

TO: Interested Parties
FROM: John Hogan
DATE: 28 January 2010
SUBJECT: 2009 Seattle Energy Code, Preliminary Public Review Draft
(Seattle Amendments to the 2009 Washington State Energy Code)

The public process to update the Seattle Energy Code is now underway. 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 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. More recently, 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.

DPD has scheduled a series of meetings to discuss these proposed amendments. All meetings will take place in the Seattle Municipal Tower (SMT), 700 Fifth Avenue, starting at 7:30 am.

8 February 2010 (Monday), SMT-4050, 7:30-10:00 am: Ch.13 - Building Envelope & Ch.16 - Renewable Energy Power Generation

9 February 2010 (Tuesday) SMT-2750, 7:30-8:45 am: Ch.15 - Lighting & Ch.12 - Metering

11 February 2010 (Thursday) SMT-4050, 7:30-9:30 am: Ch.14 - Mechanical

16 February 2010 (Tuesday) SMT-2750, 7:30-8:45 am: Ch.13 - Building Envelope

18 February 2010 (Thursday) SMT-4080, 7:30-8:45 am: Ch.14 - Mechanical

23 February 2010 (Tuesday) SMT-2750, 7:30-8:45 am: Ch.15 - Lighting

25 February 2010 (Thursday) SMT-4050, 7:30-9:30 am: RS-29 and wrap-up

The deadline for written comments is Monday, 1 March 2010. Submit comments by

- E-mail to john.hogan@seattle.gov, or
- Fax to John Hogan at 206-386-4039, or
- Mail to John Hogan, Seattle DPD, 700 Fifth Avenue, Suite 2000, P.O Box 34019, Seattle WA 98124-4019

If possible, please propose specific language changes with underline to indicate new language and strikethrough to indicate deletions.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

The goal is for the CCAB to make their recommendations in March. DPD would then consider these recommendations and forward an ordinance to the Mayor and City Council shortly thereafter. City Council consideration would occur in late Spring, with an effective date this summer (consistent with other Seattle code updates).

**SUMMARY OF
2009 SEATTLE ENERGY CODE PROPOSAL
(Seattle amendments to the 2009 Washington State Energy Code)**

Consistent with the current Seattle Energy Code, the plan is for the 2009 Seattle Energy Code (the update to be adopted this spring and effective this summer) 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. (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:

- **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).

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

**CHAPTER 13
BUILDING ENVELOPE**

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.

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	<u>ASSEMBLY MAXIMUM U-FACTOR (Btu/h·ft²·°F)</u>	<u>INSULATION MINIMUM R-VALUE (h·ft²·°F/Btu)</u>
Frozen Storage Spaces (28°F or below) and Cold Storage Spaces (28-45°F)	((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))
	((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

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

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.

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.

1312.2 Solar Heat Gain Coefficient and Shading Coefficient.

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

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.
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.

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.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

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.

1314.2 Glazing and Doors.

Discussion: Add note clarifying 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 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, 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.
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.

Procedural Note: 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 curtainwalls.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

1314.6 Continuous Air Barrier.

Discussion: Revise to apply requirement for building air leakage testing to all buildings.

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:

1314.6.2.1 Testing of Overall Building Air Leakage:

Compliance of the continuous air barrier for the opaque building envelope shall be demonstrated by testing the completed building and demonstrating that 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 pressurization 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

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

with the required air leakage rate, can be done in a timely manner. Following are comments referring to ASTM E 779:

- 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.
- 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 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.
- 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 or greater than 1, corrective work shall be performed to the continuous air barrier and the test shall be rerun.
- i. Section 10.4 - Report the air leakage rate normalized in cfm/ft^2 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.

Procedural Note: Testing and reporting are to be done in accordance with the "U.S. Army Corps of Engineers Air Leakage Test Protocol for Measuring Air Leakage in Buildings", available from the Construction Engineering Research Laboratory (CERL) of the U.S. Army Engineer Research and Development Center, 2902 Newmark Drive, Champaign IL 61824.

Testing is to be per Section 4 of that document.

Reporting is to be per Sections 5 and 6 of that document.

1314.6.2.2 Additional Testing for Air Leakage Pathways: Where the air leakage from the test in Section 1314.6.2.1 exceeds $0.25 \text{ cfm}/\text{ft}^2$, additional testing shall be conducted to determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems. Leakage pathways found and potential corrective work shall be identified in a written report provided to the owner.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

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 the building, or portion thereof,

- a. has been field tested in accordance with Section 1314.6.2.1 and the building air leakage does not exceed that allowed in Section 1314.6.2.1; and
- b. for buildings whose air leakage from the test in Section 1314.6.2.1 exceeds 0.25 cfm/ft², additional testing for air leakage pathways has been conducted in accordance with Section 1314.6.2.2 per ASTM E 1186-03 and a report prepared.

EXCEPTION: For building permit applications submitted prior to July 1, 2011, a Certificate of Occupancy is allowed to be issued for buildings which have been field tested for air leakage in accordance with Section 1314.6.2 and exceed the maximum building air leakage specified in Section 1314.6.2 provided that

- i. the test report for the whole building air leakage testing in accordance with Section 1314.6.2.1 is provided to DPD and filed with the inspection record for that permit, and
- ii. the test report for detecting air leakage pathways in accordance with Section 1314.6.2.2 using ASTM E 1186-03 is provided to DPD and filed with the inspection record for that permit.

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.

Consequently, the intent is that the next version of the Seattle Energy Code will set a maximum air leakage rate no higher than 0.25 cfm/ft².

For further information on comparisons of building envelope air leakage standards and test procedures, see "Controlling Air Leakage in Tall Buildings" by Colin Genge, ASHRAE Journal, April 2009, pages 50-60.

1314.7 Vestibules.

Discussion: Minor Seattle changes (retain existing Seattle amendment, but (1) clarify that vestibules are not to be used for other purposes, (2) limit Exception 3 to 3,000 ft² and limit Exception 4 to 2,000 ft² for closer correspondence with Section 7.4.2.7 of ASHRAE/USGBC/IESNA Standard 189.1-2009, and (3) provide exemption for semiheated spaces).

Proposal: Amend 2009 WSEC as follows -

1314.7 Vestibules. Building entrances that separate conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall not be used for any other purpose than ingress or egress. 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 not less than 7 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.

EXCEPTIONS:

1. Building entrances with revolving doors.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

2. Doors not intended to be used as a building entrance.
3. Building entrances in buildings that are less than 3,000 ft² in area.
4. Doors that open directly from a space that is less than 2,000 ft² in area and is separate from the building entrance.
5. Semiheated spaces.

1322 Opaque Envelope.

Discussion: Minor Seattle changes (retain existing Seattle amendment, but modify to correspond with changes to Table 13-1).

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. Compliance with nominal R-values shall be demonstrated for the thermal resistance of the added insulation in framing cavities and/or insulated sheathing only. Nominal R-values shall not include the thermal transmittance of other building materials or air films.

For metal frame assemblies used in spaces with electric resistance space heat, compliance shall be demonstrated with the component U-factor for the overall assembly based on the assemblies in Chapter 10.

Area-weighted averaging of the R-value is not allowed. When showing compliance with R-values, the minimum insulation R-value for all areas of the component shall comply with Tables 13-1 and 13-2. When calculating compliance using U-factors, area-weighted averaging is allowed. Where insulation is tapered (e.g. roofs), separate assembly U-factors shall be calculated for each four-foot section of tapered insulation.

EXCEPTIONS:

1. Opaque smoke vents are not required to meet insulation requirements.
2. For roofs with continuous rigid insulation on the top of the roof, the insulation R-value may be averaged for compliance with minimum prescriptive R-values only, provided that both:
 - a. the minimum insulation is no less than R-5 (but not including area within 6 inches of each roof drain), and
 - b. the area-weighted average insulation is R-68 (in lieu of R-38).

1323 Fenestration.

Discussion: 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), require overhang as one of the criteria for Exception 1;
- (2) Section 1323.1: to have fenestration area requirements vary by orientation;
- (3) Section 1323.3: add option for shading credit for open louvers and non-opaque overhangs, adjust credit based on prescriptive criteria in Table 13-1.

Proposal: Amend 2009 WSEC as follows -

1323 Fenestration ((Glazing)). The intent is that fenestration in building facades will be designed for daylighting and will vary by orientation to respond to external climatic loads.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Fenestration ((Glazing)) shall comply with Section 1312 and Tables 13-1 or 13-2. All glazing shall be, at a minimum, double glazing. In addition, all glazing assemblies shall have at least one low-emissivity coating unless the fenestration ((glazing)) assembly has an overall U-factor that complies with the values in Tables 13-1 or 13-2.

EXCEPTIONS:

1. Vertical fenestration ((glazing)) located on the display side of the street level story of a retail occupancy or where there is a street level transparency requirement in the Seattle Land Use Code or in parking lot attendant booths with a gross floor area not exceeding 50 square feet provided the fenestration ((glazing)):
 - a. (i) is double-glazed with a minimum 1/2 inch airspace and with a low-e coating having a maximum emittance of e-0.10 in a nonmetal frame or a metal frame having a thermal break (as defined in footnote 2 to Table 10-6B; or
 - (ii) has an area weighted U-factor of 0.50 or less.(U-factor calculations shall use overall assembly U-factors. When this exception is used, there are no SHGC requirements); and
 - b. has a visible transmittance of:
 - (i) 0.60 or greater for the center of the glazing assembly in any type of frame, or
 - (ii) has an area-weighted visible transmittance for the overall assembly including the frame of 0.52 or greater for fixed glazing and 0.44 or greater for operable glazing.(Visible transmittance shall be determined in accordance with Section 1312.2.); and
 - c. has an overhang with an area-weighted average projection factor of 0.50 or greater. (Projection factor shall be determined in accordance with Section 1323.3, exception 3.); and
 - d. does not exceed 75 % of the gross exterior wall area of the display side of the street level story measured from the top of the finished floor at street level. However, if the display side of the street level story exceeds 20 feet in height, then this exception may only be used for the first 20 feet of that story.When this exception is utilized, separate calculations shall be performed for these sections of the building envelope and these values shall not be averaged with any others for compliance purposes. The 75% area may be exceeded on the street level, if the additional glass area is provided from allowances from other areas of the building.
2. Single glazing for security purposes and vestibules and revolving doors shall be included in the percentage of the total glazing area, U-factor calculation and SHGC as allowed in the Tables 13-1 or 13-2. The maximum area allowed for the total of all single glazing is 1% of the gross exterior wall area.

1323.1 Area: The percentage of total fenestration ((glazing)) (vertical and overhead) area relative to the gross exterior wall area shall not be greater than the appropriate value from Tables 13-1 or 13-2 for the vertical fenestration ((glazing)) U-factor, overhead fenestration ((glazing)) U-factor and solar heat gain coefficient selected.

1323.1.1 Daylighting Area and Visible Transmittance:

- a. A minimum of 20% of the fenestration area shall be located seven feet or more above the floor.
- b. All fenestration more than seven feet above the finished floor shall have a minimum VT of 0.40. Visible transmittance shall be determined in accordance with Section 1312.2.

1323.1.2 Fenestration Orientation. The fenestration area for west-oriented and east-oriented vertical fenestration shall comply with the following:

$$A_y = A_w \text{ and } A_v = A_e.$$

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

where:

A_s = area of south-oriented vertical fenestration

A_w = area of west-oriented vertical fenestration

A_e = area of east-oriented vertical fenestration

Exceptions:

1. Vertical fenestration that complies with Section 1323, Exception 1.
2. Buildings that have an existing building or existing permanent infrastructure within 20 ft (6 m) to the south which is at least half as tall as the proposed building.
3. Buildings with shade on 75% of the west and east oriented vertical fenestration areas from permanent projections, existing buildings, existing permanent infrastructure or topography at 9 AM and 3 PM on the summer solstice (June 21 in the northern hemisphere).
4. Alterations and additions with no increase in vertical fenestration area.

1323.1.3 Fenestration External Shading. Fenestration shall have the following fixed or operable external shading systems:

- a. For south-oriented fenestration, there shall be an exterior shading system with a minimum projection factor of 0.50.
- b. For west-oriented and east-oriented fenestration, there shall be an exterior shading system capable of blocking 50% of the solar gain at an angle perpendicular to the fenestration.

1323.2 U-Factor: The area-weighted average U-factor of vertical fenestration ((glazing)) shall not be greater than that specified in Tables 13-1 or 13-2 for the appropriate area and solar heat gain coefficient. The area-weighted average U-factor of overhead fenestration ((glazing)) shall not be greater than that specified in Tables 13-1 or 13-2 for the appropriate area and solar heat gain coefficient. U-factors for glazing shall be determined in accordance with Section 1312.

1323.3 Solar Heat Gain Coefficient: The area-weighted average solar heat gain coefficient of all ((glazing)) fenestration shall be calculated separately for skylights and for each orientation for vertical fenestration and shall not be greater than that specified in Tables 13-1 or 13-2 for the appropriate area and U-factor.

EXCEPTIONS:

1. Fenestration ((Glazing)) separating conditioned space from semi-heated space or unconditioned space.
2. Vertical fenestration ((glazing)) which is oriented within 45 degrees of north shall be allowed to have a maximum solar heat gain coefficient SHGC-0.10 above that required in Tables 13-1 and 13-2.
3. For demonstrating compliance for vertical fenestration ((glazing)) for the first SHGC option in Tables 13-1 and 13-2 only, the SHGC in the proposed building shall be allowed to be reduced by using the multipliers in the table below for each fenestration ((glazing)) product shaded by permanent projections that will last as long as the building itself. Permanent projections consisting of open louvers shall be considered to provide shading, provided that no sun penetrates the louvers during the peak sun angle on June 21. For demonstrating compliance for vertical fenestration shaded by partially opaque permanent projections (e.g., framing with glass or perforated metal) that will last as long as the building itself, the PF shall be reduced by multiplying it by a factor that accounts for the solar transmittance.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Projection Factor	SHGC Multiplier (All Orientations except North-oriented)	SHGC Multiplier (North-Oriented)
((0-0.10)) 0 - 0.60	1.00	1.00
((<0.10-0.20)) <0.60 - 0.70	0.91	0.95
((<0.20-0.30)) <0.70 - 0.80	0.82	0.91
((<0.30-0.40)) <0.80 - 0.90	0.74	0.87
((<0.40-0.50)) <0.90 - 1.00	0.67	0.84
((<0.50-0.60	0.61	0.81
<0.60 - 0.70	0.56	0.78
<0.70 - 0.80	0.51	0.76
<0.80 - 0.90	0.47	0.75
<0.90 - 1.00	0.44	0.73))

Projection factor (PF) is the ratio of the horizontal depth of the external shading projection (A) divided by the sum of the height of the fenestration and the distance from the top of the fenestration to the bottom of the farthest point of the external shading projection (B), in consistent units. (See Figure 13B.)

