

Council Bill Number: 118178
Ordinance Number: 124614

AN ORDINANCE relating to Seattle Municipal Code Section 22.700.010; amending Seattle Energy Code Sections C101, C109, C402, C403, C404, C405, and C408 of the 2012 Seattle Energy Code, to correct section references, clarify regulations, and make amendments consistent with Washington State Energy Code.

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Sponsor: O'BRIEN
Committee Recommendation: Pass
Date of Committee Recommendation: 2014/10/14
Committee Vote: 3(O'Brien, Burgess, Licata)-0

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Text:

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to Seattle Municipal Code Section 22.700.010; amending Seattle Energy Code Sections C101, C109, C402, C403, C404, C405, and C408 of the 2012 Seattle Energy Code, to correct section references, clarify regulations, and make amendments consistent with Washington State Energy Code.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The following sections of Chapter 1 of the 2012 Seattle Energy Code, last amended by Ordinance 124284, are amended as follows:

SECTION C101

SCOPE AND APPLICABILITY

* * *

C101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or

other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C101.4.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C101.4.2 Landmark buildings. The code official may modify the specific requirements of this code for landmarks and require in lieu thereof alternate requirements that the code official determines will not have an adverse effect on the designated historic features of the building and will result in a reasonable degree of energy efficiency.

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Substantial alterations and repairs shall comply with the provisions of Section C101.4.7.

EXCEPTION: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Section C402.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
7. Alterations to lighting systems only that replace less than 20 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. (reserved)
9. Where an alteration project impacts an area smaller than 5,000 square feet, they are not required to be controlled receptacles.
10. Where existing systems furniture or partial-height relocatable office cubicle partitions are reconfigured or relocated within the same area, controlled receptacles are not required in the existing systems furniture or office cubicle partitions.
11. Where new or altered receptacles meet the exception to Section C405.14, they are not required to be controlled receptacles or located within 72 inches of non-controlled receptacles.

C101.4.7 Substantial alterations or repairs. In addition to meeting the applicable requirements of this code, any building or structure to which substantial alterations or repairs are made shall comply with the requirements of this section. A permit application for a voluntary energy upgrade to the building envelope is permitted to be made separately from the permit application for a substantial alterations project, provided that the threshold determination for substantial alterations includes the value of any such building envelope work.

ExceptionS:

1. Alterations and repairs to landmark buildings shall comply with this section to the extent that the code official determines that such compliance does not have an adverse effect on the designated historic features of the building. The energy use allowed by subsections 2, 3 or 4 of Section C101.4.7.3 is permitted to be increased in proportion to the additional energy use required for protection of such designated features.
2. A project that is defined as a substantial alteration primarily due to the seismic retrofitting of a building's unreinforced masonry walls is exempt from the requirements of this section.
3. A building constructed in compliance with the 2003 or more recent edition of the Seattle Building Code that would be classified as a substantial alteration only due to being reoccupied after being substantially vacant for more than 24 months is exempt from the requirements of this section.

C101.4.7.1 Definition. For the purposes of this section, substantial alterations or repairs means items 1, 2 or 4, or any combination thereof, of the definition of substantial alterations or repairs in Chapter 3 of the Seattle amendments to the IEBC, as determined by the code official.

Informative Note: Definitions 1, 2 and 4 of “substantial alterations or repairs” in the Seattle amendments to the IEBC are as follows:

1. Repair of buildings with damage ratios of 60 percent or more.
2. Remodeling or additions that substantially extend the useful physical and/or economic life of the building or a significant portion of the building, other than typical tenant remodeling.
3. ...
4. Re-occupancy of a building that has been substantially vacant for more than 24 months in occupancies other than Group R-3.
5. ...

C101.4.7.2 Pre-submittal conference. The applicant shall attend a pre-submittal conference to discuss the selected compliance path. Prior to this conference, the applicant shall meet with each energy utility serving the building to determine whether technical assistance or financial incentives are available for energy efficiency upgrades, and shall submit documentation of these meetings.

C101.4.7.3 Energy Efficiency. Buildings undergoing substantial alterations shall comply with one of the followinG:

1. Full code compliance. Fully comply with the requirements of this code for new construction.

2. Envelope thermal performance within 20 percent of code. Demonstrate that heat loss through the altered building envelope is no more than 20 percent greater than allowed by the Seattle Energy Code, using the Component Performance Building Envelope Option in Section C402.1.3, and meet all other prescriptive requirements of the Seattle Energy Code for new construction.

2.1. Default U-values. The values listed in Appendix A and Section C303 shall be used as the default U-values for existing building envelope components. For buildings with permits issued after January 1, 1992, existing building envelope components are deemed to meet the minimum U-values required by the edition of the Seattle Energy Code in effect at the time of the original permit application, where visual inspection by the code official reveals that those components appear to be equal to or better than code-compliant components.

3. Total building performance within 15 percent of code. Demonstrate that the building energy consumption will be less than 108 percent of the standard reference design using the Total Building Performance methodology in Section C407 of the Seattle Energy Code.

4. Operating energy alternative. The code official may allow a calculated building energy consumption 20 percent greater than the standard reference design calculated in accordance with the Total Building Performance methodology in Section C407, provided that:

a. The applicant demonstrates that constructability, economic, or historic preservation considerations preclude conformance with any of the above options; and

b. The owner agrees to operate the altered building at or below the annual energy use level predicted for that calculated energy performance during a period of 12 consecutive months, concluding no later than three years after issuance of the certificate of occupancy, adjusted as allowed by Sections C402.1.5.6 through C402.1.5.10, and to meet the requirements of Sections C402.1.5.11 through C402.1.5.13, substituting the energy consumption standard in option 4 of this Section C101.4.7.3 for the energy consumption targets set out in Section C402.1.5.2.

4.1. Reporting. The building owner shall report the energy consumption in kBtu/square foot using automated reporting directly from utilities via Energy Star Portfolio Manager, and shall authorize the code official to view the reports directly in Portfolio Manager during the demonstration period.

