements in kW/ton in ~~((Table 14-1K, Table 14-1L, or Table 14-1M))~~ Table 14-1C (1.15 x ~~((NPLV))~~ IPLV values in kW/ton in ~~((Table 14-1K, Table 14-1L, or Table 14-1M))~~ Table 14-1C). Water cooled centrifugal chillers designed for non-standard conditions shall have an NPLV efficiency that is at least 15% lower than the adjusted maximum NPLV rating in kW/ton defined in paragraph 1411.2.1 (1.15 x NPLV).
15. Economizer cooling shall be provided by adding a plate-frame heat exchanger on the waterside with a capacity that is a minimum of 20% of the chiller capacity at standard AHRI rating conditions.
16. The replacement boiler shall have an efficiency that is a minimum of 8% higher than the value in Table 14-1F (1.08 x value in Table 14-1F), except for electric boilers.

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CHAPTER 12 ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

Chapter 12 Energy Metering and Energy Consumption Management.

Discussion: Revise (1) to be no less stringent than ASHRAE/USGBC/IESNA Standard 189.1-2009, (2) to clarify intent.

Proposal: Amend 2009 WSEC as follows -

Chapter 12 Energy Metering and Energy Consumption Management

1201 General. All buildings shall comply with Chapter 12. Whole building energy supply sources shall be metered to supply energy consumption data to the building owner to effectively manage energy. The building shall have a totalizing meter for each energy source.

1202 Whole Building Energy Supply Metering. For buildings with a gross conditioned floor area of 20,000 ft² and larger, measurement devices with remote communication capability shall be provided to collect energy use data for each energy supply source to the building including gas, electricity and district steam. The system shall collect energy use data for the total building and separately for each of the end-use categories listed in Sections 1202.1 through 1202.5 and Figure 12A.

Exceptions:

1. Buildings where the total usage of each of the load types described in Sections 1202.1 through 1202.5 is measured through the use of installed submeters or other methods approved as equivalent by the building official.
2. Up to 5% of the total calculated load of each end-use category, as defined in Sections 1202.1 through 1202.5, may be excluded from the energy submetering requirements of this chapter.
3. Separate metering is not required for fire pumps, stairwell pressurization fans and associated life-safety systems that operate only during testing or emergency.
4. Health care facilities with loads in excess of 150kVA may have submetering that measures electrical energy usage in accordance with the normal and essential electrical systems identified in Article 517 of the Seattle Electrical Code.

All measurement devices shall be configured to automatically communicate the energy data to a data acquisition system. At a minimum, measurement devices shall provide daily data. The data acquisition system shall be capable of electronically storing the data, for a minimum of 36 months, from the measurement devices and other sensing devices and creating user reports showing daily, monthly and annual energy consumption. The system shall be commissioned in accordance with Section 1416.

~~((Meters with remote metering capability or automatic meter reading (AMR) capability shall be provided to collect energy use data for each energy supply source to the building including gas, electricity and district steam, that exceeds the thresholds listed in Table 12-1. Utility company service entrance/interval meters are allowed to be used provided that they are configured for automatic meter reading (AMR) capability.~~

Master submetering with remote metering capability (including current sensors or flow meters) shall be provided for the systems that exceed the thresholds in Table 12-1 to collect overall totalized energy use data for each subsystem in accordance with Table 12-2.))

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Metering shall be digital-type meters for the main meter. Current sensors or flow meters are allowed for submetering. ~~((For subsystems with multiple similar units, such as multicell cooling towers, only one meter is required for the subsystem.))~~ Existing buildings are allowed to reuse installed existing analog-type utility company service/interval meters.

1202.1 HVAC System Total Energy Use. This category shall include all energy used to provide space heating, space cooling, and ventilation to the building including boilers, chillers, pumps, fans for supply, return, relief, exhaust, and parking garages, etc.

1202.2 Lighting System Total Energy Use. This category shall include all energy used by interior and exterior lighting, but not including plug-in task lighting.

1202.3 Plug Load System Total Energy Use. This category shall include all energy used by plugged-in task lighting, appliances, and other equipment and devices.