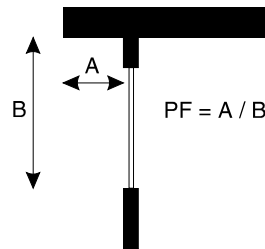


Figure 13B

1331 General.

Discussion: (1) Delete Seattle EnvStd (companion change to Sections 1322 and 1323 and Table 13-1); (2) retain existing Seattle amendment allowing prescriptive compliance for street-level retail.

Proposal: Amend 2009 WSEC as follows -

1331 General: Buildings or structures whose design heat loss rate (UA_p) and solar heat gain coefficient rate ($SHGC * A_p$) are less than or equal to the target heat loss rate (UA_t) and solar heat gain coefficient rate ($SHGC * A_t$) shall be considered in compliance with this section. The stated U-factor, F-factor or allowable area of any component assembly, listed in Tables 13-1 or

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

13-2, such as roof/ceiling, opaque wall, opaque door, glazing, floor over conditioned space, slab-on-grade floor, radiant floor or opaque floor may be increased and the U-factor or F-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, F-factors or allowable areas specified in this section.

EXCEPTION: ((Compliance is also allowed to be shown using RS 32 for Climate Zone 1 except for buildings containing attic roofs, wood framed walls or vertical fenestration with nonmetal frames, or for Group R occupancies.)) The prescriptive approach in Section 1323 may be used for that portion of the building envelope that complies with Exception 1 to Section 1323.

1333 UA Calculations.

Discussion: No Seattle changes (retain existing Seattle amendment), but add a procedural note.

Proposal: Amend 2009 WSEC as follows -

1333 UA Calculations: The target UA_t and the proposed UA_p shall be calculated using Equations 13-1 and 13-2 and the corresponding areas and U-factors from Table 13-1 or 13-2. For the target UA_t calculation, the overhead fenestration (~~(glazing)~~) shall be located in roof/ceiling area and the remainder of the glazing allowed per Table 13-1 or 13-2 shall be located in the wall area. Where insulation is tapered, separate assembly U-factors shall be calculated in accordance with Section 1322.

Procedural Note: The plans shall contain a fenestration and opaque door schedule.

The fenestration schedule shall include all vertical fenestration and skylights (curtainwalls, windows, sliding and swinging glass doors, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors (swinging metal egress doors, roll-up warehouse doors, etc.).

For all projects using the Target UA, Seattle EnvStd, and RS-29 compliance options, the fenestration and opaque door schedule shall include the manufacturer and model number for all products regardless of U-factor.

The fenestration 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 mean that the product complies with the NFRC rating, labeling, and certification program as required by the Washington State Energy Code.) For site-built fenestration products, at the time of building permit application, it is acceptable to provide simulation reports from an NFRC-accredited simulation laboratory for each product type that is to be installed in the project. The simulation must include the specific frame profiles, glazing options, gas fills, spacers, etc. that are proposed to be installed in the building. However, the NFRC Label Certificate is required to be provided to the building inspector at the construction site. (AAMA 507 reports, thermal performance matrices, and certificates of compliance are not acceptable.)

For unrated products, U-factors shall be taken from the default tables in Section 1006. If a default U-factor from Chapter 10 is used in lieu of NFRC certification, the fenestration 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 fenestration 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.).

For fenestration in nonresidential spaces, the fenestration schedule shall also include the solar heat gain coefficient for each product and, where applicable, visible transmittance (e.g. if using the Seattle EnvStd compliance option).

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

Table 13-1 Building Envelope Requirements.

Discussion: Revise opaque envelope and fenestration requirements to achieve greater energy efficiency using the criteria from ASHRAE/IESNA Standard 90.1-2007 and addenda, ASHRAE/USGBC/IESNA Standard 189.1-2009.

(1) Roofs:

(2) Walls above grade: retain existing 2006 SEC insulation criteria for mass walls, 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;

(3) Floors over unconditioned space: revise insulation for wood-framed floors per addendum bb to ASHRAE/IESNA Standard 90.1;

(4) Slab-on-grade floors: revise insulation for unheated slab floors per addendum bb to ASHRAE/IESNA Standard 90.1;

(5) Opaque doors: require insulated doors per new default values in Table 10-6C.

(6) Vertical fenestration: revise fenestration area per ASHRAE/USGBC/IESNA Standard 189.1-2009; revise U-factor for nonmetal framing per ASHRAE/USGBC/IESNA Standard 189.1-2009, revise SHGC per addendum bb to ASHRAE/IESNA Standard 90.1, retain existing 2006 SEC SHGC option;

(7) Skylights: revise U-factor for skylights without curb per ASHRAE/USGBC/IESNA Standard 189.1-2009, revise SHGC for all per ASHRAE/USGBC/IESNA Standard 189.1-2009.

Proposal: Amend 2009 WSEC as follows -

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

**TABLE 13-1
BUILDING ENVELOPE REQUIREMENTS FOR CLIMATE ZONE 1**

Opaque Elements	Nonresidential		Residential, Other than Single-Family	
	Assembly Max. U-factor	Insulation Min. R-Value	Assembly Max. U-factor	Insulation Min. R-Value
Roofs				
Insulation entirely above deck	<u>U-0.027</u> ((U-0.034))	<u>R-38 c.i.</u> ((R-30 e.+))	U-0.031	R-38 c.i.
Metal building	<u>U-0.027</u> ((U-0.034))	R-25 + R-11 + <u>R-11 Ls</u>	U-0.031	R-25 + R-11 Ls
Single-rafter	U-0.027	R-38	U-0.027	R-38
Attic and other	U-0.027	R-38 adv or R-49	U-0.027	R-38 adv or R-49
Walls, Above Grade				
Mass ([†])	<u>U-0.056 for interior insulation;</u> <u>U-0.057 for exterior and integral insulation</u> ((U-0.150))	<u>Interior insulation:</u> a. <u>R-13 cavity insulation + R-6 c.i. wood studs; or</u> b. <u>R-13 cavity insulation + R-10 c.i. metal studs; or</u> c. <u>R-22.4 insulation held solely by 1-in metal clips.</u> <u>Exterior insulation:</u> d. <u>R-16 c.i.</u> ((R-5.7 e.+))	U-0.090	R-11.4 c.i.
Metal building	<u>U-0.052</u> ((U-0.064))	<u>R-13 + R-13 c.i.</u> ((R-13 + R-7.5 e.+))	U-0.057	R-19 + R-8.5 c.i.
Steel framed	<u>U-0.055</u> ((U-0.064))	<u>R-13 + R-10 c.i.</u> ((R-13 + R-7.5 e.+))	U-0.057	R-19 + R-8.5 c.i.
Wood framed and other	<u>U-0.051</u> ((U-0.057))	<u>R-13 + R-7.5 c.i. OR</u> <u>R-21 + R-2.5 c.i.</u>	U-0.057	R-13 + R-6 c.i.
Walls, Below Grade				
Below grade wall		Same as above grade		Same as above grade
Floors				
Mass	U-0.029	R-30 c.i.	U-0.029	R-30 c.i.
Steel joist	U-0.029	R-38 + R-4 c.i.	U-0.029	R-38 + R-4 c.i.
Wood framed and other	<u>U-0.025</u> ((U-0.029))	<u>R-38</u> ((R-30))	U-0.029	R-30
Slab-on-Grade Floors				
Unheated	<u>F-0.520</u> ((F-0.540))	((R-10)) R-15 for 24 in. (with thermal break)	F-0.540	R-10 for 24 in. (with thermal break)

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Heated	F-0.360	R-10 c.i. (with thermal break)	F-0.360	R-10 c.i. (with thermal break)
Opaque Doors				
Swinging	<u>U-0.470</u> ((U-0.600))		U-0.400	
Nonswinging	<u>U-0.390</u> ((U-0.600))		U-0.400	
Fenestration (0-40%) 0-30% of Wall	Assembly Max. U-Factor	Assembly Max. SHGC	Assembly Max. U-Factor	Assembly Max. SHGC
Vertical Fenestration	<u>NFRC-certified or per 1006</u>	<u>NFRC-certified or per 1312.1</u>	<u>NFRC-certified or per 1006</u>	<u>NFRC-certified or per 1312.1</u>
Nonmetal framing: All	<u>U-0.30</u> ((U-0.32))	SHGC-0.30 all ((SHGC-0.40 all)) OR ((SHGC-0.45)) SHGC-0.35 all PLUS Permanent PF>0.50 on west, south and east OR	U-0.32	
Metal framing: Fixed/operable	U-0.40		U-0.40	
Entrance doors	U-0.60		U-0.60	
Skylights				
Without curb (i.e., sloped glazing)	<u>U-0.45</u> ((U-0.50))	SHGC-0.32 all ((SHGC-0.35 all))	U-0.50	SHGC-0.35 all
With curb (i.e., individual unit skylights)	U-0.60		U-0.60	
Fenestration <30-40% of Wall	Assembly Max. U-Factor	Assembly Max. SHGC	Assembly Max. U-Factor	Assembly Max. SHGC
Vertical Fenestration	<u>NFRC-certified or per 1006</u>	<u>NFRC-certified or per 1312.1</u>	<u>NFRC-certified or per 1006</u>	<u>NFRC-certified or per 1312.1</u>
Nonmetal framing: All	<u>U-0.24</u>	SHGC-0.35 all PLUS Permanent PF>0.50 on south AND exterior shading system blocking 50% of solar gain at an angle perpendicular to west and east	U-0.32	
Metal framing: Fixed/operable	<u>U-0.31</u>		U-0.40	
Entrance doors	<u>U-0.46</u>		U-0.60	
Skylights				
Without curb (i.e., sloped glazing)	<u>U-0.35</u>	SHGC-0.24 all	U-0.50	SHGC-0.35 all

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

With curb (i.e., individual unit skylights)	U-0.46		U-0.60	
---	--------	--	--------	--

c.i. = continuous insulation, Ls = liner system (see definitions).

Footnotes

~~((1. Nonresidential walls may be ASTM C90 concrete block walls, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with material having a maximum thermal conductivity of 0.44 Btu-in/h-ft²-°F.))~~

Procedural Note: The plans shall contain a fenestration and opaque door schedule.

The fenestration schedule shall include all vertical fenestration and skylights (windows, sliding and swinging glass doors, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors.

The fenestration 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 mean that the product complies with the NFRC rating, labeling, and certification program as required by the Washington State Energy Code.)

For unrated products, U-factors shall be taken from the default tables in Section 1006. If a default U-factor from Chapter 10 is used in lieu of NFRC certification, the fenestration 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 fenestration 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.).

For fenestration in nonresidential spaces, the fenestration schedule shall also include the solar heat gain coefficient for each product and, where applicable, visible transmittance.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

**CHAPTER 14
BUILDING MECHANICAL SYSTEMS**

1402 Mechanical Ventilation.

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

Proposal: Amend 2009 WSEC as follows -

1402 Mechanical Ventilation: The minimum requirements for ventilation shall comply with the (~~Washington State Mechanical Code (WAC 51-52)~~), Seattle Mechanical Code.

Figure 14A Mechanical Systems Compliance Path.

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

Proposal: Amend 2009 WSEC as follows –

**FIGURE 14A
MECHANICAL SYSTEMS COMPLIANCE PATH**

Section Number	Subject	Simple Systems Path	Complex Systems Path	Systems Analysis Option
1410	General Requirements	X	X	X
1411	HVAC Equipment Performance Requirements	X	X	X
1412	Controls	X	X	X
1413	Air Economizers	X	X	X
1414	Ducting Systems	X	X	X
1415	Piping Systems	X	X	X
1416	Completion Requirements	X	X	X
1420	Simple Systems (Packaged Unitary Equipment)	X		
1421	System Type	X		
1422	Controls	X		
1423	Economizers	X		
1424	Separate Air Distribution Systems	X		
1430	Complex Systems		X	
1431	System Type		X	
1432	Controls		X	
1433	Economizers		X	
1434	Separate Air Distribution Systems		X	
1435	Simultaneous Heating and Cooling		X	
1436	Heat Recovery		X	
1437	Electric Motor Efficiency		X	
1438	Variable Flow Systems		X	
1439	Exhaust Hoods		X	
RS-29	Systems Analysis			X
1440	Domestic Water Systems	X	X	X
1441	Water Heater Installation	X	X	X
1442	Shut Off Controls	X	X	X
1443	Pipe Insulation	X	X	X
1444	Conservation of Water and Pumping Energy	X	X	X
1445	Heat Recovery for Domestic Water Systems	X	X	X
1446	Domestic Hot Water Meters	X	X	X
1450	Heated Pools	X	X	X

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Section Number	Subject	Simple Systems Path	Complex Systems Path	Systems Analysis Option
1451	General	X	X	X
1452	Pool Water Heaters	X	X	X
1453	Controls	X	X	X
1454	Pool Covers	X	X	X
1454	Heat Recovery	X	X	X
1460	Cold Storage	X	X	X
1461	Refrigerated Warehouse Heating and Cooling	X	X	X
1462	Underslab Heating	X	X	X
1463	Evaporators	X	X	X
1464	Condensers	X	X	X
1465	Compressors	X	X	X

1411.1 General.

Discussion: Minor Seattle changes (retain existing Seattle amendment, modified so that condenser water return requirements apply to all cooling towers with chilled water systems).

Proposal: Amend 2009 WSEC as follows -

1411.1 General: Equipment shall have a minimum performance at the specified rating conditions not less than the values shown in Tables 14-1A through 14-1G. If a nationally recognized certification program exists for a product covered in Tables 14-1A through 14-1G, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program.

Procedural Note: If equipment is subject to an AHRI Standard, it shall be listed in the AHRI certification program.

For equipment not within the scope of the standards in Table 14-1A through 14-1G, this Code does not contain any minimum efficiency requirements. However, for any claims of efficiency, such as for calculations using the RS-29 compliance option, data shall be furnished by the equipment manufacturer consisting of a complete report from a test performed by an independent laboratory accredited by a nationally recognized accreditation organization.

Gas-fired and oil-fired forced air furnaces with input ratings $\geq 225,000$ Btu/h (65 kW) and all unit heaters shall also have an intermittent ignition or interrupted device (IID), and have either mechanical draft (including power venting) or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings $\geq 225,000$ Btu/h (65 kW), including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75% of the input rating.

Chilled water plants and buildings with more than 500 tons total capacity shall not have more than 100 tons provided by air-cooled chillers.

EXCEPTIONS:

1. Where the designer demonstrates that the water quality at the building site fails to meet manufacturer's specifications for the use of water-cooled equipment.
2. Air-cooled chillers with minimum efficiencies at least 10 percent higher than those listed in Table 14-1C.

*Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.*

3. Replacement of existing equipment.

Cooling towers serving chilled water systems shall be selected to be able to maintain a return condenser water temperature to the tower of 86°F or less at peak design conditions.

Hydronic heat pump and other cooling and refrigeration equipment (e.g. icemakers, walk-in coolers) shall not use domestic water only one time before dumping it to waste (no single pass water cooling systems are allowed). The only exceptions are: medical and dental equipment; equipment using less than 1 gpm; replacement of existing icemakers; or use of single pass cooling during power outages and other emergencies.

1411.2 Rating Conditions.

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

Proposal: Amend 2009 WSEC as follows -

1411.2 Rating Conditions: Cooling equipment shall be rated at AHRI test conditions and procedures when available. Where no applicable procedures exist, data shall be furnished by the equipment manufacturer consisting of a complete report from a test performed by an independent laboratory accredited by a nationally recognized accreditation organization.

Procedural Note: If equipment is rated in accordance with an AHRI Standard, it shall be rated at Standard (not "design") AHRI Rating Conditions.

1411.2.1 Water-Cooled Centrifugal Water-Chilling Packages--Nonstandard Conditions:

Water-cooled centrifugal water-chilling packages that are not designed for operation at AHRI Standard 550/590 test conditions reflected in Table 14-1C (44°F leaving chilled-water temperature and 85°F entering condenser water temperature with 3 gpm/ton condenser water flow) shall have maximum full-load kW/ton and NPLV ratings adjusted using the following equation:

Adjusted maximum full-load kW/ton rating = (Full load kW/ton from Table 14-1C)/K_{adj}

Adjusted maximum NPLV rating = (IPLV from Table 14-1C)/K_{adj}

Where:

K_{adj} = 6.174722 - 0.303668(X) + 0.00629466(X)² - 0.000045780(X)³

X = DT_{std} + LIFT

DT_{std} = (24 + [full load kW/ton from Table 14-1C] x 6.83)/Flow

Flow = Condenser water flow (gpm)/cooling full load capacity (tons)

LIFT = CEWT - CLWT

CEWT = Full load condenser entering water temperature (°F)

CLWT = Full load condenser leaving chilled water temperature (°F)

The adjusted full load and NPLV values are only applicable over the following full-load design ranges:

Minimum leaving chilled water temperature: 38°F;

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Maximum condenser entering water temperature: 102°F;

Condenser water flow: 1 to 6 gpm/ton; and

X > 39 and < 60.

Chillers designed to operate outside of these ranges or applications utilizing fluids or solutions with secondary coolants (e.g., glycol solutions or brines) with a freeze point of 27°F or lower from freeze protection are not covered by this standard.

1411.4 Electric Heating and Cooling Equipment.

Discussion: (1) Add 1411.4.1 limiting the size of electric resistance space heating systems, and (2) no Seattle changes to 1411.4.2 (retain existing Seattle amendment).

Proposal: Amend 2009 WSEC as follows -

1411.4 ((Packaged)) Electric Heating and Cooling Equipment:

1411.4.1 Heating Only. Electric resistance space heating systems shall not exceed 6kW (20,000 Btuh).

1411.4.2 Heating and Cooling. Packaged and split system electric equipment providing both heating and cooling with a total cooling capacity greater than 20,000 Btu/h shall be a heat pump.

EXCEPTION: Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

1412.4 Setback and Shut-Off

Discussion: Add note clarifying application of exception for relief dampers Per ASHRAE Standard 90.1-2007, Section 6.5.1.1.5.

Proposal: Amend 2009 WSEC as follows -

1412.4 Setback and Shutoff: HVAC systems shall be equipped with automatic controls capable of accomplishing a reduction of energy use through control setback or equipment shutdown during periods of nonuse or alternate use of the spaces served by the system. The automatic controls shall:

- a. Have a minimum seven-day clock and be capable of being set for seven different day types per week,
- b. Be capable of retaining programming and time setting during loss of power for a period of at least ten hours, and
- c. Include an accessible manual override, or equivalent function (e.g., telephone interface), that allows temporary operation of the system for up to two hours.

EXCEPTIONS:

1. Systems serving areas which require continuous operation at the same temperature setpoint.
2. Equipment with full load demands of 2 Kw (6,826 Btu/h) or less may be controlled by readily accessible manual off-hour controls.
3. Systems controlled by an occupant sensor that is capable of shutting the system off when no occupant is sensed for a period of up to 30 minutes.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

4. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.

For hotel and motel guest rooms, a minimum of one of the following control technologies shall be required in hotels/motels with over 50 guest rooms such that the space temperature would automatically setback (winter) or set up (summer) by no less than 3°C (5°F) when the occupant is not in the room:

1. Controls that are activated by the room occupant via the primary room access method - key, card, deadbolt, etc.
2. Occupancy sensor controls that are activated by the occupant's presence in the room.

1412.4.1 Dampers: Outside air intakes, exhaust outlets and relief outlets serving conditioned spaces shall be equipped with motorized dampers which close automatically when the system is off or upon power failure. Return air dampers shall be equipped with motorized dampers. Stair shaft and elevator shaft smoke relief openings shall be equipped with normally open (fails to open upon loss of power) dampers. These dampers shall remain closed until activated by the fire alarm system or other approved smoke detection system.

EXCEPTIONS:

1. Systems serving areas which require continuous operation.
2. Combustion air intakes.
3. Gravity (nonmotorized) relief dampers are acceptable in equipment with less than 5,000 cfm total supply flow when in buildings less than 3 stories in height.
4. Type 1 grease hoods exhaust.

Procedural Note: Per ASHRAE Standard 90.1-2007, Section 6.5.1.1.5, relief dampers are part of an air economizer system that prevents overpressurization of the building. Other exhaust is not considered relief and requires motorized damper.

Dampers installed to comply with this section, including dampers integral to HVAC equipment, shall have a maximum leakage rate when tested in accordance with AMCA Standard 500 of:

- (a) Motorized dampers: 10 cfm/ft² of damper area at 1.0 in w.g.
- (b) Nonmotorized dampers: 20 cfm/ft² of damper area at 1.0 in w.g., except that for nonmotorized dampers smaller than 24 inches in either dimension: 40 cfm/ft² of damper area at 1.0 in w.g.

Drawings shall indicate compliance with this section.

1412.4.1.1 Damper Controls: Dampers for outdoor air supply and exhaust shall automatically shut when the systems or spaces served are not in use or during building warm-up, cooldown, and setback. Operation of dampers shall be allowed during ventilation prepurge one hour before expected occupancy and for unoccupied period precooling during the cooling season.

Classrooms, gyms, auditoriums and conference rooms larger than 500 square feet of floor area shall have occupancy sensor control that will either close outside air dampers or turn off serving equipment when the space is unoccupied except where equipped with another means to automatically reduce outside air intake below design rates when spaces are partially occupied.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1412.4.2 Optimum Start Controls: Heating and cooling systems with design supply air capacities exceeding 2,000 cfm shall have optimum start controls. Optimum start controls shall be designed to automatically adjust the start time of an HVAC system each day to bring the space to desired occupied temperature levels immediately before scheduled occupancy. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint and the amount of time prior to scheduled occupancy.

1412.5 Heat Pump Controls.

Discussion: Revise to correspond with Section 503.8.3.5 of the 2009 WSEC.

Proposal: Amend 2009 WSEC as follows -

1412.5 Heat Pump Controls: (~~Unitary air cooled heat pumps shall include microprocessor controls that minimize supplemental heat usage during start up, set up, and defrost conditions. These controls shall anticipate need for heat and use compression heating as the first stage of heat. Controls shall indicate when supplemental heating is being used through visual means (e.g., LED indicators). Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplemental heater operation above 40°F.~~) Heat pumps with supplementary electric resistance heaters shall have controls complying with the following requirements:

1. Prevent supplementary heater operation when the heating load can be met by the heat pump alone; and
2. The cut-on temperature for compression heating shall be higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compressing heating shall be higher than the cut-off temperature for supplementary heating.

All heat pumps installed under this section shall include the capability to lock out the supplementary heat based on outdoor temperature. This control shall have a maximum setting of 40°F. At final inspection, the lock out control shall be set to 32°F or less.

EXCEPTION: The controls may allow supplementary heater operation during defrost.

1412.6 Combustion Heating Equipment Controls.

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

Proposal: Amend 2009 WSEC as follows -

1412.6 Combustion Heating Equipment Controls: Combustion heating equipment with a capacity over 225,000 Btu/h shall have (~~modulating~~) modulated or staged combustion control. Boilers shall have proportionately-modulated or staged combustion control to control both the fuel and the air.

EXCEPTIONS:

1. Boilers under 1,000,000 Btu/h input capacity.
2. Radiant heaters.
3. Systems with multiple boilers which are sequentially-staged.

Boilers shall comply with the reset requirements in Section 1432.2.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1412.9 Enclosed Loading Dock, Parking Garage, and Motor Vehicle Repair Garage Exhaust Ventilation System Control.

Discussion: Modify for consistency with the Seattle Mechanical Code and to achieve further fan energy savings.

Proposal: Amend 2009 WSEC as follows -

1412.9 Enclosed Loading Dock, ~~(and)~~ Parking Garage, and Motor Vehicle Repair Garage Exhaust Ventilation System Control. Mechanical ventilation systems for enclosed loading docks, ~~(and)~~ parking garages, and motor vehicle repair garages shall be designed to exhaust the airflow rates (maximum and minimum) determined in accordance with the ~~((State Mechanical Code (chapter 51-52 WAC)))~~ Seattle Mechanical Code Section 404.

~~((Ventilation systems shall be equipped with a control device that operates the system automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices. Each of the following types of controllers shall be capable of shutting off fans or modulating fan speed.))~~ Mechanical ventilation systems shall operate continuously to provide ventilation per Seattle Mechanical Code Section 404.2.

1. Gas sensor controllers shall be arranged to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices and shall be equipped with gas-sensor systems that modulate the ventilation system by staging fans or varying fan speed to maintain gas concentrations below specified maximum levels ~~((used to activate the exhaust ventilation system shall stage or modulate fan speed upon detection of specified gas levels))~~. All equipment used in sensor controlled systems shall be designed for the specific use and installed in accordance with the manufacturer's recommendations. The following are minimum gas sensor system requirements:
 - a. ~~((Garages and))~~ In enclosed loading docks, parking garages, and motor vehicle repair garages used predominantly by gasoline-powered vehicles shall be equipped with a controller and a full array of carbon monoxide (CO) sensors set to maintain levels of carbon monoxide below 35 parts per million (ppm). Spacing and location of the sensors shall be installed in accordance with manufacturer recommendations.
 - b. In enclosed loading docks, parking garages, and motor vehicle repair garages ~~((W))~~ where more than 20 percent of the vehicles using the garage or loading dock are powered by nongasoline fuels, the area exposed to nongasoline fueled vehicle exhaust shall be equipped with a controller and fuel-appropriate sensors. The set-point for the nongasoline sensors shall be no less than the standard used by OSHA for eight hour exposure. The controller shall activate the ventilation system when sensor set-point is reached. Spacing and location of the sensors shall be installed in accordance with manufacturer recommendations.
2. Automatic time clocks used to activate the system shall activate the system during occupied periods. The time clock shall be capable of scheduling multiple start and stop times for each day of the week, varying the daily schedule, and retaining programming for a 10-hour period during loss of power.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

3. Occupant detection sensors used to activate the system shall detect entry into the parking garage along both the vehicle and pedestrian pathways.

1412.9.1 System Activation Devices for Enclosed Loading Docks. Ventilation systems for enclosed loading docks shall operate continuously and shall be staged or vary fan speed by gas sensors.

EXCEPTION: Enclosed loading docks, having a total design capacity less than 3000 cfm, are permitted to use occupant sensors or time clocks with a manual over-ride switch. Ready access to the switch shall be provided to persons in the loading dock area. Time clocks shall activate the system during occupied periods and shall be capable of scheduling multiple start and stop times for each day of the week, varying the daily schedule, and retaining programming for 10 hours during loss of power.

~~((be activated by one of the following:~~

- ~~1. Gas sensors; or~~
- ~~2. Time clock and a manual over-ride switch located in the dock area that is accessible to persons in the loading dock area.))~~

1412.9.2 System Activation Devices for Enclosed Parking Garages. Ventilation systems for enclosed parking garages shall operate continuously and shall be staged or vary fan speed by gas sensors.

EXCEPTIONS:

1. Enclosed parking garages or motor vehicle repair garages having a total design capacity less than 6,000 cfm are permitted to use either of the following:
 - a. An automatic time clock that activates the system during occupied periods that is capable of scheduling multiple start and stop times for each day of the week, varying the daily schedule, and retaining programming for 10 hours during loss of power.
 - b. An occupant detection sensor that activates the system when entry into the parking garage along a vehicle or pedestrian pathway is detected.
2. For enclosed parking garages that are routinely closed to vehicle traffic the garage ventilation system can be shut down during periods when the garage is not scheduled to be open provided that the all of the following conditions are met:
 - a. Enclosed parking garage has a total coverage gas detection system.
 - b. Gas detection system is continuously active to stage fans or vary fan speed to maintain specified gas concentration levels below specified maximum levels, and
 - c. System operates for a minimum of 1-hour after the garage is scheduled to be closed.

~~((be activated by gas sensors.~~

EXCEPTION: A parking garage ventilation system having a total design capacity under 8,000 cfm may use a time clock or occupant sensors.))

Procedural Note: For purposes of this section, enclosed parking garages that are routinely closed to vehicle traffic are defined as commercial parking structures that have posted closed hours.

Enclosed parking garages that serve multifamily residential, garages that are open 24 hours per day for 7 days per week, or other similar uses are not considered to be defined as routinely closed to vehicle traffic.

1412.9.3 System Activation Devices for Enclosed Motor Vehicle Repair Garages. Ventilation systems for enclosed motor vehicle repair garages shall operate continuously and shall be staged or vary fan speed by gas sensors.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

EXCEPTION: Motor vehicle repair garages are permitted to shutdown during periods when the garage is closed provided there is a manual override switch for garage employees to enable the system after hours and the gas detection system is continuously active to stage fans or vary fan speed to maintain specified gas concentration levels below specified maximum levels.

1413.1 Operation.

Discussion: Clarify definition of design supply air per ASHRAE Standard 90.1-2007 User's Manual, page 6-67.

Proposal: Amend 2009 WSEC as follows -

1413.1 Operation: Air economizers shall be capable of automatically modulating outside and return air dampers to provide 100 percent of the design supply air as outside air to reduce or eliminate the need for mechanical cooling.

The design supply air is the total airflow provided through the heating or cooling source.