C101.4.7.4 Impracticality. In cases where full compliance with all the requirements of Section C101.4.7 is impractical, the applicant is permitted to arrange a pre- design conference with the design team and the code official to seek modifications. The applicant shall identify specific requirements that are impractical, and shall identify design solutions and modifications that achieve a comparable level of energy efficiency. The code official is authorized to waive specific requirements in this code to the extent that the code official determines those requirements to be impractical.

SECTION C109

ADMINISTRATIVE REVIEW

C109.1 Administrative review by the code official. Prior to issuance of the building permit, ((-A-)) applicants may request administrative review by the code official of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the code official.

C109.2 Administrative review by the Construction Codes Advisory Board. After administrative review by the building official, and prior to issuance of the building permit, ((-A-)) applicants may request review by the Construction Codes Advisory Board of decisions or actions pertaining to the application and interpretation of this code. The review will be performed by a panel of three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the code official.

* * *

Section 2. The following sections of Chapter 4 of the 2012 Seattle Energy Code, last amended by Ordinance 124284, are amended as follows:

SECTION C402

BUILDING ENVELOPE REQUIREMENTS

* * *

Table C402.1.2

Opaque Thermal Envelope Assembly Requirements^a

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	U-0.026	U-0.026	U-0.032	U-0.031
Metal buildings	U-0.027	U-0.027	U-0.029	U-0.031
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade				
Mass	U-0.057	U-0.057	U-0.078	U-0.071
Metal building	U-0.052	U-0.052	U-0.052	U-0.044
Steel framed	U-0.055	U-0.055	U-0.049	U-0.044
Wood framed and other	U-0.051	U-0.051	U-0.051	U-0.044
Walls, Below Grade				
Below-grade wallb	U-0.070	U-0.070	Same as above grade	Same as above grade
Floors				
Mass	U-0.029	U-0.029	U-0.031	U-0.031
Joist/framing	U-0.029 steel joist	U-0.029 steel joist	U-0.029	U-0.029
	U-0.025 wood joist	U-0.025 wood joist		
Slab-on-Grade Floors				
Unheated slabs	((F-0.520))	((F-0.520))	F-0.54	F-0.52
	F-0.540	F-0.540		
Heated slabsc	((F-0.36))	((F-0.36))	F-0.55	F-0.55
	F-0.55	F-0.55		

a Use of opaque assembly U-factors, C-factors, and F- factors from Appendix A is required unless otherwise allowed by Section C402.1.2.

b Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

c Heated slab F-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

* * *

Equation C402-1

Target UA_t

UAt	=	$ \begin{aligned} &U_{radt}A_{radt} + U_{mrt}A_{mrt} + U_{rat}A_{rat} + U_{mwt}(A_{mwt} + A_{mwbgt}) + U_{mbwt}(A_{mbwt} + A_{mbwbgt}) + \\ &U_{sfwt}(A_{sfwt} + A_{sfwbgt}) + U_{wfw}(A_{wfw} + A_{wfwbgt}) + U_{fint}A_{fint} + U_{fjt}A_{fjt} + F_{st}P_{st} + F_{srt}P_{srt} + \\ &U_{dst}A_{dst} + U_{drt}A_{drt} + U_{vgt}A_{vgt} + U_{vgmt}A_{vgmt} + U_{vgmot}A_{vgmot} + U_{vgdt}A_{vgdt} + U_{ogt}A_{ogt} \end{aligned} $	
	Uat	=	The target combined specific heat transfer of the gross roof/ceiling assembly, exterior wall and floor area.

Where:

Uradt	=	The thermal transmittance value for roofs with the insulation entirely above deck found in Table C402.1.2.
Umrt	=	The thermal transmittance value for metal building roofs found in Table C402.1.2.
Urat	=	The thermal transmittance value for attic and other roofs found in Table C402.1.2.
Umw	=	The thermal transmittance value for opaque mass walls found in Table C402.1.2.
Umbwt	=	The thermal transmittance value for opaque metal building walls found in Table C402.1.2.
Usfwt	=	The thermal transmittance value for opaque steel-framed walls found in Table C402.1.2.
Uwfw	=	The thermal transmittance value for opaque wood framed and other walls found in Table C402.1.2.
Ufnt	=	The thermal transmittance value for mass floors over unconditioned space found in Table C402.1.2.
Ufjt	=	The thermal transmittance value for joist floors over unconditioned space found in Table C402.1.2.
Fst	=	The F-factor for slab-on- grade floors found in Table C402.1.2.
Fsrt	=	The F-factor for radiant slab floors found in Table C402.1.2.
Udst	=	The thermal transmittance value for opaque swinging doors found in Table C402.2.
Udrt	=	The thermal transmittance value for opaque roll-up or sliding doors found in Table C402.2.
Uvgt	=	The thermal transmittance value for vertical fenestration with nonmetal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgnt	=	The thermal transmittance value for vertical fenestration with fixed metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgmot	=	The thermal transmittance value for vertical fenestration with operable metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgdt	=	The thermal transmittance value for entrance doors found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uogt	=	The thermal transmittance for skylights found in Table C402.3 which corresponds to the proposed skylight area as a percent of gross exterior roof area.
Afnt	=	The proposed mass floor over unconditioned space area, Afm.
Afjt	=	The proposed joist floor over unconditioned space area, Afj.
Pst	=	The proposed linear feet of slab-on-grade floor perimeter, Ps.
Psrt	=	The proposed linear feet of radiant slab floor perimeter, Prs.
Adst	=	The proposed opaque swinging door area, Ads.
Adrt	=	The proposed opaque roll-up or sliding door area, Adr.
and		

If the vertical fenestration area as a percent of gross above-grade exterior wall area does not exceed the maximum allowed in Section C402.3.1.3:

Anwt	=	The proposed opaque mass above-grade wall area, Amw.
Anwbgt	=	The proposed opaque below- grade mass wall area, Amwbg.
Ambwt	=	The proposed opaque above- grade metal building wall area, Ambw.