1202.4 Process Load System Total Energy Use. This category shall include all energy used by any non-building operation load (e.g. nonresidential refrigeration and cooking) that accounts for over 2% of the total building connected load. If the total process energy use is less than 2% of the total building connected load, the process energy use is allowed to be included in miscellaneous process energy use.

1202.5 Miscellaneous Total Energy Use. This category shall include energy use other than those specified in Sections 1202.1 through 1202.4 including domestic hot water, elevators and escalators, and swimming pools.

1203 Metering for New or Replacement Systems and Equipment: Where new or replacement systems or equipment is installed in an existing building, metering shall be installed so that that system or equipment is included in the total for the corresponding end-use category in accordance with Section 1202.

Exceptions:

1. Where new or replacement systems or equipment that falls below the threshold in Table 12-2 is installed in an existing building that was not subject to the requirements of this chapter, no additional metering shall be required.
2. Where new or replacement systems or equipment ~~((is installed))~~ that exceeds the threshold in ~~((Table 12-1 or))~~ Table 12-2 is installed in an existing building that was not subject to the requirements of this chapter, metering shall be installed for that system or equipment in accordance with Section 1202~~((+20+))~~ except that a data acquisition system shall not be required for buildings less than 50,000 ft².

1204 Energy Display. For each building subject to Section 1202, a permanent, readily accessible and visible display shall be provided in the building accessible by building operation and management. At a minimum the display shall be capable of providing the current energy demand for the whole building, updated for each energy source, as well as the average and peak demands for the previous day and the same day the previous year, and the total energy usage for the previous 12 months.

Exception: For existing buildings where a data acquisition system is not required, compliance with Section 1204 shall not be required.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



FIGURE 12A
ENERGY SOURCE AND SEPARATE END-USE SUBMETERING

<u>Energy Source</u>	<u>Separate End-use Submetering</u>
<u>Electrical service</u>	<u>HVAC, Lighting, Plugs, Process, Miscellaneous Energy used in the project</u>
<u>Gas and steam service</u>	<u>HVAC, Process, Miscellaneous Energy used in the project</u>
<u>On-site renewable electric power</u>	<u>Electrical energy supplied to the project</u>
<u>Geothermal</u>	<u>Heat content supplied to the project</u>
<u>On-site renewable thermal energy</u>	<u>Heat content supplied to the project</u>

Informative Note: Metering of on-site renewable thermal energy, such as for solar water heating systems, will typically require measurement of input and output temperature and flow to determine the thermal energy.

((TABLE 12-1
ENERGY SOURCE METER THRESHOLDS

<u>Energy Source</u>	<u>Main Metering Threshold</u>
Electrical service	> 500 kVA
On-site renewable electric power	> 10 kVA (peak)
Gas and steam service	> 300 kW (1,000,000 Btu/h)
Geothermal	> 300 kW (1,000,000 Btu/h) heating
On-site renewable thermal energy	> 10 kW (30,000 Btu/h)

))

TABLE 12-2
COMPONENT ENERGY MASTER SUBMETERING THRESHOLDS

<u>Component</u>	<u>Submetering Threshold</u>
Chillers/heat pump systems	> 70 kW (240,000 Btu/h) cooling capacity
Packaged AC unit systems	> 70 kW (240,000 Btu/h) cooling capacity
HVAC fan systems	> 15 kW (20 hp)
Exhaust fan systems	> 15 kW (20 hp)
Make-up air fan systems	> 15 kW (20 hp)

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Component	Submetering Threshold
Pump systems	> 15 kW (20 hp)
Cooling tower systems	> 15 kW (20 hp)
Boilers, furnaces and other heating equipment systems	> 300 kW (1,000,000 Btu/h) heating capacity
General lighting circuits	> 15 kVA
Miscellaneous electric loads	> 15 kVA

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**CHAPTER 13
BUILDING ENVELOPE**

Figure 13A Building Envelope Compliance Options.

Discussion: Modify to add new sections.