Systems shall provide a means to relieve excess outdoor air during air economizer operation to prevent overpressurizing the building. Air economizers shall be used for RS-29 analysis base case for all systems without exceptions in Sections 1413, 1423, or 1433. Water economizers, when allowed by Section 1132.2 exception 1 or Section 1433 exceptions 3 and 9, shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 50°F dry-bulb/45°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures.

1413.3 Integrated Operation.

Discussion: Delete exceptions per addendum cz to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

1413.3 Integrated Operation: The HVAC system and its controls shall allow economizer operation when mechanical cooling is required simultaneously. Air and water economizers shall be capable of providing partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load.

((EXCEPTIONS:—

1. ~~Individual, direct expansion units that have a rated capacity less than 65,000 Btu/h and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~
2. ~~Water-cooled water chillers with waterside economizer.)~~

1413.5 Economizer Heating System Impact.

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

Proposal: Amend 2009 WSEC as follows -

1413.5 Economizer Heating System Impact. Any HVAC system that increases the building heating energy use during economizer operation is not allowed (e.g. single-fan/dual-duct systems and multizone systems).

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

EXCEPTION: Where the heating is allowed by Section 1435.

Informative Note: Single-fan/dual-duct systems and multizone systems do not comply with this requirement. This is because economizer operation lowers the temperature of the air entering the hot deck heating coil, increasing its energy use. In order to use this type of system, the system must meet one of the economizer exceptions and have neither type of economizer. (Another resolution is to use a dual-fan/dual-duct system where the hot deck fan supplies only return air or return air plus minimum ventilation air.)

This requirement will not affect three-deck multizone since they cannot work with an air economizer in any case (it would make the neutral deck a cold deck).

An exception to the heating impact is provided for economizers on VAV systems that cause zone level heating to increase due to a reduction in supply air temperature. Reducing supply air temperatures on a cooling-VAV system will reduce fan energy (particularly if the system has a variable speed drive), offsetting the energy lost due to increased reheat energy.

See the discussion and diagrams in the ASHRAE Standard 90.1-2007 User's Manual, Section 6.5.1.4, page 6-52.

1414.1 Duct Sealing and Testing.

Discussion: (1) Clarify definition of low-pressure and high-pressure duct work, (2) require testing of ductwork located outdoors per addendum to ASHRAE/IESNA Standard 90.1-2007, (3) require testing of all sections of high-pressure duct work.

Proposal: Amend 2009 WSEC as follows -

1414.1 Duct Sealing and Testing: Duct work and plenums shall be sealed in accordance with Section 1414.1.1. Additionally, ducts shall be tested in accordance with Sections 1414.1.2 and 1414.1.3 as required.

High-pressure shall mean duct work that is designed to operate at static pressures in excess of 3 inches water column. All other duct work shall be considered low-pressure.

1414.1.1 Sealing: Duct work which is designed to operate at pressures above 1/2 inch water column static pressure shall be sealed as follows:

1. Static pressure 1/2 inch to 3 inches: Seal all transverse joints and longitudinal seams. Spiral lock seams in round and flat oval duct work do not require sealing; however, other seams shall be sealed.
2. Static pressure above 3 inches: Seal all transverse joints, longitudinal seams and duct wall penetrations.

All low pressure supply and return air systems not located entirely within the conditioned space, including the unconditioned side of enclosed stud bays or joist cavities/spaces used to transport air, shall be securely fastened and sealed. Duct work shall be sealed using welds, gaskets, mastic, or mastic-plus-embedded-fabric tape. Enclosed stud bays or joist cavities/spaces used to transport air shall be sealed using mastic-plus-embedded-fabric tape, or when drywall is used to enclose the air system, drywall mud and tape. Duct tape is not permitted as a sealant on any ducts.

EXCEPTION: Fibrous glass duct systems installed in accordance with Standard UL 181A and flexible duct systems installed in accordance with Standard UL 181B may use tapes listed for these systems.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

Procedural Note: Longitudinal seams are joints oriented in the direction of airflow. Transverse joints are connections of two duct sections oriented perpendicular to airflow. Duct wall penetrations are openings made by any screw fastener, pipe, rod or wire. All other connections are considered transverse joints, including but not limited to spin-ins, taps and other branch connections, access door frames and jambs, duct connections to equipment.

1414.1.2 Low Pressure Duct Leak Test: All duct systems shall be sealed to a leakage rate not to exceed 6 percent of the fan flow if the duct system:

1. Is connected to a constant volume, single zone, air conditioner, heat pump or furnace; and
2. Serves less than 5,000 square feet of floor area; and
3. Has more than 25 percent duct surface area located in any unconditioned space.

The leakage rate shall be confirmed through field verification and diagnostic testing, in accordance with SMACNA Duct Leakage Test Procedures - 1985.

1414.1.3 High Pressure Duct Leak Test: Duct work that is designed to operate at static pressures in excess of 3 inches water column and all ductwork located outdoors shall be leak-tested in accordance with SMACNA Duct Leakage Test Procedures - 1985. ~~((Representative sections totaling no less than 25 percent of the total installed duct area for the designated pressure class shall be tested.))~~

Duct systems with pressure ratings in excess of 3 in. w.c. shall be identified on the drawings. The maximum permitted duct leakage shall be:

$$L_{\max} = C_L P^{0.65}$$

Where:

- L_{\max} = Maximum permitted leakage in cfm/100 ft² duct surface area.
- C_L = Duct leakage class, cfm/100 ft² at 1 in. w.c.
- C_L = 6 for rectangular sheet metal, rectangular fibrous, and round flexible ducts.
- C_L = 3 for round/flat oval sheet metal or fibrous glass ducts.
- P = Test pressure, which shall be equal to the design duct pressure class rating in in. w.c.

1414.2 Insulation.

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

Proposal: Amend 2009 WSEC as follows -

1414.2 Insulation: Ducts and plenums that are constructed and function as part of the building envelope, by separating interior space from exterior space, shall meet all applicable requirements of Chapter 13. These requirements include insulation installation, moisture control, air leakage, and building envelope insulation levels. ~~((Unheated equipment rooms with combustion air louvers shall be isolated from the conditioned space by insulating interior surfaces to a minimum of R-11 and any exterior envelope surfaces per Chapter 13)).~~ Outside air ducts serving individual supply air units with less than 2,800 cfm of total supply air

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

capacity shall be insulated to a minimum of R-7 and are not considered building envelope. Other outside air duct runs are considered building envelope until they,

1. connect to the heating or cooling equipment, or
2. are isolated from the exterior with an automatic shut-off damper complying with Section 1412.4.1.

Once outside air ducts meet the above listed requirements, any runs within conditioned space shall comply with Table 14-5 requirements.

Other ducts and plenums shall be thermally insulated per Table 14-5.

EXCEPTIONS:

1. Within the HVAC equipment.
2. Exhaust air ducts not subject to condensation.
3. Exposed ductwork within a zone that serves that zone.

1416.4 Commissioning Compliance Form.

Discussion: Require correction of deficiencies found during commissioning by a date certain.

Proposal: Amend 2009 WSEC as follows -

1416.4 Commissioning Compliance Form. A commissioning compliance checklist shall be submitted to the building official upon substantial completion of the building. The checklist shall be completed and signed by the building owner or owner's representative. The building official may require that the Commissioning Compliance form components be submitted to verify compliance with Sections 1416 and 1513.8 requirements. Completion of the Commissioning Compliance Checklist (Figure 14B) is deemed to satisfy this requirement.

**FIGURE 14B
COMMISSIONING COMPLIANCE CHECKLIST**

Project Information	Project Name:
	Project Address:
	Commissioning Authority:
Commissioning Plan (Section 1416.3.1)	<input type="checkbox"/> Commissioning Plan was used during construction and included items below <ul style="list-style-type: none"> . A written schedule including Systems Testing and Balancing, Functional Testing, and Supporting Documentation. . Roles and Responsibilities of the commissioning team. . Functional Test procedures and forms.
Systems Balancing (Section 1416.3.2)	<input type="checkbox"/> Systems Balancing has been completed <ul style="list-style-type: none"> . Air and Hydronic systems are proportionately balanced in a manner to first minimize throttling losses.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

	<p>Test ports are provided on each pump for measuring pressure across the pump.</p>
<p>Functional Testing (Section 1416.3.3)</p>	<p><input type="checkbox"/> HVAC Systems Functional Testing has been completed (Section 1416.3.3) HVAC systems have been tested to ensure that equipment, components, and subsystems are installed, calibrated, adjusted and operate in accordance with approved plans and specifications.</p> <p><input type="checkbox"/> HVAC Controls Functional Testing has been completed (Section 1416.3.3) HVAC controls have been tested to ensure that control devices are calibrated, adjusted and operate properly. Sequences of operation have been functionally tested to ensure they operate in accordance with approved plans and specifications.</p> <p><input type="checkbox"/> Lighting Controls Functional Testing has been completed (Section 1513.7) Lighting controls have been tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications.</p>
<p>Supporting Documents (Section 1416.3.4)</p>	<p><input type="checkbox"/> Systems documentation, record documents and training have been completed or are scheduled.</p> <p>System documentation has been provided to the owner or scheduled date:</p> <p>Record documents have been submitted to owner or scheduled date:</p> <p>Training has been completed or scheduled date:</p>
<p>Commissioning Report (Section 1416.3.5)</p>	<p><input type="checkbox"/> Commissioning Report submitted to Owner and includes items below.</p> <p>Completed Functional Tests documentation.</p> <p>Deficiencies found during testing required by this section which have not been corrected at the time of report preparation and the anticipated date of correction.</p> <p>Deferred tests, which cannot be performed at the time of report preparation due to climatic conditions or other circumstances beyond control of Commissioning Authority.</p>
<p>Certification</p>	<p><input type="checkbox"/> I hereby certify that all requirements for commissioning have been completed in accordance with the Washington State Energy Code, including all items above, <u>and that the deficiencies will be corrected by the anticipated date shown in the report.</u></p> <p>Building Owner or Owner's Representative</p> <p>Date</p>

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1431.2 System Sizing Limits.

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

Proposal: Amend 2009 WSEC as follows -

1431.2 System Sizing Limits: Heating and cooling design loads for the purpose of sizing systems shall be determined in accordance with one of the procedures described in Chapter 29 of Standard RS-1 listed in Chapter 7 or an equivalent computation procedure. For interior temperatures, 70°F shall be used for heating and 75°F for cooling, except where different values are specified in the Washington Administrative Code (WAC). For exterior temperatures, 24°F shall be used for heating and 82°F dry bulb and 66°F for wet bulb for cooling.

Building mechanical systems for all buildings which provide space heating and/or space cooling shall be sized no greater than 150 percent of the design load as calculated above, except that cooling towers shall comply with the sizing requirements in Section 1411.1. No additional safety factor is allowed.

For buildings with a total equipment cooling capacity of 300 tons and above, the equipment shall comply with one of the following:

1. No one unit shall have a cooling capacity of more than 2/3 of the total installed cooling equipment capacity;
2. The equipment shall have a variable speed drive; or
3. The equipment shall have multiple compressors.

EXCEPTION: The following limited exemptions from the sizing limit shall be allowed; however, in all cases heating and/or cooling design load calculations shall be submitted.

1. For a single piece of equipment which has both heating and cooling capability, only one function, either the heating or the cooling, need meet the requirements of this section. Capacity for the other function shall be, within available equipment options, the smallest size necessary to meet the load.
2. Stand-by equipment may be installed if controls and devices are provided which allow redundant equipment to operate automatically only when the primary equipment is not operating.
3. Multiple units of the same equipment type, such as multiple chillers and boilers, with combined capacities exceeding the design load, or a single unit that is capable of modulating to a part-load capacity of 50 percent of the load or less, may be specified to operate concurrently only if controls are provided that sequence or otherwise optimally control the operation of each unit based on load.
4. Installed space heating equipment output that does not exceed 10 Btu/h per square foot of gross conditioned floor area and installed space cooling equipment output that does not exceed 15 Btu/h per square foot of gross conditioned floor area. No additional safety factor is allowed.

1432.2 Systems Temperature Reset Controls.

Discussion: Require variable speed pump control at same threshold as Section 1438.

Proposal: Amend 2009 WSEC as follows -

1432.2 Systems Temperature Reset Controls

1432.2.1 Air Systems for Multiple Zones: Systems supplying heated or cooled air to multiple zones shall include controls which automatically reset supply air temperatures by representative building loads. Temperature shall be reset by at least 25 percent of the design

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

supply-air-to-room-air temperature difference. Interior zones without an exterior wall load impact and high occupancy areas (per Section 1412.8) shall have maximum airflow sized to meet typical cooling loads with the higher reset air temperature.

EXCEPTIONS:

1. Where specified humidity levels are required to satisfy process needs, such as computer rooms or museums.
2. Systems that prevent reheating, recooling, or mixing of heated and cooled air supply.
3. 75 percent of the energy for reheating is from site-recovered or site solar energy sources.
4. Zones with peak supply air quantities of 300 cfm or less.
5. Dedicated outdoor air systems less than 5,000 cfm with separate thermal controls.

1432.2.2 Hydronic Systems: Systems with a design capacity of 300,000 Btu/h or greater supplying heated or mechanically refrigerated water shall include controls which automatically reset supply water temperatures by representative building loads or by outside air temperature. Temperature shall be reset by at least 25 percent of the design supply-to-return water temperature differences.

EXCEPTIONS:

1. Steam boilers.
2. Systems that provide heating with 100°F or lower supply temperature (e.g., water source heat pump loops).

To limit the heat loss from the heat rejection device (cooling tower), for hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection (e.g., cooling tower):

- a. If a closed-circuit tower (fluid cooler) is used, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower (for freeze protection), or low leakage positive closure dampers shall be provided.
- b. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
- c. If an open-circuit tower is used in conjunction with a separate heat exchanger to isolate the tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

For hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection (e.g., cooling tower) and having a total pump system power 5 hp and greater (~~exceeding 10 hp~~), each hydronic heat pump shall have:

- a. A two-position two-way (but not three-way) valve, or
- b. A variable head pressure two-way (water regulating) control valve or pump.

For the purposes of this section, pump system power is the sum of the nominal power demand (i.e., nameplate horsepower at nominal motor efficiency) of motors of all pumps that are required to operate at design conditions to supply fluid from the heating or cooling source to all heat transfer devices (e.g., coils, heat exchanger) and return it to the source. This converts the system into a variable flow system and, as such, the primary circulation pumps shall comply with the variable flow requirements in Section 1438.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1432.4 Direct Digital Control System Capabilities.

Discussion: Establish clear threshold where DDC systems are required.