Asfwbg	=	The proposed opaque below- grade steel framed wall area, Asfwbg.
Asfw	=	The proposed opaque above- grade steel framed wall area, Asfw.
Asfwbg	=	The proposed opaque below- grade steel framed wall area, Asfwbg.
Awfw	=	The proposed opaque above- grade wall wood framed and other area, Awfw.
Awfwbg	=	The proposed opaque below- grade wall wood framed and other area, Awfwbg.
Avg	=	The proposed vertical fenestration area with nonmetal framing, Avg *
Avgm	=	The proposed vertical fenestration area with fixed metal framing, Avgm *
Avgmo	=	The proposed vertical fenestration area with operable metal framing * Avgmo.
Avgd	=	The proposed entrance door area, Avgd *
or		

For buildings utilizing ((C402.3.1.2)) C402.3.1.3, vertical fenestration area as a percent of gross exterior above-grade wall may not exceed the amount allowed by that section. For all other buildings, if the vertical fenestration area as a percent of gross exterior above-grade wall area exceeds the maximum allowed in Section C402.3.1, the area of each vertical fenestration element shall be reduced in the base envelope design by the same percentage and the net area of each above-grade wall type increased proportionately by the same percentage so that the total vertical fenestration area is exactly equal to the allowed percentage per Section C402.3.1 of the gross above-grade wall area. The target wall area of a given wall type shall be the sum of the proposed below grade area and the increased above- grade area.

and

If the skylight area as a percent of gross exterior roof area does not exceed the maximum allowed in Section C402.3.1:

Aradt	=	The proposed roof area with insulation entirely above the deck, Aradt.
Amrt	=	The proposed roof area for metal buildings, Amr.
Arat	=	The proposed attic and other roof area, Aor.
Aogat	=	The proposed skylight area, Aogor.
or		

If the skylight area as a percent of gross exterior roof area exceeds the maximum allowed in Section C402.3.1, the area of each skylight element shall be reduced in the base envelope design by the same percentage and the net area of each roof type increased proportionately by the same percentage so that the total skylight area is exactly equal to the allowed percentage per Section C402.3.1 of the gross roof area.

*NOTE: The vertical fenestration area does not include opaque doors and opaque spandrel panels.

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

EXCEPTION. Single glazing is permitted for security purposes and for revolving doors, provided that the total area of single glazing does not exceed 1 percent of the gross exterior wall area, and such glazing is included in the percentage of the total glazing area, U-factor and SHGC requirements in Section C402.3.

CLIMATE ZONE	5 AND MARINE 4	6
Vertical Fenestration		
U- factor		
Nonmetal framing (all)a	0.30	0.30
Metal framing (fixed)b	0.38	0.36
Metal framing (operable)c	0.40	0.40
Metal framing (entrance doors)d	0.60	0.60
SHGC		
SHGC	0.35	0.40
Skylights		
U- factor	0.45	0.50
SHGC	0.32	0.35

NR.= No requirement.

a "Nonmetal framing" includes framing materials other than metal, with or without metal reinforcing or cladding.

b "Metal framing" includes metal framing, with or without thermal break. "Fixed" includes curtain wall, storefront, picture windows, and other fixed windows.

c "Metal framing" includes metal framing, with or without thermal break. "Operable" includes operable fenestration products other than "entrance doors."

d "Metal framing" includes metal framing, with or without thermal break. "Entrance door" includes glazed swinging entrance doors. Other doors which are not entrance doors, including sliding glass doors, are considered "operable."

C402.3.1 Maximum area. The vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed 30 percent of the gross above-grade wall area. The skylight area shall not exceed 5 percent of the gross roof area.

EXCEPTION: For vertical fenestration at street level retail or for other occupancies where the Seattle Land Use Code requires street-level transparency, the fenestration area shall not exceed 75 percent of the area of the street-level wall that faces the street or that adjoins other pedestrian areas used for retail access. For the purposes of this exception, the street-level wall shall be measured from the street-level floor to the interior ceiling level or to 20 feet above floor level, whichever is lowest. 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. On the street level the 75 percent fenestration area is permitted to be exceeded, if the additional fenestration area is deducted from fenestration allowances for other areas of the building.

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the

gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

EXCEPTION: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

Informative Note: NFRC 200 covers almost all commonly-used glazing products. *Fenestration* products *not* within NFRC 200's scope include glass block, translucent fiberglass, curved glass, corrugated or patterned glazing, double-pane glass with shading devices between the panes, and glazing with translucent or patterned films.

C402.3.1.2 (Reserved)

C402.3.1.3 Increased vertical fenestration area with high-performance fenestration. The vertical fenestration area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30% but shall not exceed 40% of the gross above grade wall area, for the purpose of prescriptive compliance with Section C402.1.2 or for the Target UA calculation in Equations C402-1 or C402-5, provided that each of the following conditions are met:

1. The vertical fenestration shall have the following maximum U-factorS:
 - a. Non-metal framing (all) = 0.28
 - b. Metal framing (fixed) = ~~(0.34)~~ 0.36
 - c. Metal framing (operable) = ~~(0.39)~~ 0.36
 - d. Metal framing (entrance doors) = 0.60

An area-weighted average shall be permitted to satisfy the U-factor requirements for each fenestration product category listed above. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average U-factor.

2. The SHGC of the vertical fenestration shall be less than or equal to 0.35, adjusted for projection factor in compliance with Section C402.3.3.1.

The compliance path described in this Section (~~(C402.3.1.2)~~) C402.3.1.3 is not permitted to be used for the Total Building Performance compliance path as set out in Section C407.