Proposal: Amend 2009 WSEC as follows –

**FIGURE 13A
BUILDING ENVELOPE COMPLIANCE OPTIONS**

Section Number	Subject	Prescriptive Option	Component Performance Option	Systems Analysis Option
1310	General Requirements	X	X	X
1311	Insulation	X	X	X
1312	((Glazing))Fenestration and Doors	X	X	X
1313	Moisture Control	X	X	X
1314	Air Leakage	X	X	X
1320	Prescriptive Building Envelope Option	X		
1321	General	X		
1322	Opaque Envelope	X		
1323	((Glazing))Fenestration	X		
1330	Component Performance Building Envelope Option		X	
1331	General		X	
1332	Component U-Factors		X	
1333	UA Calculations		X	
1334	Solar Heat Gain Coefficient		X	
1335	Visible Transmittance		X	
RS-29	Systems Analysis			X

1310.1 Conditioned Spaces.

Discussion: Companion change to Section 1335.

Proposal: Amend 2009 WSEC as follows -

1310.1 Conditioned Spaces: The building envelope for conditioned spaces shall also comply with one of the following paths:

- a. Prescriptive Building Envelope Option Sections 1320 through 1323.
- b. Component Performance Building Envelope Option Sections 1330 through ((1334)) 1335.
- c. Systems Analysis. See Section 1141.4.

1310.3 Cold Storage and Refrigerated Spaces.

Discussion: (1) Revise to be no less stringent than changes to Table 13-1, and (2) add assembly U-factors for Target UA compliance option.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Proposal: Amend 2009 WSEC as follows -

1310.3 Cold Storage and Refrigerated Spaces: Exterior and interior surfaces of frozen storage spaces or cold storage spaces in refrigerated warehouses may comply with either the prescriptive or component performance approach using insulation values in Table 13-3. The remainder of refrigerated warehouse area containing conditioned or semi-conditioned spaces shall comply by using either the prescriptive or component performance approach using Tables 13-1 and 13-2.

EXCEPTIONS:

1. Areas within refrigerated warehouses that are designed solely for the purpose of quick chilling or freezing of products with design cooling capacities of greater than 240 Btu/hr-ft² (2 tons per 100 ft²).
2. Controlled atmosphere storage exterior floor and partition wall insulation.

**TABLE 13-3
REFRIGERATED WAREHOUSE INSULATION**

SPACE	SURFACE	ASSEMBLY MAXIMUM U-FACTOR (Btu/h·ft ² ·°F)	INSULATION MINIMUM R-VALUE (h·ft ² ·°F/Btu)
Frozen Storage Spaces (28°F or below) and	((Exterior)) Roof/Ceiling	U-0.027	R-38 ((R-36))
	((Exterior)) Wall	U-0.027	R-38 ((R-36))
	((Exterior)) Floor	U-0.027	R-38 ((R-36))
Cold Storage Spaces (28-45°F)	((Interior Partition [†]))		((R-28))
((Cold Storage Spaces (28-45°F)))	((Exterior Roof/Ceiling))		((R-28))
	((Exterior Wall))		((R-28))
	((Interior Partition [†]))		((R-19))

(([†] Interior partitions include any wall, floor, or ceiling that divides frozen storage spaces or cold storage spaces from each other, conditioned spaces, unconditioned spaces, or semi-conditioned spaces.))

1311.5 Slab-On-Grade Floor.

Discussion: Revise to correspond with Section 502.1.4.8 of the 2009 WSEC.

Proposal: Amend 2009 WSEC as follows -

1311.5 Slab-On-Grade Floor: Slab-on-grade insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance of 24 inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance of 24 inches. Above grade insulation shall be protected. A 2-inch by 2-inch (maximum) nailer may be placed at the finished floor elevation for attachment of interior finish materials. ((Slab-on-grade insulation installed inside the foundation wall shall extend downward from the top of the slab a minimum distance of 24 inches or to the top of the footing, whichever is less. Insulation installed outside the foundation shall extend downward a minimum of 24 inches or to the frost line, whichever is greater. Above grade insulation shall be protected.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.

~~EXCEPTION: For monolithic slabs, the insulation shall extend downward from the top of the slab to the bottom of the footing.))~~

1311.6 Radiant Floors.

Discussion: No Seattle changes (retain existing Seattle amendment).

Proposal: Amend 2009 WSEC as follows -

1311.6 Radiant Floors (on or below grade): Slab-on-grade insulation shall extend downward from the top of the slab a minimum distance of 36 inches or downward to the top of the footing and horizontal for an aggregate of not less than 36 inches.