Proposal: Amend 2009 WSEC as follows -

1432.4 Direct Digital Control System Capabilities: All ~~((complex))~~ systems shall be equipped with direct digital control (DDC) systems ~~((and all buildings with))~~ where the total cooling capacity exceeds~~((ing))~~ 780,000 Btu/h (2,662 kW) and shall have the following capability:

- a. Trending: All control system input and output points shall be accessible and programmed for trending, and a graphic trending package shall be provided with the control system.
- b. Demand Response Setpoint Adjustment: Control logic shall increase the cooling zone set points by at least 2°F (1°C) and reduce the heating zone set points by at least 2°F (1°C) when activated by a demand response signal. The demand response signal shall be a binary input to the control system or other interface approved by the serving electric utility.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1433 Economizers.

Discussion: (1) Clarify that requirements also apply to redundant equipment;

(2) Exception 1: clarify treatment of redundant units in calculations; add option b for very high efficiency equipment with improvement per addendum cz 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: clarify the DOAS systems that accompany 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 Btu/h, 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.

Proposal: Amend 2009 WSEC as follows -

1433 Economizers. Air economizers meeting the requirements of Section 1413 shall be provided on all new systems including those serving computer server rooms, electronic equipment, radio equipment, telephone switchgear, and also on redundant equipment.

EXCEPTIONS:

1. a. Qualifying small equipment: This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors. This exception is allowed to be used for other cooling units and split systems with a total cooling capacity rated in accordance with Section 1411.2 of less than 33,000 Btu/h (hereafter referred to as qualifying small systems) provided that these are high-efficiency cooling equipment with SEER and EER values more than 15% higher than minimum efficiencies listed in Tables 14-1A, 14-1B and 14-1D, in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all qualifying small equipment without economizers shall not exceed 72,000 Btu/h per building, or 5% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. Redundant units are not included in determining the total capacity of all units without economizers in a building ((eounted in the capacity limitations)). This exception shall not be used for the shell-and-core permit or for the initial tenant improvement or for RS-29 analysis.
- b. Qualifying very-small very-high efficiency equipment: This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors. This exception is allowed to be used for other cooling units and split systems with a total cooling capacity rated in accordance with Section 1411.2 of less than or equal to 24,000 Btu/h (hereafter referred to as qualifying very-small very-high efficiency equipment) provided that these are high-efficiency cooling equipment with SEER and EER values more than 64% higher than minimum efficiencies listed in Tables 14-1A, 14-1B and 14-1D, in the appropriate size category, using the same test procedures. If a unit is rated with an IPLV, IEER or SEER, then to eliminate the required economizer, the minimum cooling efficiency of the HVAC unit shall be increased by the percentage shown. If the HVAC unit is only rated with a full load metric like EER or COP cooling then these shall be increased by the percentage shown. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all qualifying very-small very-high efficiency equipment without economizers shall not exceed 24,000 Btu/h per tenant space. This exception shall not be used for the shell-and-core permit or for the initial tenant improvement or for RS-29 analysis.

Procedural Note: Exception 1 is only applicable to HVAC equipment that complies with Section 1411.1 and is regulated in Tables 14-1A, 14-1B and 14-1D.

Section 1411.1 requires that "if a nationally recognized certification program exists for a product covered in Tables 14-1A through 14-1G, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program." As the AHRI program does satisfy those criteria, products subject to the AHRI standards must be listed in the AHRI certification program.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

In Tables 14-1A, 14-1B, and 14-1D, virtually all of the equipment efficiency ratings are required to be determined in accordance with an AHRI Standard. Energy Code compliance is determined at standard conditions (not at project specific conditions). Compliance should be verifiable through the AHRI directory at www.ahridirectory.org. It is not acceptable for a manufacturer to submit their own calculations for AHRI standards.

Consequently, to use exception 1 to Section 1433, a product must both: be within the scope of the specified AHRI standard and be included in the AHRI certification program. Certain equipment used in computer server rooms is not within the scope of the standards listed in Tables 14-1A, 14-1B, and 14-1D and is not eligible for certification. Therefore, such equipment does not qualify to use exception 1 to Section 1433 (though it may qualify to use another exception).

Informative Note: At the time this code was adopted, very few equipment models could be shown to meet the criteria in Exception 1b. Be aware that the higher efficiency cooling equipment allowed in Exceptions 1a and 1b does not provide equivalence to air economizer. ASHRAE Standard 189.1-2009 does not allow higher-efficiency cooling units to be substituted for air economizer in coastal California, western Oregon, western Washington, western British Columbia, or Alaska. This is because these climates have so many hours when outside air can be used for cooling that no improvement in cooling equipment efficiency can compensate for this outside air cooling capability.

2. Chilled water terminal units connected to systems with chilled water generation equipment with IPLV values more than 25% higher than minimum part load efficiencies listed in Table 14-1C, in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all systems without economizers shall not exceed ~~((480,000))~~ 72,000 Btu/h per building, or ~~((20))~~ 5% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. This exception shall not be used for the shell-and-core permit or for the initial tenant improvement or for RS-29 analysis.
3. Water-cooled refrigeration equipment serving chilled beams and chilled ceilings space cooling systems only which are provided with a water economizer meeting the requirements of Section 1413. Water economizer capacity per building shall not exceed 500 tons. This exception shall not be used for RS-29 analysis.

Procedural Note: This water economizer exception applies to equipment that only serves chilled beams and chilled ceilings space cooling systems. Chilled beams and chilled ceilings space cooling systems are often partnered with Direct Outside Air Supply (DOAS) systems. The DOAS system is not included in this exception and shall comply with the air economizer requirements.

4. Systems for which at least 75% of the annual energy used for mechanical cooling is provided from site-recovery or site-solar energy source.
5. Systems where special outside air filtration and treatment, for the reduction and treatment of unusual outdoor contaminants, makes an air economizer infeasible.
6. Systems with dehumidification that affect other systems so as to increase the overall building energy consumption. New humidification equipment shall comply with Section 1413.4.
7. Systems complying with all of the following criteria:
 - a. Consist of multiple water source heat pumps with a total cooling capacity for each water-source heat pump of less than 54,000 Btu/h that are connected to a common water loop;
 - b. Have a minimum of 60% air economizer complying with Section 1413 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;
 - c. Have water source heat pumps with an EER at least 15% higher for cooling and, for units serving perimeter zones with heating loads (e.g. zones with exterior walls, roofs, or floors), a COP at least 15% higher for heating than that specified in Section 1411;

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

- d. Where provided with a dedicated boiler or furnace for that building, have a central boiler or furnace efficiency of 90 percent minimum; and
 - e. Provide heat recovery with a minimum 50% heat recovery effectiveness as defined in Section 1436 to preheat the outside air supply.
8. For Group R Occupancy, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/h provided that these are high-efficiency cooling equipment with SEER and EER values more than 15 percent higher than minimum efficiencies listed in Tables 14-1A, 14-1B and 14-1D, in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. For split-systems, compliance is based on the cooling capacity of individual fan coil units.

Procedural Note: For variable refrigerant flow (VRF) systems seeking to utilize Exception 8, the capacity is based on the outside unit size. This corresponds with the AHRI 1230, the new standard for rating efficiency of VRF systems. New Exception 10 is now the primary compliance option for VRF systems without economizer.

9. Equipment used to cool any dedicated server room, electronic equipment room or telecom switch room provided that they completely comply with option 9a, 9b, or 9c in the table below. The total capacity of all systems without air economizers shall not exceed 240,000 Btu/h per building or 10 percent of its air economizer capacity, whichever is greater. This exception shall not be used for RS-29 analysis.
10. Variable refrigerant flow (VRF) systems, multiple-zone split-system heat pumps, consisting of multiple, individually metered indoor units with multi-speed fan motors, served on a single common refrigeration circuit with an exterior reverse-cycle heat pump with variable speed compressor(s) and variable speed condenser fan(s). These systems shall also be capable of providing simultaneous heating and cooling operation, where in all zones recovered energy from the indoor units operating in one mode can be transferred to one or more indoor units operating in the other mode, and shall serve at least 20 percent internal (no perimeter wall within 12 feet (3')) and 20 percent perimeter zones (as determined by conditioned floor area) and the outdoor unit shall be at least 65,000 Btu/h in total capacity. Systems utilizing this exception shall have 50 percent heat recovery effectiveness on the outside air. For the purposes of this exception, dedicated server rooms, electronic equipment rooms or telecom switch rooms are not considered perimeter zones and shall not exceed 20% of the floor area served by the VRF system. This exception shall be limited to buildings of 60,000 square feet and less.

	Equipment Type	Higher Equipment Efficiency	Part-Load Control	Economizer
Option 9a <u>(maximum of less than 54,000 Btu/h total per room)</u>	Table 14-1A and Table 14-1B ^a	+ ((15)) 20% ^b	((Required over 85,000 Btu/h^e))	None required
Option 9b	Table 14-1A and Table 14-1B ^a	+((5)) 10% ^d	Required over 85,000 Btu/h ^c	<u>Dedicated Waterside economizer</u>
Option 9c	ASHRAE Standard 127 ^f	+ 0% ^g	Required over 85,000 Btu/h ^c	<u>Dedicated Waterside economizer</u>

Footnotes to table

- a. For a system where all of the cooling equipment is subject to the AHRI standards listed in Tables 14-1A and 14-1B, the system shall comply with all of the following (note that if the system contains any cooling equipment that exceeds the capacity limits in Table 14-1A or 14-1B, or if the system contains any cooling equipment that is not included in Table 14-1A or 14-1B, then the system is not allowed to use this option).
- b. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 15 percent greater than the value listed in Tables 14-1A and 14-1B (1.15 x values in Tables 14-1A and 14-1B).

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

- c. For units with a total cooling capacity over 85,000 Btu/h, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50 percent of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g., minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).
- d. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 5 percent greater than the value listed in Tables 14-1A and 14-1B (1.05 x values in Tables 14-1A and 14-1B).
- e. The system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 50°F dry-bulb/45°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures. The equipment shall be served by a dedicated condenser water system (~~unless a nondedicated condenser water system exists that can provide appropriate water temperatures during hours when waterside economizer cooling is available~~).
- f. For a system where all cooling equipment is subject to ASHRAE Standard 127-2007.
- g. The cooling equipment subject to the ASHRAE Standard 127-2007 shall have an EER value and an IPLV value that is equal or greater than the value listed in Tables 14-1A and 14-1B when determined in accordance with the rating conditions ASHRAE Standard 127-2007 (i.e., not the rating conditions in AHRI Standard 210/240 or 340/360). This information shall be provided by an independent third party.

Procedural Note: Options 9a and 9b are only applicable to HVAC equipment that complies with Section 1411.1 and is regulated in Tables 14-1A and 14-1B.

Section 1411.1 requires that "if a nationally recognized certification program exists for a product covered in tables 14-1A through 14-1G, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program." As the AHRI program does satisfy those criteria, products subject to the AHRI standards must be listed in the AHRI certification program.

In Tables 14-1A and 14-1B, virtually all of the equipment efficiency ratings are required to be determined in accordance with an AHRI standard. Energy Code compliance is determined at standard conditions (not at project specific conditions). Compliance should be verifiable through the AHRI directory at www.AHRIdirectory.org. It is not acceptable for a manufacturer to submit their own calculations for AHRI standards.

Consequently, to use exception 9 options 9a and 9b to Section 1433, a product must both: be within the scope of the specified AHRI standard and be included in the AHRI certification program. Certain equipment used in computer server rooms is not within the scope of the standards listed in Tables 14-1A and 14-1B and is not eligible for certification. Therefore, such equipment does not qualify to use exception 9 options 9a and 9b to Section 1433.

Certain equipment used in computer server rooms is not within the scope of the standards listed in Tables 14-1A and 14-1B, but is within the scope of ASHRAE Standard 127, Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners. This equipment is eligible to use exception 9 option 9c to Section 1433.

Informative Note: For hydronic systems over 300,000 Btuh, see Section 1432.2.2.

1435 Simultaneous heating and cooling.

Discussion: (1) Clarify that simultaneous heating and cooling is prohibited for ground-coupled systems regardless of whether they actually use ground water, and (2) clarify the reset requirements in Section 1432.2 are always applicable.

Proposal: Amend 2009 WSEC as follows -

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

1435 Simultaneous heating and cooling. Systems which provide heating and cooling simultaneously to a zone are prohibited. Zone thermostatic and humidistatic controls shall be capable of operating in sequence the supply of heating and cooling energy to the zone. Such controls shall prevent:

- a. Reheating for temperature control.
- b. Recooling for temperature control.
- c. Mixing or simultaneous supply of air that has been previously mechanically heated and air that has been previously cooled, either by economizer systems, ((ground water)) ground-coupled hydronic loops, or by mechanical refrigeration.
- d. Other simultaneous operation of heating and cooling systems to the same zone.
- e. Reheating for humidity control.

EXCEPTIONS:

1. Variable air volume (VAV) systems which, during periods of occupancy are designed and controlled:
 - 1.1 To reduce the primary air supply to each zone to a minimum air volume when the zone temperature is in a 5°F (3°C) zone temperature dead band after cooling is no longer required and before reheating, recooling or mixing takes place. This minimum volume shall be no greater than the larger of the following:
 - 1.1.1 Twenty percent of the peak supply volume; or
 - 1.1.2 The volume of outdoor air required to meet zone ventilation requirements, unless increasing the volume to critical zones (zones with the highest ratio of outside air to total supply air) beyond the minimum ventilation requirements results in a decrease in overall outside air required by the HVAC system. An increase beyond minimum ventilation rates shall not be applied to more than 20 percent of the zones with reheat on any one system excluding zones equipped with ventilation controls for high occupancy areas required by Section 1317.2.2.
 - 1.2 So the volume of air that is reheated, recooled, or mixed in peak heating demand shall be less than 50 percent of the zone design peak supply rate.
 - 1.3 So the airflow between dead band and full heating or full cooling shall be modulated.
 - 1.4 So the control logic of each system shall have means preventing changes in setpoint(s) from inducing simultaneous heating and cooling (including economizer cooling) except for humidity control or zone controls operating as described under exception 1.1.
2. Zones where special pressurization relationships, cross-contamination requirements, or code-required minimum circulation rates are such that variable air volume systems are impractical, such as some areas of hospitals and laboratories. Systems which use this exception and supply heated or cooled air to multiple zones shall include:
 - 2.1 Controls that automatically reset supply air temperatures by representative building loads or by outside air temperature unless it can be shown that supply air temperature reset increases overall building annual energy costs.
In all cases, these controls shall comply with the requirements in Section 1432.2.
 - 2.2 Variable speed drives for supply and return fans, zone dampers on all zones, specified occupied and unoccupied or low occupancy airflows, and have controls which reduce airflow in response to changes in occupancy levels.
3. Zones where at least 75% of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered (including condenser heat) or site solar energy source.
4. Zones where specific humidity levels are required to satisfy process needs, such as computer rooms, museums, surgical suites, and buildings with refrigerating systems, such as supermarkets, refrigerated warehouses, and ice arenas.
5. Zones with a peak supply air quantity of 300 cfm (142 L/s) or less.
6. Three deck multizone systems that mix economizer-cooled (mixed) air with heated or cooled air where the temperature of the economizer-cooled air is reset based on weighted zone heating and cooling loads and zone

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

airflow is reduced to a minimum of 20% design airflow or the volume of outdoor air required to meet zone ventilation requirements before mixing is allowed.