Equation C402-5

Component Performance UxA

$$(UA \text{ Sum}) + (FL \text{ Sum}) + (CA \text{ Sum}) + (XVG) + (XSky) < \text{Zero.} \quad ; \quad (\text{Equation 402- 5})$$

Where:

UA Sum = Sum of the (UA Dif) values for each assembly that comprises a portion of the building thermal envelope, other than assemblies included in FL Sum and CA Sum

$$UA \text{ Dif} = (UA \text{ Proposed}) - (UA \text{ Table})$$

$$UA \text{ Table} = (\text{Maximum allowable U-factor specified in Table C402.1.2 or Table C402.3}) \times (\text{Area})_a$$

$$UA \text{ Proposed} = (\text{Proposed U-value}) \times (\text{Area})$$

FL Sum = Sum of the (FL Dif) values for each slab on grade assembly that comprises a portion of the building thermal envelope

$$FL \text{ Dif} = (FL \text{ Proposed}) - (FL \text{ Table})$$

$$FL \text{ Table} = (\text{Maximum allowable F-factor specified in Table C402.1.2}) \times (\text{Perimeter length})$$

$$FL \text{ Proposed} = (\text{Proposed F-value}) \times (\text{Perimeter length})$$

CA Sum = Sum of the (CA Dif) values for each below- grade wall assembly that comprises a portion of the building thermal envelope

$$CA \text{ Dif} = (CA \text{ Proposed}) - (CA \text{ Table})$$

$$CA \text{ Table} = (\text{Maximum allowable C-factor specified in Table C402.1.2}) \times (\text{area})$$

$$CA \text{ Proposed} = (\text{Proposed C-value}) \times (\text{area})$$

~~XVG (Excess Vertical Glazing Value) = (XVGArea x UVG) -- (XVGArea x UWall), but not less than zero.~~

~~XVGArea (Excess Vertical Glazing Area) = (Proposed Vertical Glazing Area) -- (Allowable Vertical Glazing Area determined in accordance with Section C402.3.1)~~

~~UA Wall = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of the above-grade exterior wall~~

~~UWall = UA Wall / total above-grade opaque exterior wall area~~

~~UA VG = Sum of the (UA Proposed) values for each vertical glazing assembly~~

~~UVG = UA VG / total vertical glazing area~~

~~XSky (Excess Skylight Value) = (XSArea X USky) -- (XSArea x U Roof), but not less than zero.~~

~~XSArea (Excess Skylight Area) = (Proposed Skylight Area) -- (Allowable Skylight Area determined in accordance with Section C402.3.1)~~

~~UA Roof = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of a roof~~

~~URoof = UA Roof / total opaque roof area~~

~~UA Sky = Sum of the (UA Proposed) values for each skylight assembly~~

~~USky = UA Sky / total skylight area~~

~~Footnote~~

~~a: Fenestration U-factors in Table C402.3 may be modified by the exceptions to Sections C402.3, C402.3.1 and C402.3.1.2.~~

~~A + B + C + D + E < Zero (Equation C402.5)~~

~~Where:~~

~~A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.~~

~~UA Dif = UA Proposed -- UA Table.^a~~

~~UA Proposed = Proposed U-value ? Area.~~

~~UA Table = (U-factor from Table C402.1.2 or Table C402.3) ? Area.~~

~~B = Sum of the (FL Dif) values for each distinct slab on grade perimeter condition of the building thermal envelope.~~

~~Table C402.1.2~~

~~Opaque Thermal Envelope Assembly Requirements^a~~

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	U-0.026	U-0.026	U-0.032	U-0.031
Metal buildings	U-0.027	U-0.027	U-0.029	U-0.031
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade				
Mass	U-0.057	U-0.057	U-0.078	U-0.071
Metal building	U-0.052	U-0.052	U-0.052	U-0.044
Steel framed	U-0.055	U-0.055	U-0.049	U-0.044
Wood framed and other	U-0.051	U-0.051	U-0.051	U-0.044
Walls, Below Grade				
Below-grade wallb	U-0.070	U-0.070	Same as above grade	Same as above grade
Floors				
Mass	U-0.029	U-0.029	U-0.031	U-0.031
Joist/framing	U-0.029 steel joist	U-0.029 steel joist	U-0.029	U-0.029
	U-0.025 wood joist	U-0.025 wood joist		
Slab-on-Grade Floors				
Unheated slabs	((F-0.520))	((F-0.520))	F-0.54	F-0.52
	F-0.540	F-0.540		
Heated slabsc	((F-0.36))	((F-0.36))	F-0.55	F-0.55
	F-0.55	F-0.55		

a Use of opaque assembly U-factors, C-factors, and F- factors from Appendix A is required unless otherwise allowed by Section C402.1.2.

b Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

c Heated slab F-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

Equation C402-1

Target UA_t

$$U_{At} = U_{radt}A_{radt} + U_{mrt}A_{mrt} + U_{rat}A_{rat} + U_{mwt}(A_{mwt} + A_{mwbgt}) + U_{mbwt}(A_{mbwt} + A_{mbwbgt}) + U_{sfwt}(A_{sfwt} + A_{sfwbgt}) + U_{wfw}t(A_{wfw}t + A_{wfw}bgt) + U_{fint}A_{fint} + U_{fjt}A_{fjt} + F_{st}P_{st} + F_{srt}P_{srt} + U_{dst}A_{dst} + U_{drt}A_{drt} + U_{vgt}A_{vgt} + U_{vgmt}A_{vgmt} + U_{vgmot}A_{vgmot} + U_{vgdt}A_{vgdt} + U_{ogt}A_{ogt}$$

U_{at} = The target combined specific heat transfer of the gross roof/ceiling assembly, exterior wall and floor area.

Where:

U_{radt} = The thermal transmittance value for roofs with the insulation entirely above deck found in Table C402.1.2.

U_{mrt} = The thermal transmittance value for metal building roofs found in Table C402.1.2.

U_{rat} = The thermal transmittance value for attic and other roofs found in Table C402.1.2.

U_{mwt} = The thermal transmittance value for opaque mass walls found in Table C402.1.2.

U_{mbwt} = The thermal transmittance value for opaque metal building walls found in Table C402.1.2.

U_{sfwt} = The thermal transmittance value for opaque steel-framed walls found in Table C402.1.2.

$U_{wfw}t$ = The thermal transmittance value for opaque wood framed and other walls found in Table C402.1.2.

U_{fint} = The thermal transmittance value for mass floors over unconditioned space found in Table C402.1.2.

U_{fjt} = The thermal transmittance value for joist floors over unconditioned space found in Table C402.1.2.