~~((If required by the building official where soil conditions warrant such insulation, t))~~ The entire area of a radiant floor shall be thermally isolated from the soil. Where a soil gas control system is provided below the radiant floor, which results in increased convective flow below the radiant floor, the radiant floor shall be thermally isolated from the sub-floor gravel layer.

1312 Fenestration and Doors.

Discussion: Revise terminology for consistency.

Proposal: Amend 2009 WSEC as follows -

1312 ~~((Glazing))~~ Fenestration and Doors

1312.1 Standard Procedure for Determination of ~~((Glazing))~~ Fenestration and Door U-Factors: U-factors for ~~((glazing))~~ fenestration and doors shall be determined, certified and labeled in accordance with Standard RS-31 by a certified independent agency licensed by the National Fenestration Rating Council (NFRC). Compliance shall be based on the ~~((Residential or the Nonresidential))~~ Model Size in Table 4-3 of RS-31. Product samples used for U-factor determinations shall be production line units or representative of units as purchased by the consumer or contractor. Unlabeled ~~((glazing))~~ fenestration and doors shall be assigned the default U-factor in Table 10-6.

1312.2 Solar Heat Gain Coefficient and Visible Transmittance.

Discussion: (1) Retain existing Seattle amendments; (2) add exception 3 for dynamic glazing for SHGC per addendum c1 to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

1312.2 Solar Heat Gain Coefficient and ~~((Shading Coefficient))~~ Visible Transmittance: Solar Heat Gain Coefficient (SHGC) and Visible Transmittance (VT), shall be determined, certified and labeled in accordance with the National Fenestration Rating Council (NFRC) Standard by a certified, independent agency, licensed by the NFRC.

EXCEPTIONS:

1. Shading coefficients (SC) or solar heat gain coefficient for the center of glass shall be an acceptable alternate for compliance with solar heat gain coefficient requirements. Shading coefficients or solar heat gain coefficient for the center of glass for glazing shall be taken from Chapter 15 of Standard RS-1 or from the manufacturer's ~~((test))~~ data using a spectral data file determined in accordance with NFRC 300.

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2. For the purposes of 1323, Exception 1, visible transmittance for the center of the glazing assembly shall be taken from Chapter 15 of Standard RS-1 or from the manufacturer's data using a spectral data file determined in accordance with NFRC 300.
3. For dynamic glazing, the minimum SHGC shall be used to demonstrate compliance with this section. Dynamic glazing shall be considered separately from other vertical fenestration, and area-weighted averaging with other vertical fenestration that is not dynamic glazing shall not be permitted.

Informative Note: Using the exception for the SHGC for the center-of-glass does not give the full credit for the overall product (including the frame) that the NFRC-certified SHGC does. Though the SHGC for the frame is not zero (the ASHRAE Handbook of Fundamentals indicates that the SHGC can range from 0.11-0.14 for metal frames and from 0.02 to 0.07 for wood/vinyl/fiberglass frames), the SHGC for the frame is invariably lower than that for the glass. Consequently, an NFRC-certified SHGC will generally be lower.

Conversely, the VT for the center-of-glass overstates the VT for the overall product (including the frame). The VT for the frame is zero. Consequently, an NFRC-certified VT will always be lower. For this reason, Exception 2 to Section 1312.2 is only applicable to Exception 1 in Section 1323. It is not applicable to other sections.

1313.2 Roof/Ceiling Assemblies.

Discussion: Revise reference to cite Seattle code.

Proposal: Amend 2009 WSEC as follows -

1313.2 Roof/Ceiling Assemblies: Roof/ceiling assemblies where the ventilation space above the insulation is less than an average of 12 inches shall be provided with a vapor retarder. (For enclosed attics and enclosed rafter spaces, see Section 1203.2 of the ((International))Seattle Building Code.) Roof/ceiling assemblies without a vented airspace, allowed only where neither the roof deck nor the roof structure are made of wood, shall provide a continuous vapor retarder with taped seams.