1436.1 Fan Systems.

Discussion: Add note to clarify heat recovery effectiveness criteria for Seattle.

Proposal: Amend 2009 WSEC as follows -

1436.1 Fan Systems: Fan systems which have a minimum outdoor air capacity of 5,000 cfm or greater shall have a heat recovery system with at least 50 percent recovery effectiveness. Fifty percent heat recovery effectiveness shall mean an increase in the outside air supply temperature at design heating conditions of one half the difference between the outdoor design air temperature and 65 degrees F. Provision shall be made to bypass or control the heat recovery system to permit air economizer operation as required by Section 1433. Heat recovery energy may be provided from any site-recovered or site-solar source. Where a single room or space is supplied by multiple units, the aggregate ventilation (cfm) of those units shall be used in applying this requirement.

Procedural Note: In Seattle, the outdoor design air temperature is 24°F. The difference between 24°F and 65°F is 41 degrees. One-half of 41 degrees is 20.5 degrees. Therefore, in Seattle, the heat recovery system shall raise the outside supply air temperature to a minimum of 44.5°F (24°F + 20.5°F) at the outdoor design conditions in order to comply with the requirement for fifty percent heat recovery effectiveness.

EXCEPTIONS: These exceptions only apply to the particular exhaust subsystems. The remaining cfm of the main supply system is subject to the energy recovery requirements.

1. Laboratory systems equipped with both variable air volume supply and variable air volume or two-speed exhaust fume hoods provided that an instruction label is placed on the face of the hood that provides the information in Exhibit 14-1.

Exhibit 14-1

INSTRUCTIONS TO OPERATOR

To be in compliance with the Energy Code, this fume hood is designed to operate as variable air volume (VAV) by adjusting the sash or controller. Maintain sash in the minimum position during use and close totally when the fume hood is not in use.

2. Systems serving spaces heated to less than 60 degrees F.
3. Systems which can be shown to use as much energy with the addition of heat recovery equipment as without it.
4. Systems exhausting toxic, flammable, paint exhaust or corrosive fumes making the installation of heat recovery equipment impractical.
5. Type I commercial kitchen hoods.
6. Systems that only provide cooling.
7. Cooling only air handling units or air conditioning units where the minimum outdoor air is less than 70 percent of total supply air.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

1436.2 Condensate Systems.

Discussion: Clarify applicable systems for condensate recovery.

Proposal: Amend 2009 WSEC as follows -

1436.2 Condensate Systems: (~~On-site steam h~~) Heating systems with on-site steam generation shall have condensate water recovery.

On-site includes a system that is located within or adjacent to one or more buildings within the boundary of a contiguous area or campus under one ownership and which serves one or more of those buildings.

Buildings using steam generated off-site with steam heating systems which do not have condensate water recovery shall have condensate water recovery.

1436.3 Heat Recovery for Service Water Heating.

Discussion: Add note indicating typical systems to which heat recovery is applicable.

Proposal: Amend 2009 WSEC as follows -

1436.3 Heat Recovery for Service Water Heating: Condenser water heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:

- a. The facility operates 24 hours a day.
- b. The total installed heat rejection capacity of the water-cooled systems exceeds 1,500,000 Btu/h of heat rejection.
- c. The capacity of service water heating equipment exceeds 250,000 Btu/h.

The required heat recovery system shall have the capacity to provide the smaller of:

- a. 60 percent of the peak heat rejection load at design conditions; or
- b. Preheat of the peak service hot water draw to 85°F; or
- c. 50 percent of the service water heating load.

EXCEPTIONS:

1. Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.

Informative Note: This requirement typically applies to hotels, dormitories, mixed-use retail/residential projects, commercial kitchens, and institutions such as prisons and hospitals according to the ASHRAE Standard 90.1-2007 User's Manual, page 6-76.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

1436.4 Condenser Heat Recovery.

Discussion: Clarify the basis for the calculations and the minimum heat recovery required.

Proposal: Amend 2009 WSEC as follows -

1436.4 Condenser Heat Recovery: Facilities having food service, meat or deli departments and having 500,000 Btu/h or greater of remote refrigeration condensers shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, space heating or for dehumidification reheat. Facilities having a gross conditioned floor area of 40,000 ft² or greater and 1,000,000 Btu/h or greater of remote refrigeration shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, and either for space heating or for dehumidification reheat for maintaining low space humidity.

The capacity shall be equal to the total amount of heat rejected from the refrigeration system or the total load. The required heat recovery system shall have the capacity to provide the smaller of:

- a. 60 percent of the peak heat rejection load at design conditions; or
- b. 50 percent of the service water heating load plus space heating load.

1438 System Criteria.

Discussion: (1) Change threshold to 5 hp, (2) clarify that the requirements are applicable to parking garage ventilation fans, and (3) retain existing Seattle note.

Proposal: Amend 2009 WSEC as follows -

1438 System Criteria. For fans and pumps (~~(7-5)~~) 5 horsepower and greater including custom and packaged air handlers serving variable air volume fan systems, constant volume fans, parking garage ventilation fans, heating and cooling hydronic pumping systems, pool and service water pumping systems, domestic water pressure boosting systems, cooling tower fan, and other pumps or fans where variable flows are required, there shall be:

- a. Variable speed drives, or
- b. Other controls and devices that will result in fan and pump motor demand of no more than 30% of design wattage at 50% of design air volume for fans when static pressure set point equals 1/3 the total design static pressure, and 50% of design water flow for pumps, based on manufacturer's certified test data. Variable inlet vanes, throttling valves (dampers), scroll dampers or bypass circuits shall not be allowed.

Informative Note: At the time this code was adopted, very few technologies could be shown to meet the criteria in option b.

EXCEPTION: Variable speed devices are not required for motors that serve:

1. Fans or pumps in packaged equipment where variable speed drives are not available as a factory option from the equipment manufacturer.
2. Fans or pumps that are required to operate only for emergency fire-life-safety events (e.g., stairwell pressurization fans, elevator pressurization fans, fire pumps, etc.).

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

1438.1 Heat Rejection Equipment: The requirements of this section apply to heat rejection equipment used in comfort cooling systems such as air-cooled condensers, open cooling towers, closed-circuit cooling towers, and evaporative condensers.

EXCEPTION: Heat rejection devices included as an integral part of equipment listed in Tables 14-1A through 14-1D. Heat rejection equipment shall have a minimum efficiency performance not less than values specified in Table 14-1G. These requirements apply to all propeller, axial fan and centrifugal fan cooling towers. Table 14-1G specifies requirements for air-cooled condensers that are within rating conditions specified within the table.

1438.1.1 Variable flow controls: Cooling tower fans (~~(7-5)~~) 5 hp and greater shall have control devices that vary flow by controlling leaving fluid temperature or condenser temperature/pressure of the heat rejection device.

1438.1.2 Limitation on centrifugal fan cooling towers: Open cooling towers with a combined rated capacity of 1,100 gpm and greater at 95°F condenser water return, 85°F condenser water supply and 75°F outdoor wet-bulb temperature shall meet the energy efficiency requirement for axial fan open circuit cooling towers.

EXCEPTION: Open circuit cooling towers that are ducted (inlet or discharge) or have external sound attenuation that requires external static pressure capability.

1438.2 Hot gas bypass limitation: Cooling equipment with direct expansion coils rated at greater than 95,000 Btu/h total cooling capacity shall have a minimum of 2 stages of cooling capacity or capacity modulation other than hot gas bypass that is capable of reducing input and output by at least 50%.

1438.3 Large volume fan systems: Single or multiple fan systems serving a zone or adjacent zones without separating walls with total air flow over 10,000 cfm (3,540 L/s) are required to reduce airflow based on space thermostat heating and cooling demand. A variable speed drive shall reduce airflow to a maximum 75% of peak airflow or minimum ventilation air requirement as required by Section 403 of the IMC, whichever is greater.

EXCEPTIONS:

1. Systems where the function of the supply air is for purposes other than temperature control, such as maintaining specific humidity levels or supplying an exhaust system.
2. Dedicated outdoor air supply unit(s) with heat recovery where airflow is equal to the minimum ventilation requirements and other fans cycle off unless heating or cooling is required.
3. An area served by multiple units where designated ventilation units have 50% or less of total area airflow and nonventilation unit fans cycle off when heating or cooling is not required.

1439.1 Kitchen Hoods.

Discussion: Require variable speed drive for kitchen hood fans.

Proposal: Amend 2009 WSEC as follows -

1439.1 Kitchen Hoods. Each kitchen area with total exhaust capacity larger than 2000 cfm shall be provided with make-up air sized so that at least 50% of exhaust air volume be (a) unheated or heated to no more than 60°F and (b) uncooled or cooled without the use of mechanical cooling.

In addition, the kitchen exhaust hood shall have a variable speed drive with a sensor that is capable of operating the fan based on the smoke and temperature flow through the hood, stepping down the fan when there is no smoke.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

EXCEPTIONS:

1. Where hoods are used to exhaust ventilation air which would otherwise exfiltrate or be exhausted by other fan systems. A detailed accounting of exhaust airflows shall be provided on the plans that accounts for the impact of any required demand controlled ventilation.
2. Certified grease extractor hoods that require a face velocity no greater than 60 fpm.

1444 Conservation of Water and Pumping Energy.

Discussion: Establish requirements for all service water pressure booster systems per addendum cv to ASHRAE/IESNA Standard 90.1-2007.

Proposal: Amend 2009 WSEC as follows -

1444 Conservation of Water and Pumping Energy. Pumps for all domestic water systems shall comply with Section 1438.

In addition, domestic water pressure booster systems shall be designed such that:

- a. One or more pressure sensors shall be used to vary pump speed and/or start and stop pumps. The sensor(s) shall either be located near the critical fixture(s) that determine the pressure required, or logic shall be employed that adjusts the setpoint to simulate operation of remote sensor(s).
- b. No device(s) shall be installed for the purpose of reducing the pressure of all of the water supplied by any booster system pump or booster system, except for safety devices.
- c. No booster system pumps shall operate when there is no service water flow.

Procedural Note: Section 1438 requires variable speed drive or equivalent for pumps 5 hp and greater in domestic water pressure boosting systems. The requirements in this Section 1444 are in addition to the variable speed drive requirement. They are not an alternate to the requirements in Section 1438.

1452 Pool Water Heaters.

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

Proposal: Amend 2009 WSEC as follows -

1452 Pool Water Heaters: Pool water heaters using electric resistance heating as the primary source of heat are prohibited for pools over 2,000 gallons. Heat pump pool heaters shall have a minimum COP of 4.0 determined in accordance with ASHRAE Standard 146, Method of Testing for Rating Pool Heaters. Other pool heating equipment shall comply with the applicable efficiencies in Tables 14-1A through 14-1G.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

CHAPTER 15 LIGHTING, MOTORS, AND TRANSFORMERS

1513.1 Local Control and Accessibility.

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

Proposal: Amend 2009 WSEC as follows -

1513.1 Local Control and Accessibility: Each space, enclosed by walls or ceiling-height partitions, shall be provided with lighting controls located within that space. The lighting controls, whether one or more, shall be capable of turning off all lights within the space. The controls shall be readily accessible, at the point of entry/exit, to personnel occupying or using the space.

EXCEPTIONS: The following lighting controls may be centralized in remote locations:

1. Lighting controls for spaces which must be used as a whole.
2. Automatic controls, when provided in addition to manual controls, need not be accessible to the users and may be centralized in a remote location.
3. Controls requiring trained operators.
4. Controls for safety hazards and security.

1513.3 Daylight Zone Control.

Discussion: Add minor clarifications to the exception that separate circuiting is required for all daylight zones, restaurants are treated like retail, and multifamily residential is exempted.

Proposal: Amend 2009 WSEC as follows -

1513.3 Daylight Zone Control: All daylighted zones, as defined in Chapter 2, both under overhead glazing and adjacent to vertical glazing, shall be provided with individual controls, or daylight-or occupant-sensing automatic controls, which control the lights independent of general area lighting.

In all areas with skylights, monitors or other fenestration at or above ceiling level and in all areas with windows and all areas in parking garages with facade openings, all permanent luminaires in the daylighted zone shall be controlled by automatic daylight sensing controls. The primary daylighted zone shall be controlled separately from the secondary daylighted zone.

Automatic daylight sensing controls shall:

- a. Be capable of reducing the light output of the controlled luminaires while maintaining a uniform level of illuminance by either:
 1. Continuous dimming to at least 20% light output; or
 2. ~~((Step switching of each lamp in individual luminaires (noncontinuous dimming devices shall have adjustable separation (deadband) of on and off points to prevent short cycling) and provide an automatic OFF control, switching alternate luminaires is not permitted except with single lamp luminaires; or~~

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

3.) Step dimming by reducing the output of all of the lamps in individual luminaires by at least 50% and provide an automatic OFF control.

b. Control only luminaires within the daylighted area.

c. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.

Any switching devices installed to override the automatic daylighting control shall comply with the criteria in Section 1513.6.2 items a through e.

Contiguous daylight zones adjacent to vertical glazing are allowed to be controlled by a single controlling device servicing no more than eight fixtures or 60 linear feet of façade provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under overhead glazing shall be controlled separately from daylight zones adjacent to vertical glazing.