Fst	=	The F-factor for slab-on- grade floors found in Table C402.1.2.
Fsrt	=	The F-factor for radiant slab floors found in Table C402.1.2.
Udst	=	The thermal transmittance value for opaque swinging doors found in Table C402.2.
Udrt	=	The thermal transmittance value for opaque roll-up or sliding doors found in Table C402.2.
Uvgt	=	The thermal transmittance value for vertical fenestration with nonmetal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgmt	=	The thermal transmittance value for vertical fenestration with fixed metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgmot	=	The thermal transmittance value for vertical fenestration with operable metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uvgdt	=	The thermal transmittance value for entrance doors found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area. * Buildings utilizing Section C402.3.1.3 shall use the thermal transmittance value specified there.
Uogt	=	The thermal transmittance for skylights found in Table C402.3 which corresponds to the proposed skylight area as a percent of gross exterior roof area.
Afmt	=	The proposed mass floor over unconditioned space area, Afm.
Aft	=	The proposed joist floor over unconditioned space area, Afj.
Pst	=	The proposed linear feet of slab-on-grade floor perimeter, Ps.
Psrt	=	The proposed linear feet of radiant slab floor perimeter, Prs.
Adst	=	The proposed opaque swinging door area, Ads.
Adrt	=	The proposed opaque roll-up or sliding door area, Adr.
and		

If the vertical fenestration area as a percent of gross above-grade exterior wall area does not exceed the maximum allowed in Section C402.3.1.3:

Anwt	=	The proposed opaque mass above-grade wall area, Amw.
Anwbgt	=	The proposed opaque below- grade mass wall area, Amwbg.
Ambwt	=	The proposed opaque above- grade metal building wall area, Ambw.
Asfwbgt	=	The proposed opaque below- grade steel framed wall area, Asfwbg.
Asfw	=	The proposed opaque above- grade steel framed wall area, Asfw.
Asfwbgt	=	The proposed opaque below- grade steel framed wall area, Asfwbg.
Awfw	=	The proposed opaque above- grade wall wood framed and other area, Awfw.
Awfwbgt	=	The proposed opaque below- grade wall wood framed and other area, Awfwbgt.
Avg	=	The proposed vertical fenestration area with nonmetal framing, Avg *
Avgmt	=	The proposed vertical fenestration area with fixed metal framing, Avgm *
Avgmot	=	The proposed vertical fenestration area with operable metal framing * Avgmo.
Avgdt	=	The proposed entrance door area, Avgd *
or		

For buildings utilizing ((C402.3.1.2)) C402.3.1.3, vertical fenestration area as a percent of gross exterior above-grade wall may not exceed the amount allowed by that section. For all other buildings, if the vertical fenestration area as a percent of gross exterior above-grade wall area exceeds the maximum allowed in Section C402.3.1, the area of each vertical fenestration element shall be reduced in the base envelope design by the same percentage and the net area of each above-grade wall type increased proportionately by the same percentage so that the total vertical fenestration area is exactly equal to the allowed percentage per Section C402.3.1 of the gross above-grade wall area. The target wall area of a given wall type shall be the sum of the proposed below grade area and the increased above-grade area.

and

If the skylight area as a percent of gross exterior roof area does not exceed the maximum allowed in Section C402.3.1:

Aradt	=	The proposed roof area with insulation entirely above the deck, Arad.
Amrt	=	The proposed roof area for metal buildings, Amr.
Arat	=	The proposed attic and other roof area, Aor.
Aogat	=	The proposed skylight area, Aogor.
or		

If the skylight area as a percent of gross exterior roof area exceeds the maximum allowed in Section C402.3.1, the area of each skylight element shall be reduced in the base envelope design by the same percentage and the net area of each roof type increased proportionately by the same percentage so that the total skylight area is exactly equal to the allowed percentage per Section C402.3.1 of the gross roof area.

*NOTE: The vertical fenestration area does not include opaque doors and opaque spandrel panels.

* * *

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

EXCEPTION. Single glazing is permitted for security purposes and for revolving doors, provided that the total area of single glazing does not exceed 1 percent of the gross exterior wall area, and such glazing is included in the percentage of the total glazing area, U-factor and SHGC requirements in Section C402.3.

Table C402.3

Building Envelope Requirements---Fenestration

CLIMATE ZONE	5 AND MARINE 4	6
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Vertical Fenestration

U- factor		
Nonmetal framing (all)a	0.30	0.30
Metal framing (fixed)b	0.38	0.36
Metal framing (operable)c	0.40	0.40
Metal framing (entrance doors)d	0.60	0.60
SHGC		
SHGC	0.35	0.40
Skylights		
U- factor	0.45	0.50
SHGC	0.32	0.35

NR . = No requirement.

a "Nonmetal framing" includes framing materials other than metal, with or without metal reinforcing or cladding.

b "Metal framing" includes metal framing, with or without thermal break. "Fixed" includes curtain wall, storefront, picture windows, and other fixed windows.

c "Metal framing" includes metal framing, with or without thermal break. "Operable" includes operable fenestration products other than "entrance doors."

d "Metal framing" includes metal framing, with or without thermal break. "Entrance door" includes glazed swinging entrance doors. Other doors which are not entrance doors, including sliding glass doors, are considered "operable."

C402.3.1 Maximum area. The vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed 30 percent of the gross above-grade wall area. The skylight area shall not exceed 5 percent of the gross roof area.

EXCEPTION: For vertical fenestration at street level retail or for other occupancies where the Seattle Land Use Code requires street-level transparency, the fenestration area shall not exceed 75 percent of the area of the street-level wall that faces the street or that adjoins other pedestrian areas used for retail access. For the purposes of this exception, the street-level wall shall be measured from the street-level floor to the interior ceiling level or to 20 feet above floor level, whichever is lowest. 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. On the street level the 75 percent fenestration area is permitted to be exceeded, if the additional fenestration area is deducted from fenestration allowances for other areas of the building.

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

EXCEPTION: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

Informative Note: NFRC 200 covers almost all commonly-used glazing products. *Fenestration* products *not* within NFRC 200's scope include glass block, translucent fiberglass, curved glass, corrugated or patterned glazing, double-pane glass with shading devices between the panes, and glazing with translucent or patterned films.