EXCEPTIONS:

1. Vapor retarders need not be provided where all of the insulation is installed between the roof membrane and the structural roof deck.
2. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all of the following conditions are met:
 1. The unvented attic space is completely contained within the building thermal envelope.
 2. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
 3. Where wood shingles or shakes are used, a minimum ¼ inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
 4. Any air-impermeable insulation shall be a vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.
 5. Either items a, b or c shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.
 - b. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified per WA Climate Zone for condensation control:
 - i. Climate Zone 1: R-10 minimum rigid board or air-impermeable insulation R-value.
 - ii. Climate Zone 2: R-25 minimum rigid board or air-impermeable insulation R-value.

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- c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified per WA Climate Zone for condensation control. The air-permeable insulation shall be installed directly under the air impermeable insulation.
 - i. Climate Zone 1: R-10 minimum rigid board or air-impermeable insulation R-value.
 - ii. Climate Zone 2: R-25 minimum rigid board or air-impermeable insulation R-value.

1314.2 Fenestration and Doors.

Discussion: Clarify meaning of field fabricated per ASHRAE Standard 90.1-2007, Section 5.4.3.2 interpretation.

Proposal: Amend 2009 WSEC as follows -

1314.2 ((Glazing))Fenestration and Doors: Air leakage for fenestration and doors shall be determined in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 or ASTM E283 as specified below. Air leakage shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the National Fenestration Rating Council, and shall be labeled and certified by the manufacturer. Air leakage shall not exceed:

- a. 1.0 cfm/ft² for glazed swinging entrance doors and revolving doors, tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with NFRC 400, AAMA/WDMA/CSA 101/I.S.2/A440, or ASTM E283.
- b. 0.04 cfm/ft² for curtain wall and storefront ((glazing))fenestration, tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with NFRC 400, AAMA/WDMA/CSA 101/I.S.2/A440, or ASTM E283.
- c. 0.2 cfm/ft² for all other products when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440, or 0.3 cfm/ft² when tested at a pressure of at least 6.24 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S./A440.

EXCEPTIONS:

- 1. Openings that are required to be fire resistant.
- 2. Field-fabricated fenestration and doors that are weather-stripped or sealed in accordance with Section 1314.1. A field-fabricated fenestration product is a fenestration product including a glazed exterior door whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field-fabricated does not include curtain walls.
- 3. For garage doors, air leakage determined by test at standard test conditions in accordance with ANSI/DASMA 105 shall be an acceptable alternate for compliance with air leakage requirements.
- 4. Units without air leakage ratings produced by small business that are weatherstripped or sealed in accordance with Section 1314.1.

1314.6 Continuous Air Barrier.

Discussion: Revise (1) to apply requirement for building air leakage testing to all buildings; (2) to specify confidence interval; (3) to more carefully specify test pressures and ranges; and (4) to add another reference to the informative note.

Seattle amendments do not apply to residential spaces, except that procedural requirements and informative notes in boxed text or brackets, and amendments to administrative and enforcement provisions, apply to all projects.



Proposal: Amend 2009 WSEC as follows -

1314.6 Continuous Air Barrier: For all buildings ((over five stories)), the building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of, the conditioned space. All air barrier components of each envelope assembly shall be clearly identified on construction documents and the joints, interconnections and penetrations of the air barrier components shall be detailed.

Construction documents shall also contain a diagram showing the building's pressure boundary in plan(s) and section(s) and a calculation of the area of the pressure boundary to be considered in the test.

Informative Note: As stated above, the continuous air barrier is intended to control the air leakage into and out of the conditioned space. The definition of conditioned space includes semiheated spaces and indirectly conditioned spaces, so these spaces are included when detailing the continuous air barrier and when determining the pressure boundary for conducting the air leakage test. However, unheated spaces are not included when determining the pressure boundary.

The air leakage test is done using calibrated fans. The amount of airflow in cfm (as adjusted for temperature and pressure) at 75 Pa (0.3" w.g.) measured during the test is divided by the area of the building envelope (the pressure boundary) included in the test. Multiplying that building envelope area by 0.4 cfm will provide an indication of how many cfm are needed to perform the test (how many fans or fan capacity).