EXCEPTION: The following are exempt from the requirements for automatic daylighting controls in Section 1513.3, but shall have separate control of the lights in the daylight zone which is independent of general area lighting:

1. Retail and restaurant spaces adjacent to vertical glazing (retail and restaurant spaces under overhead glazing are not exempt).
2. Lighting exempted by Section 1512.
3. Display, exhibition and specialty lighting complying with Section 1513.4.
4. The following spaces are exempt from the requirements for automatic daylighting controls in Section 1513.3 provided that they have occupancy sensor controls that comply with Section 1513.6.1:
 - a. Small spaces in the daylighted zone that are normally unoccupied (such as a storage room with a window or restrooms);
 - b. Rooms less than 300 square feet; and
 - c. Conference rooms 300 square feet and larger that have a lighting control system with at least four scene options and an occupancy sensor control that complies with Section 1513.6.1.
5. HID lamps with automatic controls that are capable of reducing the power consumption by at least 50%.
6. HID lamps 100 watts or less.
7. Multifamily residential.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

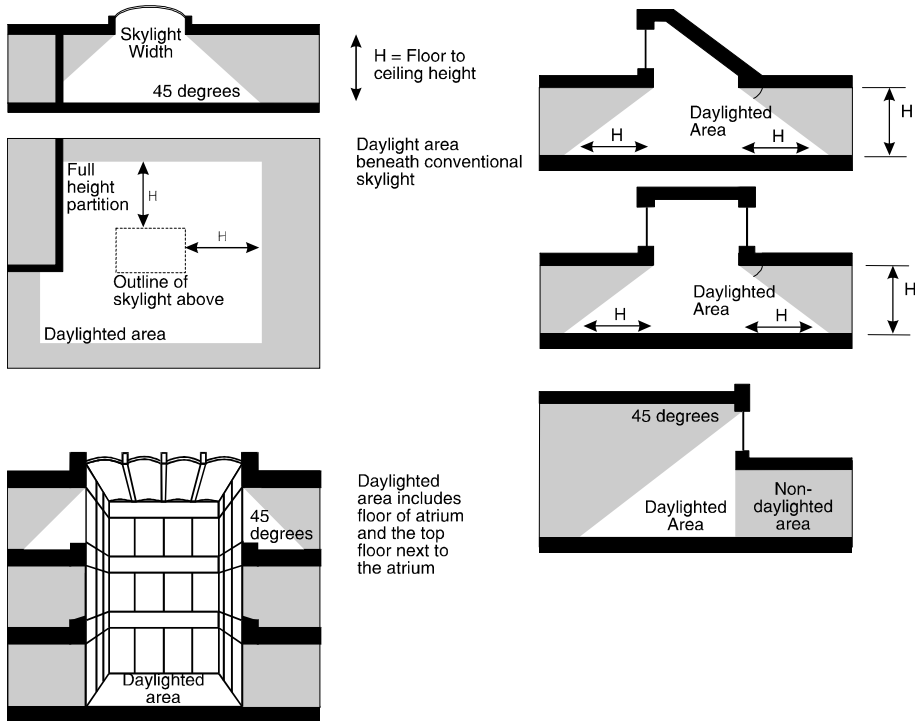
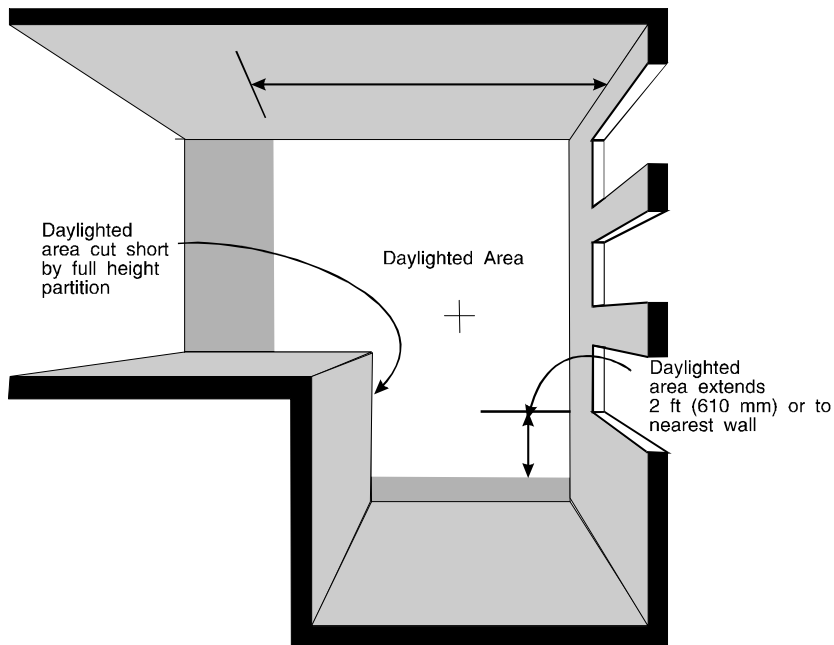


Exhibit 1513.3a
(to be updated to match 2009 code)



Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Exhibit 1513.3b
(to be updated to match 2009 code)

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1513.6 Automatic Shut-Off Controls, Interior.

Discussion: (1) 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) expand use of occupancy sensor controls per addenda x, bp, cf, and cz to ASHRAE/IESNA Standard 90.1-2007; and (3) require reduction in 24-hours lighting when spaces are unoccupied.

Proposal: Amend 2009 WSEC as follows -

1513.6 Automatic Shut-Off Controls, Interior: All buildings shall be equipped with separate automatic controls to shut off the lighting in all spaces during unoccupied hours, including lighting with dual functionality as normal and emergency lighting. Within these buildings, the following spaces shall be equipped with occupancy sensors that comply with Section 1513.6.1:

- a. all office areas less than 300 ft² enclosed by walls or ceiling-height partitions, and
- b. all meeting and conference rooms, and training rooms,
- c. all ((~~school~~)) classrooms and lecture halls,
- d. employee lunch and break rooms,
- e. rooms used for document copying and printing,
- f. restrooms,
- g. dressing, locker, and fitting rooms, and
- h. warehouse and storage spaces greater than 50 ft² ((shall be equipped with occupancy sensors that comply with Section 1513.6.1)).

In addition, lighting in stairwells and parking garages shall have one or more control devices to automatically reduce lighting power in any one controlled zone by at least 50% within 30 minutes of all occupants leaving that controlled zone. [Lighting zones for occupancy sensors in parking garages shall be no larger than 2,500 ft².](#)

For other spaces, automatic controls may be an occupancy sensor, time switch, or other device capable of automatically shutting off lighting. (For hotel and motel guestrooms, see Section 1513.7.)

EXCEPTIONS:

1. Areas that must be continuously illuminated (e.g., 24-hour convenience stores), or illuminated in a manner requiring manual operation of the lighting.
2. Emergency lighting and means of egress illumination as required by code that are automatically OFF during normal building operation.
3. Switching for industrial or manufacturing process facilities as may be required for production.
4. 24-hour occupancy areas in hospitals and laboratory spaces.
5. Areas in which medical or dental tasks are performed are exempt from the occupancy sensor requirement.
6. Dwelling units.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1513.6.1 Occupancy Sensors: Occupancy sensors shall be capable of automatically turning off all the lights in an area, no more than 30 minutes after the area has been vacated. Light fixtures controlled by occupancy sensors shall have a wall-mounted, manual switch capable of turning off lights when the space is occupied. Wall-mounted occupancy sensors shall either be manual ON or shall be controlled to automatically turn the lighting on to no more than 50% power.

EXCEPTIONS:

1. Occupancy sensors in stairwells are allowed to have two step lighting (high-light and low-light) provided the control fails in the high-light position.
2. Parking garages are not required to have a wall-mounted manual switch.
3. Restrooms, warehouse, and parking garages are allowed to use automatic ON.

1513.6.2 Automatic Time Switches: Automatic time switches shall have a minimum 7-day clock and be capable of being set for 7 different day types per week and incorporate an automatic holiday "shut-off" feature, which turns off all loads for at least 24 hours and then resumes normally scheduled operations. Automatic time switches shall also have program back-up capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.

Automatic time switches shall incorporate an over-ride switching device which:

- a. Is readily accessible;
- b. Is located so that a person using the device can see the lights or the areas controlled by the switch, or so that the area being illuminated is annunciated; and
- c. Is manually operated;
- d. Allows the lighting to remain on for no more than two hours when an over-ride is initiated; and
- e. Controls an area not exceeding 5,000 square feet or 5 percent of footprint for footprints over 100,000 square feet, whichever is greater.

1513.8 Commissioning Requirements.

Discussion: (1) Provide more detail for commissioning per addendum az to ASHRAE/IESNA Standard 90.1-2007; (2) establish setpoints for initial installation.

Proposal: Amend 2009 WSEC as follows -

1513.8 Commissioning Requirements: For lighting controls which include daylight or occupant sensing automatic controls, automatic shut-off controls, occupancy sensors, or automatic time switches, the lighting controls shall be tested to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to ensure they operate in accordance with approved plans and specifications.

When occupant sensors, time switches, or photosensors are used, the following functionality testing shall be performed:

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

- a. Confirm that the sensitivity and time-out adjustments for occupant sensors yield acceptable performance (i.e. lights turn off only after space is vacated). At initial installation, occupancy sensor controls shall be set to turn lights off at 15 minutes unless other thresholds are specifically mentioned in the approved permit.
- b. Confirm that the time switches are programmed to turn the lights off.
- c. Confirm that photosensor controls reduce electric light levels based on the amount of usable daylight in the space as specified. At initial installation, automatic daylighting sensor setpoints shall be set at 30 footcandles or not more than 110% of the footcandle level specified on the drawings in the approved permit.

The construction documents for the electrical permit shall state the party who will conduct and certify the functional testing. The party responsible for the functional testing shall not be directly involved in either the design or construction of the project and shall provide documentation certifying that the installed lighting controls meet or exceed all documented performance criteria. Certification shall be specific enough to verify conformance.

See Section 1416 for complete requirements. Optional examples of test methods and forms are provided in Reference Standard 34.

1521 Prescriptive Interior Lighting Requirements.

Discussion: Revise to correspond with changes to Section 1531. The values in the Lighting Power Allowance compliance option in Section 1531 were changed in the 2009 WSEC, but no companion change was made to the Prescriptive Lighting compliance option in Section 1521. As the Prescriptive Lighting compliance option in Section 1521 allows unlimited numbers of lighting fixtures, the fixtures should be limited to single-lamp. This allows both T-8 and the newer T-5 lamps which are most often installed in single-lamp fixtures.

Proposal: Amend 2009 WSEC as follows -

1521 Prescriptive Interior Lighting Requirements: Spaces for which the Unit Lighting Power Allowance in Table 15-1 is 0.80 W/ft² or greater may use unlimited numbers of lighting fixtures and lighting energy, provided that the installed lighting fixtures comply with all four of the following criteria:

- a. one-lamp (~~(or two-lamp (but not three-))~~) (but not two- or more lamp);
(~~(b. luminaires have a reflector or louver assembly to direct the light (bare lamp strip or industrial fixtures do not comply with this section);~~)
- b. ~~((e-))~~ fitted with type T-1, T-2, T-4, T-5, T-8 or compact fluorescent lamps from 5 to 60 watts (but not T-10 or T-12 lamps); and
- c. ~~((d-))~~ hard-wired fluorescent electronic dimming ballasts with photocell or programmable dimming control for all lamps in all zones (nondimming electronic ballasts and electronic ballasts that screw into medium base sockets do not comply with this section).

Track lighting (~~((s))~~) and bare lamp strip or industrial fixtures are not allowed under this path.

EXCEPTIONS:

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1. Up to a total of 5% of installed lighting fixtures may use any type of ballasted lamp and do not require dimming controls.
2. Clear safety lenses are allowed in food prep and serving areas and patient care areas in otherwise compliant fixtures.
3. LED lights.
4. Metal halide lighting which complies with all three of the following criteria:
 - i. luminaires or lamps which have a reflector or louver assembly to direct the light;
 - ii. fixtures are fitted with ceramic metal halide lamps not exceeding 150 watts; and
 - iii. electronic ballasts.

1532 Exterior Lighting Power Allowance.

Discussion: Retain light pollution criteria, add limits in Table 15-2 for billboards.

Proposal: Amend 2009 WSEC as follows -

1532 Exterior lighting power allowance. All exterior building grounds luminaires that operate at greater than 100 watts shall contain lamps having a minimum efficacy of 60 lm/W unless the luminaire is controlled by a motion sensor or qualifies for one of the following exceptions.

The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are designated on the buildings plans to be illuminated and are permitted in Table 15-2B for the applicable lighting zone. Trade-offs are allowed only among exterior lighting applications listed in the Table 15-2B "Tradable Surfaces" section. The lighting zone for building exterior is determined from Table 15-2A unless otherwise specified by the local jurisdiction.

EXCEPTION: Lighting used for the following exterior applications is exempt when equipped with a control device independent of the control of the nonexempt lighting:

- a. Specialized signal, directional, and marker lighting associated with transportation.
- b. Lighting integral to signs.
- c. Lighting integral to equipment or instrumentation and installed by its manufacturer.
- d. Lighting for theatrical purposes, including performance, stage, film production, and video production.
- e. Lighting for athletic playing areas.
- f. Temporary lighting.
- g. Lighting for industrial production.
- h. Theme elements in theme/amusement parks.
- i. Lighting used to highlight features of public monuments.
- j. Group U Occupancy accessory to Group R-3 or R-4 Occupancy.

For open parking and outdoor areas and roadways, luminaires mounted above 15 feet shall be Full Cutoff Luminaires. (Full Cutoff means a luminaire light distribution where zero candela intensity occurs at an angle of 90 degrees above nadir, and all greater angles from nadir.)

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Table 15-1 Unit Lighting Power Allowance.

Discussion: (1) Revise lighting power allowances to achieve greater energy efficiency per addendum by to ASHRAE/IESNA Standard 90.1-2007; (2) delete footnotes that are not referenced in the table (and therefore are not applicable).

Office allowance is reduced further (note that the “Technical Support Document: 50% Energy Savings Design Technology Packages for Medium Office Buildings”, PNNL, September 2009, contains a lighting power allowance of 0.75 W/ft2 (page 4.6, page 44 of the pdf)).

Retail supplemental lighting based on the AEDG for Small Retail Buildings, ASHRAE/AIA/IESNA/USGBC/USDOE, 2006.

Lamp technology continues to improve. While the first generation of T-8 fluorescent lamps achieved 80+ lumens per Watt, the second achieved 90+ lumens per Watt, and a third generation is now available that achieves 100+ lumens per Watt. Fluorescent lamps have better color rendition and ceramic metal halide lamps have come on to the market.