C402.3.1.2 (Reserved)

C402.3.1.3 Increased vertical fenestration area with high-performance fenestration. The vertical fenestration area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30% but shall not exceed 40% of the gross above grade wall area, for the purpose of prescriptive compliance with Section C402.1.2 or for the Target UA calculation in Equations C402-1 or C402-5, provided that each of the following conditions are met:

1. The vertical fenestration shall have the following maximum U-factorS:

a. Non-metal framing (all) = 0.28

b. Metal framing (fixed) = ~~((0.34))~~ 0.36

c. Metal framing (operable) = ~~((0.39))~~ 0.36

d. Metal framing (entrance doors) = 0.60

An area-weighted average shall be permitted to satisfy the U-factor requirements for each fenestration product category listed above. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average U-factor.

2. The SHGC of the vertical fenestration shall be less than or equal to 0.35, adjusted for projection factor in compliance with Section C402.3.3.1.

The compliance path described in this Section ~~((C402.3.1.2))~~ C402.3.1.3 is not permitted to be used for the Total Building Performance compliance path as set out in Section C407.

Component Performance UxA

$$(UA \text{ Sum}) + (FL \text{ Sum}) + (CA \text{ Sum}) + (XVG) + (XSky) < \text{Zero.} \quad ; \quad (\text{Equation 402- 5})$$

Where:

UA Sum = Sum of the (UA Dif) values for each assembly that comprises a portion of the building thermal envelope, other than assemblies included in FL Sum and CA Sum

$$UA \text{ Dif} = (UA \text{ Proposed}) - (UA \text{ Table})$$

$$UA \text{ Table} = (\text{Maximum allowable U-factor specified in Table C402.1.2 or Table C402.3}) \times (\text{Area})_a$$

$$UA \text{ Proposed} = (\text{Proposed U-value}) \times (\text{Area})$$

FL Sum = Sum of the (FL Dif) values for each slab on grade assembly that comprises a portion of the building thermal envelope

$$FL \text{ Dif} = (FL \text{ Proposed}) - (FL \text{ Table})$$

$$FL \text{ Table} = (\text{Maximum allowable F-factor specified in Table C402.1.2}) \times (\text{Perimeter length})$$

$$FL \text{ Proposed} = (\text{Proposed F-value}) \times (\text{Perimeter length})$$

CA Sum = Sum of the (CA Dif) values for each below- grade wall assembly that comprises a portion of the building thermal envelope

$$CA \text{ Dif} = (CA \text{ Proposed}) - (CA \text{ Table})$$

$$CA \text{ Table} = (\text{Maximum allowable C-factor specified in Table C402.1.2}) \times (\text{area})$$

$$CA \text{ Proposed} = (\text{Proposed C-value}) \times (\text{area})$$

~~XVGA (Excess Vertical Glazing Area) = (Proposed Vertical Glazing Area) - (Allowable Vertical Glazing Area determined in accordance with Section C402.3.1)~~

~~UA Wall = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of the above-grade exterior wall~~

~~UWall = UA Wall / total above-grade opaque exterior wall area~~

~~UA VG = Sum of the (UA Proposed) values for each vertical glazing assembly~~

~~UVG = UA VG / total vertical glazing area~~

~~XSky (Excess Skylight Value) = (XSArea x USky) - (XSArea x URoof), but not less than zero.~~

~~XSArea (Excess Skylight Area) = (Proposed Skylight Area) - (Allowable Skylight Area determined in accordance with Section C402.3.1)~~

~~UA Roof = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of a roof~~

~~URoof = UA Roof / total opaque roof area~~

~~UA Sky = Sum of the (UA Proposed) values for each skylight assembly~~

~~USky = UA Sky / total skylight area~~

~~Footnote~~

~~a: Fenestration U-factors in Table C402.3 may be modified by the exceptions to Sections C402.3, C402.3.1 and C402.3.1.2.~~

A + B + C + D + E < Zero (Equation C402.5)

Where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.

UA Dif = UA Proposed - UA Table.^a

UA Proposed = Proposed U-value ? Area.

UA Table = (U-factor from Table C402.1.2 or Table C402.3) ? Area.

B = Sum of the (FL Dif) values for each distinct slab on grade perimeter condition of the building thermal envelope.

FL Dif = FL Proposed - FL Table.

FL Proposed = Proposed F-value ? Perimeter length.

FL Table = (F-factor specified in Table C402.1.2) ? Perimeter length.

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope.

CA Dif = CA Proposed - CA Table.

CA Proposed = Proposed C-value ? Area.

CA Table = (Maximum allowable C-factor specified in Table C402.1.2) ? Area.

If the proposed vertical glazing area is less than or equal to the maximum vertical glazing area allowed by Section C402.3.1, the value of D (Excess Vertical Glazing Value) shall be zero. Otherwise:

$D = (DA ? UV) -- (DA ? U_{Wall})$, but not less than zero.

$DA = (\text{Proposed Vertical Glazing Area}) -- (\text{Vertical Glazing Area allowed by Section C402.3.1})$.

UA Wall = Sum of the (UA Proposed) values for each opaque assembly of the exterior wall.

U_{Wall} = Area-weighted average U-value of all above- grade wall assemblies.

UAV = Sum of the (UA Proposed) values for each vertical glazing assembly.

$UV = UAV/\text{total vertical glazing area}$.

If the proposed skylight area is less than or equal to the skylight area allowed by Section C402.3.1, the value of E (Excess Skylight Value) shall be zero. Otherwise:

$E = (EA ? US) -- (EA ? U_{Roof})$, but not less than zero.

$EA = (\text{Proposed Skylight Area}) -- (\text{Allowable Skylight Area from Section C402.3.1})$.

U_{Roof} = Area-weighted average U-value of all roof assemblies.

UAS = Sum of the (UA Proposed) values for each skylight assembly.

$US = UAS/\text{total skylight area}$.

Footnote:

a: Fenestration U-factors in Table C402.3 may be modified by the exceptions to Sections C402.3, C402.3.1 and C402.3.1.1, and must use the factors in C402.3.3 where that section is utilized for compliance.