1314.6.1 Characteristics: The continuous air barrier shall have the following characteristics:

- a. The air barrier component of each assembly shall be joined and sealed in a flexible manner to the air barrier component of adjacent assemblies, allowing for the relative movement of these assemblies and components. This requirement shall not be construed to restrict the materials or methods by which the air barrier is achieved.
- b. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the air barrier without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
- c. It shall be installed in accordance with the manufacturer's instructions and in such a manner as to achieve the performance requirements.

1314.6.2 Compliance: Compliance of the continuous air barrier for the ((opaque)) building envelope shall be demonstrated by testing the completed building and demonstrating that the upper 95% confidence interval for the air leakage rate of the building envelope does not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inch w.g. (1.57 psf) as specified below.

- a. Whole building testing shall be accomplished in accordance with ASTM E 779 or approved similar test. Tests shall be accomplished using either (1) both pressurization and depressurization or (2) pressurization alone, but not depressurization alone((or depressurization or both)). The building shall not be tested unless it is verified that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner. Following are comments referring to ASTM E 779:

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- b. Under ASTM E 779 it is permissible to test using the building's HVAC system. In buildings with multistory HVAC systems and shafts it is permissible to test using the building's mechanical system using CAN/CGSB-149.15-96 Determination of the Overall Envelope Airtightness of Buildings by the Fan Pressurization Method Using the Building's Air Handling Systems, Canadian General Standards Board, Ottawa.
- c. ~~((In lieu of the fan pressurization method described in ASTM E 779, a tracer gas test of the building air change rate in accordance with ASTM E 741 is also allowed. The tracer gas test shall be run with building HVAC fans off.))~~ Reserved.
- d. Section 8.1 - For purposes of this test, a multizone building shall be configured as a single zone by opening all interior doors, and otherwise connecting the interior spaces as much as possible. It is also allowed to test a smaller section of the building, provided the test area can be isolated from neighboring conditioned zones by balancing the pressure in adjacent conditioned zones to that in the zone being tested. This can be very difficult to do in buildings with multistory shafts and HVAC systems. If a smaller section of the building is tested, provide a drawing showing the zone(s) tested, the pressure boundaries and a diagram of the testing equipment configuration.
- e. Section 8.2 - Seal all intentional functional openings such as exhaust and relief louvers, grilles and dryer vents that are not used in the test to introduce air, using plastic sheeting and duct tape or similar materials. All plumbing traps shall be filled with water.
- f. Section 8.10 - The test pressure range shall be from ~~((10))~~ 25 Pa to 80 Pa ~~((- If approved by the building official, lower test pressures are acceptable))~~, but the upper limit shall not be less than 50 Pa, and the difference between the upper and lower limit shall not be less than 25 Pa.
- g. Section 9.4 - If both pressurization and depressurization are not tested, plot the air leakage against the corrected P for ~~((either))~~ pressurization ~~((or depressurization))~~.
- h. Section 9.6.4 - If the pressure exponent n is less than ~~((0.5))~~ 0.45 or greater than ~~((1))~~ 0.85, ~~((corrective work shall be performed to the continuous air barrier and))~~ the test shall be rerun with additional readings over a longer time interval.
- i. Section 10.4 - Report the air leakage rate normalized in cfm/ft² at 0.3 inch w.g. (1.57 psf) over the total area of the building envelope air pressure boundary including the lowest floor, any below-grade walls, above-grade walls, and roof (or ceiling) (including windows and skylights) separating the interior conditioned space from the unconditioned environment.

Informative Note: Those familiar with building air leakage testing indicate that there are three critical areas:

- the junctions at the top of the building between interior and exterior walls and the roof;
- the wall areas around the perimeter of the windows (not the windows themselves); and
- brackets and other penetrations used to support exterior features such as awnings and canopies.

For buildings with excessive air leakage, there is a methodology to determine air leakage pathways: ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

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1314.6.3 Certificate of Occupancy: A final certificate of occupancy shall not be issued for the building, or portion thereof, until such time that the building official determines that the project complies with one of the following:

a. Option 1:

- i. the continuous air barrier has been inspected by a qualified person (such as the designer or a building commissioning agent) who is not associated with the construction company and an inspection report by that person has been submitted to the building official; and
- ii. the building, or portion thereof, has been field tested in accordance with Section 1314.6.2, and the test report for the whole building air leakage testing in accordance with Section 1314.6.2 is provided to DPD and filed with the inspection record for the project.