Proposal: Amend 2009 WSEC as follows -

**TABLE 15-1
UNIT LIGHTING POWER ALLOWANCE (LPA)**

Use ¹	LPA ² (W/ft ²)
Automotive facility	((0.85)) <u>0.82</u>
Convention center	((1.10)) <u>1.08</u>
Courthouse	((1.10)) <u>1.05</u>
Cafeterias, fast food establishments ⁵ , restaurants/bars ⁵	((1.20)) <u>0.99</u>
Dormitory	((0.85)) <u>0.61</u>
Dwelling unit	1.00
Exercise center	((0.95)) <u>0.88</u>
Gymnasias, assembly spaces	0.95
Health care clinic	((1.00)) <u>0.87</u>
Hospital, nursing homes, and other Group I-1 and I-2 Occupancies	1.20
Hotel/motel	1.00
Laboratory spaces (all spaces not classified “laboratory” shall meet office and other appropriate categories)	1.62
Laundries	1.20
Libraries ⁵	((1.20)) <u>1.18</u>
Manufacturing facility	((1.20)) <u>1.11</u>
Museum	((1.20)) <u>1.06</u>
Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches) ⁵	((0.94)) <u>0.85</u>
Parking garages	0.20
Penitentiary and other Group I-3 Occupancies	0.90

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Police and fire stations	0.90
Post office	((1.00)) 0.87
Retail ¹⁰ , retail banking, mall concourses, wholesale stores (pallet rack shelving)	1.33
School buildings (Group E Occupancy only), school classrooms, day care centers	((1.00)) 0.99
Theater, motion picture	((0.97)) 0.83
Theater, performing arts	1.25
Transportation	((0.80)) 0.77
Warehouses	((0.5)) 0.50
Workshop	1.20
Plans Submitted for Common Areas Only⁽⁷⁾	
Main floor building lobbies ³ (except mall concourses)	1.10
All building common areas, corridors, toilet facilities and washrooms, elevator lobbies, including Group R-1 and R-2 Occupancies	0.80

Footnotes for Table 15-1

1. In cases in which a general use and a specific use are listed, the specific use shall apply. In cases in which a use is not mentioned specifically, the *Unit Lighting Power Allowance* shall be determined by the building official. This determination shall be based upon the most comparable use specified in the table. See Section 1512 for exempt areas.
2. The watts per square foot may be increased, by 2% per foot of ceiling height above 20 feet, unless specifically directed otherwise by subsequent footnotes.
3. The watts per square foot of room may be increased by 2% per foot of ceiling height above 12 feet.
- ~~((4. For all other spaces, such as seating and common areas, use the *Unit Lighting Power Allowance* for assembly.))~~
Reserved.
5. The watts per square foot of room may be increased by 2% per foot of ceiling height above 9 feet.
6. Reserved.
- ~~((7. For conference rooms and offices less than 150 ft² with full-height partitions, a Unit Lighting Power Allowance of 1.1 w/ft² may be used.))~~
Reserved.
8. Reserved.
- ~~((9. For indoor sport tournament courts with adjacent spectator seating over 5,000, the *Unit Lighting Power Allowance* for the court area is 2.60 W/ft².)~~
Reserved.
10. Display window illumination installed within 2 feet of the window, provided that the display window is separated from the retail space by walls or at least three-quarter-height partitions (transparent or opaque) and lighting for free-standing display where the lighting moves with the display are exempt.

An additional lighting power allowance is allowed for merchandise display luminaires installed in retail sales area that are specifically designed and directed to highlight merchandise. The following additional wattages apply:

- i. ~~((0.6))~~ 0.4 watts per square foot of sales floor area not listed in ii or iii below,
- ii. ~~((1.4))~~ 0.9 watts per square foot of furniture, clothing, cosmetics or artwork floor area, or

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

- iii. ((2.5)) 1.5 watts per square foot of jewelry, crystal, or china floor area.

The specified floor area for i, ii, or iii above, and the adjoining circulation paths shall be identified and specified on building plans. Calculate the additional power allowance by multiplying the above LPDs by the sales floor area for each department excluding major circulation paths. The total additional lighting power allowance is the sum of allowances for sales categories i, ii, or iii plus an additional 1,000 watts for each separate tenant larger than 250 square feet in area.

The additional wattage is allowed only if the merchandise display luminaires comply with all of the following:

- a. located on ceiling-mounted track or directly on or recessed into the ceiling itself (not on the wall),
- b. adjustable in both the horizontal and vertical axes (vertical axis only is acceptable for fluorescent and other fixtures with two points of track attachment),

This additional lighting power is allowed only if the specified lighting is actually installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose.

((11. ~~Provided that a floor plan, indicating rack location and height, is submitted, the square footage for a warehouse may be defined, for computing the interior Unit Lighting Power Allowance, as the floor area not covered by racks plus the vertical face area (access side only) of the racks. The height allowance defined in footnote 2 applies only to the floor area not covered by racks.~~) Reserved.

**Table 15-2A Exterior Lighting Zones &
Table 15-2B Lighting Power Densities for Building Exteriors.**

Discussion: Revise to eliminate highest lighting category.

Proposal: Amend 2009 WSEC as follows –

**TABLE 15-2A
EXTERIOR LIGHTING ZONES**

Lighting Zone	Description
1	Developed areas of national parks, state and city parks, forest
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed areas
3	All other areas

Deleted: 4
Deleted: High activity commercial districts in major metropolitan areas as designated by the local jurisdiction

**TABLE 15-2B
LIGHTING POWER DENSITIES FOR BUILDING EXTERIORS**

Specific area description	Zone 1	Zone 2	Zone 3	

Deleted: Zone 4

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Base site allowance ¹		500 W	600 W	750 W		Deleted: 1300 W
Tradable Surfaces²						
Uncovered Parking Areas	Parking areas and drives	0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²		Deleted: 0.13 W/ft ²
Building Grounds	Walkways less than 10 ft wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot		Deleted: 1.0 W/linear foot
	Walkways 10 ft wide or greater, Plaza areas, Special feature areas	0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²		Deleted: 0.2 W/ft ²
	Exterior stairways	0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²		Deleted: 1.0 W/ft ²
	Pedestrian tunnel	0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²		Deleted: 0.3 W/ft ²
	Landscaping	0.04 W/ft ²	0.05 W/ft ²	0.05 W/ft ²		Deleted: 0.05 W/ft ²
Building Entrances and Exits	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width		Deleted: 30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width		Deleted: 20 W/linear foot of door width
	Entry canopies	0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²		Deleted: 0.4 W/ft ²
Sales Canopies	Free standing and attached	0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²		Deleted: 1.0 W/ft ²
Outdoor Sales	Open areas ³	0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²		Deleted: 0.7 W/ft ²
	Street frontage for vehicle sales lots in addition to "open area" allowance	No Allowance	10 W/linear foot	10 W/linear foot		Deleted: 30 W/linear foot
Nontradable Surfaces⁴						
Building Facades and billboards and signs		No Allowance	0.1 W/ft ² for each illuminated wall or surface ⁵	0.15 W/ft ² for each illuminated wall or surface ⁶		Deleted: 0.2 W/ft ² for each illuminated wall or surface ⁷
Automated Teller Machines and Night Depositories		270 W per location ⁸	270 W per location ⁸	270 W per location ⁸		Deleted: 270 W per location ⁸
Entrances and Gatehouse Inspection Stations at Guarded Facilities		0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area		Deleted: 0.75 W/ft ² of covered and uncovered area
Loading Areas for Law Enforcement, Fire, Ambulance and Other Emergency Service Vehicles		0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area		Deleted: 0.5 W/ft ² of covered and uncovered area
Material Handling and Associated Storage		No Allowance	No Allowance	0.5 W/ft ²		Deleted: 0.5 W/ft ²
Drive-up Windows and Doors		400 W per drive-through	400 W per drive-through	400 W per drive-through		Deleted: 400 W per drive-through

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Parking Near 24-hour Retail Entrances	800 W per main entry	800 W per main entry	800 W per main entry		Deleted: 800 W per main entry
---------------------------------------	----------------------	----------------------	----------------------	--	-------------------------------

FOOTNOTES FOR TABLE 15-2B:

1. Base site allowance may be used in tradable or nontradable surfaces.
2. Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.
3. Including vehicle sales lots.
4. Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.
5. May alternately use 2.5 watts per linear foot for each wall or surface length.
6. May alternately use 3.75 watts per linear foot for each wall or surface length.
7. May alternately use 5 watts per linear foot for each wall or surface length.
8. An additional 90 watts is allowed per additional ATM location.

Proposed amendments do not apply to multifamily residential spaces

Informative or procedural notes in boxed text or brackets apply to all projects.

**CHAPTER 16
ON-SITE RENEWABLE ENERGY SYSTEMS**

Discussion: Add requirements for on-site renewable energy systems from ASHRAE/USGBC/IESNA Standard 189.1-2009 (1) infrastructure from Section 7.3.2, and (2) installed capacity from Section 7.4.1.2.

Proposal: Amend 2009 WSEC as follows –

**CHAPTER 16
ON-SITE RENEWABLE ENERGY SYSTEMS**

1601 Scope: This chapter covers the requirements for on-site renewable energy systems. This chapter applies to new buildings and additions more than 5,000 ft² to existing buildings.

1610 General Requirements: The building on-site renewable energy system shall comply with Section 1611 and with one of the following paths:

- a. Prescriptive Section 1621
- b. Systems Analysis. See Section 1141.4

1611 Infrastructure. Building projects shall provide for the future installation of on-site renewable energy systems with a minimum rating of 3.7 W/ft² or 13 Btu/h/ft² (40 W/m²) multiplied by the total roof area in ft² (m²). Building projects design shall show allocated space and pathways for installation of on-site renewable energy systems and associated infrastructure.

Exception to 7.3.2: Building projects that have an annual daily average incident solar radiation available to a flat plate collector oriented due south at an angle from horizontal equal to the latitude of the collector location less than 1.36 kBtu/ft²/day (4.0 kWh/m²/ day), accounting for existing buildings, permanent infrastructure that is not part of the building project, topography or trees, are not required to provide for future on-site renewable energy systems.

**FIGURE 16A
ON-SITE RENEWABLE ENERGY SYSTEMS COMPLIANCE PATH**

Section Number	Subject	Prescriptive Option	Systems Analysis Option
1610	General Requirements	X	X
1611	Infrastructure	X	X
1620	Prescriptive Option	X	
1621	Annual Production	X	
RS-29	Systems Analysis		X

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1620 Prescriptive Option for On-Site Renewable Energy Systems.

1621 Annual Production of On-site Renewable Energy Systems. Building projects shall contain onsite renewable energy systems that provide the annual energy production equivalent of 4.0 KBtu/ft² (13 kWh/m²) of conditioned space. The annual energy production shall be the combined sum of all on-site renewable energy systems.

EXCEPTION: Buildings that demonstrate compliance with both of the following are not required to contain on-site renewable energy systems:

1. An annual daily average incident solar radiation available to a flat plate collector oriented due South at an angle from horizontal equal to the latitude of the collector location less than 1.36 kBtu/ft²/day (4.0 kWh/m²/ day), accounting for existing buildings, permanent infrastructure that is not part of the building project, topography and trees, and
2. Purchase of renewable electricity products complying with the Green-e Energy National Standard for Renewable Electricity Products of at least 7 kWh/ft² (75 kWh/m²) of conditioned space each year until the cumulative purchase totals 70 kWh/ft² (750 kWh/m²) of conditioned space.

Informative Note: The intent of the second requirement in the exception is that ten years worth of power be purchased. For further information, see Green-e Energy National Standard for Renewable Electricity Products, Version 1.6, Dec 5, 2008, available from Green-e, c/o Center for Resource Solutions, 1012 Torney Ave., Second Floor, San Francisco, CA 94129, 1-415-561-2100; www.green-e.org

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

RS-29
NONRESIDENTIAL BUILDING DESIGN BY SYSTEMS ANALYSIS

Make changes to RS-29 to correspond with changes to Chapters 11-16.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

INFORMATIVE OR PROCEDURAL NOTES

Notes are added to the following sections simply to provide information to the reader or to highlight certain DPD procedural requirements.

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 Note: 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, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors.
For all projects using the Target UA compliance option, 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 mean that the product complies with the NFRC rating, labeling, and certification program as required by the Washington State Energy Code.)
For unrated products, U-factors shall be taken from the default tables in Section 1006. If a default U-factor from Chapter 10 is used 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.).

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.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

Procedural Note: 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, glass block, plastic panels, clerestories, skylights, etc.), as well as all opaque doors.

The glazing schedule shall include the manufacturer and model number for all products with a U-factor less than 0.40 if there is a metal frame. The schedule shall include the manufacturer and model number for all products with a U-factor less than 0.35 for other frame types such as wood, vinyl and fiberglass.

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 mean that the product complies with the NFRC rating, labeling, and certification program as required by the Washington State Energy Code.)

For unrated products, U-factors shall be taken from the default tables in Section 1006. If a default U-factor from Chapter 10 is used 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.).

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 1 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 floor area are assigned a negative 1.0 points and therefore shall 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%,</p> <p>or</p> <p>Air-source heat pump with minimum HSPF of 8.5.</p> <p><u>[Procedural Note: To qualify to claim this credit, projects shall have already received a mechanical permit and a copy of the mechanical permit shall be pasted on to the building permit drawings showing the heating equipment type and the minimum equipment efficiency.]</u></p>	1.0

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

1b	<p>HIGH EFFICIENCY HVAC EQUIPMENT 2: Closed-loop ground source heat pump; with a minimum COP of 3.3.</p> <p><u>[Procedural Note: To qualify to claim this credit, projects shall have already received a mechanical permit and a copy of the mechanical permit shall be pasted on to the building permit drawings showing the heating equipment type and the minimum equipment efficiency.]</u></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 Note: To qualify to claim this credit, projects shall have already received a mechanical permit and a copy of the mechanical permit shall be pasted on to the building permit drawings showing the heating equipment type and the minimum equipment efficiency.]</u></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 Note: To qualify to claim this credit, projects shall have already received a mechanical permit and a copy of the mechanical permit shall be pasted on to the building permit drawings showing the location of the heating and cooling equipment and all the ductwork.]</u></p>	1.0
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 Note: For glazing U-factors - for Prescriptive compliance, see procedural note under Section 602.7.2. - for Component performance compliance, see note under Section 502.2.1.]</u></p>	0.5

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

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 Note: For glazing U-factors - for Prescriptive compliance, see procedural note under Section 602.7.2. - for Component performance compliance, see note under Section 502.2.1.]</u></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 Note: For glazing U-factors - for Prescriptive compliance, see procedural note under Section 602.7.2. - for Component performance compliance, see note under Section 502.2.1.]</u></p>	2.0
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 Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.</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 Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.</p>	1.0

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

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 Note: To qualify to claim this credit, projects shall have already received a plumbing permit and a copy of the plumbing permit shall be pasted on to the building permit drawings showing the water heater equipment type and the minimum equipment efficiency and the maximum flow rates for plumbing fixtures.]</u></p>	0.5
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 Note: To qualify to claim this credit, projects shall have already received a plumbing permit and a copy of the plumbing permit shall be pasted on to the building permit drawings showing 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>	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>	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

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.

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 style="text-align: center;"><u>[Procedural Note: To qualify to claim this credit, projects shall have already received an electrical permit and a copy of the electrical permit shall be pasted on to the building permit drawings showing the photovoltaic or wind turbine equipment type and the calculation of the minimum annual energy power production.]</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.

Proposed amendments do not apply to multifamily residential spaces
Informative or procedural notes in boxed text or brackets apply to all projects.