* * *

SECTION C403

BUILDING MECHANICAL SYSTEMS

* * *

C403.2.4 HVAC system controls. Each heating and cooling system shall be provided with thermostatic controls as specified in Section C403.2.4.1, C403.2.4.2, C403.2.4.3, C403.2.4.4, C403.4.1, C403.4.2, C403.4.3, C403.4.4, C403.4.5, C403.4.6, C403.4.7, C403.4.8, C403.4.9, or C403.4.10.

C403.2.4.1 Thermostatic controls. The supply of heating and cooling energy to each zone shall be controlled by individual thermostatic controls capable of responding to temperature within the zone. At a minimum, each floor of a building shall be considered as a separate zone. Controls on systems required to have economizers and serving single zones shall have multiple cooling stage capability and activate the economizer when appropriate as the first stage of cooling. See Section C403.3.1 or C403.4.1 for further economizer requirements. Where humidification or dehumidification or both is provided, at least one humidity control device shall be provided for each humidity

control system.

EXCEPTION: Independent perimeter systems that are designed to offset only building envelope heat losses or gains or both serving one or more perimeter zones also served by an interior system provided:

1. The perimeter system includes at least one thermostatic control zone for each building exposure having exterior walls facing only one orientation (within +/-45 degrees) (0.8 rad) for more than 50 contiguous feet (15,240 mm); and
2. The perimeter system heating and cooling supply is controlled by a thermostat located within the zones served by the system.

C403.2.4.1.1 Heat pump supplementary heat. 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 supplementary heater operation above 40 degrees F. At final inspection, the lock out control shall be set to 32 degrees F (0 degrees C) or less.

EXCEPTION: Packaged terminal heat pumps (PTHPs) of less than 2 tons (24,000 Btu/hr) cooling capacity provided with controls that prevent supplementary heater operation above 40 degrees F.

C403.2.4.2 Setpoint overlap restriction. Where used to control both heating and cooling, zone thermostatic controls shall provide a temperature range or deadband of at least 5 degrees F (2.8 degrees C) within which the supply of heating and cooling energy to the zone is capable of being shut off or reduced to a minimum.

EXCEPTION: Thermostats requiring manual changeover between heating and cooling modes.

C403.2.4.3 Off-hour controls. For all occupancies other than Group R and for conditioned spaces other than dwelling units within Group R occupancies, each zone shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

EXCEPTIONS:

1. Zones that will be operated continuously.
2. Zones with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a readily accessible manual shutoff switch.

C403.2.4.3.1 Thermostatic setback capabilities. Thermostatic setback controls shall have the capability to set back or temporarily operate the system to maintain zone temperatures down to 55 degrees F (13 degrees C) or up to 85 degrees F (29 degrees C).

C403.2.4.3.2 Automatic setback and shutdown capabilities. Automatic time clock or programmable controls shall be capable of starting and stopping the system for seven different daily schedules per week and retaining their programming and time setting during a loss of power for at least 10 hours. Additionally, the controls shall have a manual override that allows temporary operation of the system for up to 2 hours; a manually operated timer capable of being adjusted to operate the system for up to 2 hours; or an occupancy sensor.

C403.2.4.3.3 Automatic start capabilities. Automatic start controls shall be provided for each HVAC system. The controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

C403.2.4.4 Shutoff damper controls. Outdoor air supply, relief and exhaust ducts shall be equipped with motorized dampers complying with Section C402.4.5.2 that will automatically shut when the systems or spaces served are not in use or during building warm-up, cooldown, and setback.

EXCEPTIONS:

1. Gravity relief dampers complying with exception 1 to Section C402.4.5.2 serving systems with a design outdoor air intake, relief or exhaust capacity of less than 300 cfm total supply shall be permitted.

2. Gravity dampers shall be permitted for buildings of any height located in Climate Zones 1, 2 and 3.
3. Gravity (nonmotorized) dampers in Group R occupancies where the design outdoor air intake or exhaust capacity does not exceed 300 cfm (189 L/s).
4. Systems serving areas which require continuous operation.
5. Combustion air intakes.
6. Operation of dampers shall be allowed during ventilation prepurge one hour before expected occupancy and for unoccupied period precooling during the cooling season.
7. Dampers are not required in systems where specifically prohibited by the International Mechanical Code.

C403.2.4.5 Snow melt system controls. Snow- and ice- melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50 degrees F (10 degrees C) and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40 degrees F (4 degrees C) so that the potential for snow or ice accumulation is negligible.

C403.2.4.6 Combustion heating equipment controls. Combustion heating equipment with a capacity over 225,000 Btu/h shall have modulating or staged combustion control.

EXCEPTIONS:

1. Boilers.
2. Radiant heaters.

C403.2.4.7 Group R-1 hotel/motel guest rooms. 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 5 degrees F (3 degrees C) 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.

C403.2.4.8 Group R-2 and R-3 dwelling units. The primary space conditioning system within each dwelling unit shall be provided with at least one programmable thermostat for the regulation of space temperature. The thermostat shall allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day.

Each additional system provided within the dwelling unit shall be provided with at least one adjustable thermostat for the regulation of temperature.

EXCEPTIONS:

1. 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.
2. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.
3. Ductless heat pumps.

Each thermostat shall be capable of being set by adjustment or selection of sensors as follows: When used to control heating only: 55 degrees F to 75 degrees F; when used to control cooling only: 70 degrees F to 85 degrees F; all other: 55 degrees F to 85 degrees F with

an adjustable deadband of not less than 10 degrees F.

C403.2.4.9 Group R-2 sleeping units. The primary space conditioning system within each sleeping unit shall be provided with at least one programmable thermostat for the regulation of space temperature. The thermostat shall allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day.

Each additional system provided within the sleeping unit shall be provided with at least one adjustable thermostat for the regulation of temperature.

EXCEPTIONS:

1. 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.
2. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.
3. Zones with a full HVAC load demand not exceeding 3,400 Btu/h (1 kW) and having a readily accessible manual shutoff switch.
4. Ductless heat pumps.

Each thermostat shall be capable of being set by adjustment or selection of sensors as follows: When used to control heating only: 55 degrees F to 75 degrees F; when used to control cooling only: 70 degrees F to 85 degrees F; all other: 55 degrees to 85 degrees with an adjustable deadband of not less than 10 degrees.