Informative Note: Option 1 does not require that testing achieve 0.40 cfm/ft². The requirement is that the testing be executed in accordance with Section 1314.6.2.

b. Option 2:

- i. the building, or portion thereof, has been field tested in accordance with Section 1314.6.2 and the building air leakage does not exceed that allowed in Section 1314.6.2.

Informative Note: As of 2009, the U.S. Army Corps of Engineers limits air leakage in its facilities to 0.25 cfm/ft² for mold prevention and so as to reduce energy use in accordance with the 2005 U.S. Energy Policy Act. Tested buildings have been in the range of 0.16-0.25 cfm/ft². Their experience is that few buildings have to be sealed and re-tested to meet these requirements when buildings are designed and constructed with attention to details.

For further information on comparisons of building envelope air leakage standards and test procedures, see "U.S. Army Corps of Engineers Air Leakage Protocol for Measuring Air Leakage in Buildings", "Controlling Air Leakage in Tall Buildings" by Colin Genge, ASHRAE Journal, April 2009, pages 50-60, and "Protocol for Field Testing of Tall Buildings to Determine Envelope Air Leakage Rate" by William Bahnfleth, Grenville Yuill, and Brian Lee, ASHRAE Transactions 1999, V. 105, Pt. 2.

1314.7 Vestibules.

Discussion: Retain existing Seattle amendment, but

- (1) provide exemptions for semiheated spaces and for elevator lobbies in parking garages; and
- (2) add informative note to clarify intent.

Proposal: Amend 2009 WSEC as follows -

1314.7 Vestibules. Building entrances that separate conditioned space from the exterior shall be enclosed vestibules, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. Interior and exterior doors shall have a minimum distance between them of

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not less than 7 ft and a maximum distance of not more than 20 ft when in the closed position. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior envelope of unconditioned vestibules shall comply with the requirements for a conditioned space. The building lobby is not considered a vestibule.

EXCEPTIONS:

1. Building entrances with revolving doors.
2. Doors not intended to be used as a building entrance.
3. Building entrances in buildings that are less than four stories above grade and less than 10,000 ft² in area.
4. Doors that open directly from a space that is less than 3,000 ft² in area and is separate from the building entrance.
5. Entrances to semi-heated spaces.
6. Elevator doors in parking garages provided that the elevators have an enclosed lobby at each level of the garage.

Informative Note: Building entrances are defined as the means ordinarily used to gain access to the building, so this does not include the handicapped access doors that might be adjacent to a revolving door.

Doors other than for building entrances, such as those leading to service areas, mechanical rooms, electrical equipment rooms, or exits from fire stairways, are not covered by this requirement. There is less traffic through these doors and the vestibule may limit access for large equipment.

Enclosed lobbies in parking garages also serve to reduce the flow of vehicle exhaust into the building.

1321 Prescriptive Building Envelope Option, General.

Discussion: Clarify that compliance is to be done separately for nonresidential and residential spaces for consistency with ASHRAE/IESNA Standard 90.1-2007, Section 5.2.1.

Proposal: Amend 2009 WSEC as follows -

1321 General: This section establishes building envelope design criteria in terms of prescribed requirements for building construction. Compliance shall be calculated separately for the building envelope for nonresidential spaces and for residential spaces.

1322 Opaque Envelope.

Discussion: (1) Add descriptions of alternate compliance options for assemblies with thermal bridges; (2) add cross-reference to Section 1332 for calculation of U-factors for assemblies with metal framing; (3) retain existing Seattle exception, but modify to correspond with changes to Table 13-1; and (4) add procedural note to clarify application to elevator shafts and stairwells.

Proposal: Amend 2009 WSEC as follows -

1322 Opaque Envelope: Roof/ceilings, opaque exterior walls, opaque doors, floors over unconditioned space, below-grade walls, slab-on-grade floors and radiant floors enclosing conditioned spaces shall be insulated according to Section 1311 and Tables 13-1 or 13-2.

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