C403.2.4.10 Direct digital control system capabilities. All complex systems equipped with direct digital control (DDC) systems and all buildings with total cooling capacity exceeding 780,000 Btu/h (2,662 kW) shall have the following capability:

1. 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.
2. Demand Response Setpoint Adjustment: Control logic shall increase the cooling zone set points by at least 2 degrees F (1 degrees C) and reduce the heating zone set points by at least 2 degrees F (1 degrees 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.

* * *

C403.2.9 Mechanical systems commissioning and completion requirements. Mechanical systems shall be commissioned and completed in accordance with Section C408(~~(-2-)~~).

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through C403.2.10.5. All motors less than 1 horsepower shall meet the provisions of Sections C403.2.10.3.

C403.2.10.1 Allowable fan floor horsepower. Each HVAC system at fan system design conditions shall not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, exhaust fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable-air-volume systems shall comply with the constant volume fan power limitation.

EXCEPTION: The following fan systems are exempt from allowable fan floor horsepower requirement.

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

C403.2.10.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the code official.

EXCEPTIONS:

- 1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
- 2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.
- 3. For fans used only in approved life safety applications such as smoke evacuation.

C403.2.10.3 Fractional hp fan motors. Motors for fans that are 1/12 hp or greater and less than 1 hp shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent when rated in accordance with DOE 10 C.F.R. 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustments for airflow balancing in lieu of a varying motor speed.

EXCEPTIONS:

- 1. Motors in the airstream within fan-coils and terminal units that operate only when providing heating to the space served.
- 2. Motors installed in space conditioning equipment certified under Section C403.2.3.

* * *

C403.2.11 Heating outside a building. Systems installed to provide heat outside a building shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically deenergized when no occupants ~~((are))~~ have been present in the area heated by each individual device for a period not to exceed one hour.

* * *

SECTION C404

SERVICE WATER HEATING

(Mandatory)

* * *

C404.7 (Reserved) ~~((Hot water system controls. Circulating hot water system pumps or heat trace shall be arranged to be turned off either automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls.))~~

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SECTION C405

ELECTRICAL POWER AND LIGHTING SYSTEMS

(Mandatory)

* * *

C405.14 Controlled receptacles. At least 50 percent of all 125 volt 15- and 20-ampere receptacles installed in private offices, open offices, or classrooms, including those installed in modular partitions and modular office workstation systems, shall be controlled receptacles. In rooms larger than 200 square feet (19 M²), a controlled receptacle shall be located within 72 inches (1.8 M) of each uncontrolled receptacle. Controlled receptacles shall be visibly differentiated from standard receptacles and shall be controlled by one of the following automatic control deviceS:

1. An occupant sensor that turns receptacle power off when no occupants have been detected for a maximum of 30 minutes, or
2. A time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be capable of providing an independent schedule for each portion of the building not to exceed 25,000 square feet (2,323 M²) and not to exceed one full floor. The device shall be capable of being overridden for periods of up to two hours by a timer accessible to occupants. Any individual override switch shall control the controlled receptacles for a maximum area of 5,000 square feet (465 M²). Override switches for controlled receptacles are permitted to control the lighting within the same area.

Exception: Receptacles designated for specific equipment requiring 24-hour operation, for building maintenance functions, or for specific safety or security equipment are not required to be controlled by an automatic control device and are not required to be located within 72 inches (1.8 M) of a controlled receptacle.

Informative Note: See Section C101.4.3, exceptions 9, 10 and 11, regarding *controlled receptacle* requirements for alterations to existing buildings.

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SECTION C408

SYSTEM COMMISSIONING

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403, service water heating systems in Section C404, electrical power and lighting systems in Section C405 and energy metering in Section C409. Prior to passing the final mechanical and electrical inspections or obtaining a certificate of occupancy, the registered design professional or qualified commissioning authority shall provide evidence of systems commissioning and completion in accordance with the provisions of this section.

Exception: Where commissioning is not required by Sections C408.2 through C408.5, the requirements of Section C408.1 do not apply.

Copies of all documentation shall be given to the owner and made available to the code official upon request in accordance with Sections C408.1.2 and C408.1.3.

C408.1.1 Commissioning plan. A commissioning plan shall be developed by a registered design professional or qualified commissioning authority and shall include the items listed in this section. Items 1 -- 4 shall be included with the construction documents, and items 5 -- 8 shall be submitted prior to the first mechanical inspection. For projects where no mechanical inspection is required, items 5 -- 8 shall be submitted prior to the first electrical inspection.

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.

2. Roles and responsibilities of the commissioning team, including statement of qualifications of the commissioning authority in accordance with Section C408.1.

3. A schedule of activities including systems testing and balancing, functional testing, and supporting documentation.

4. Where the qualified commissioning authority is an employee of one of the registered design professionals of record or an employee or subcontractor of the project contractor, an In-House Commissioning Disclosure and Conflict Management Plan shall be submitted with the commissioning plan. This Plan shall disclose the qualified commissioning authority's contractual relationship with other team members and provide a conflict management plan demonstrating that the qualified commissioning authority is free to identify any issues discovered and report directly to the owner.

5. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.

6. Functions to be tested.

7. Conditions under which the test will be performed.

8. Measurable criteria for performance.

C408.1.2.1 Acceptance of ~~((report))~~ Commissioning Report. Buildings, or portions thereof, shall not pass the final mechanical and electrical inspections or obtain a certificate of occupancy, until such time as the code official has received a letter of transmittal from the building owner acknowledging that the building owner has received the Commissioning Report required by Section C408.1.3.4 and the completed Commissioning Compliance Checklist (Figure C408.1.2.1).

* * *

Section 3. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the ____ day of _____, 2014, and signed by me in open session in authentication of its passage this

____ day of _____, 2014.

President _____ of the City Council

Approved by me this ____ day of _____, 2014.

Edward B. Murray, Mayor

Filed by me this ____ day of _____, 2014.

Monica Martinez Simmons, City Clerk

(Seal)

