City of Seattle
Gregory J. Nickels, Mayor

Department of Planning & Development
Diane M. Sugimura, Director

5 October 2009

RE: Proposed Revisions to the Washington State Energy Code (WSR #09-17-136)

Peter DeVries, Council Chair
Washington State Building Code Council
PO Box 42525
Olympia WA 98504-2525

Attached are comments on the proposed revisions to the Washington State Energy Code.

General:

- We support the proposed revisions, except as noted below. We strongly recommend that the Washington State Building Code Council adopt these revisions with the attached modifications at this time.
- We commend the Washington State Building Code Council for updating the code, as required by federal law (background attached), to achieve energy savings closer to the latest version of ASHRAE/IESNA Standard 90.1. (Standard 90.1 is cited in the U.S. National Energy Policy Act (EPAct) as the basis for nonresidential Energy Codes.)

Key comments:

- Table 5-1 and Tables 6-1 & 6-2: modify to eliminate reductions in stringency and to reinstate separate building envelope criteria for Climate Zones 1 & 2.
- Chapters 13-15: modify to achieve stringency no less than the 2009 IECC and ASHRAE Standard 90.1-2007.
- Throughout: minor wording changes to clarify intent and improve enforcement.

Detailed comments are attached. Please contact me at 206-386-9145 if you have any questions.

Sincerely,

(faxed original is signed)

John Hogan, AIA, P.E.
Senior Code Development Analyst

EPACT BACKGROUND

The public review draft for the 2009 State Energy Code contains a "summary of changes in existing rules" starting on page 3. The first paragraph cites requirements that State Energy Codes must comply with under the U.S. Energy Policy Act, but does not provide any details. While some Council members and staff are aware of this responsibility, other members of the Council may not be. Here is a summary on how adopting the nonresidential revisions can help the Council with one of their responsibilities under federal law.

The 1992 U.S. National Energy Policy Act (EPAct) establishes ASHRAE/IESNA Standard 90.1 as the basis for nonresidential State Energy Codes. Whenever Standard 90.1 is revised, this starts a process where the U.S. Department of Energy must make a finding on energy savings. EPAct also requires that each State then evaluate their Energy Code within two years of the U.S. DOE finding and determine whether their nonresidential Energy Code achieves a comparable level of energy efficiency. Those who have been around know that the Council has been through this process in the past.

So, here is where we are now: ASHRAE/IESNA Standard 90.1 was last updated in 2007. It is my understanding that the U.S. Department of Energy has completed their evaluation and has found that the 2007 version of Standard 90.1 saves energy compared to the 2004 version. While the U.S. Department of Energy has not yet formally published their findings, they are expected to do that in the near future. That will start the two-year clock for Washington State to update the Washington State Energy Code to achieve energy savings no less than the 2007 version of Standard 90.1. Since the Council's next update is three years away, the Council will need to make these energy efficiency improvements now.

Adoption of the proposed revisions to the Washington State Energy Code that are now out for public comment, <u>with some additional changes</u>, will provide a good basis for making a positive statement about the nonresidential requirements in the Washington State Energy Code.

DETAILED COMMENTS

The proposals below show language changes from the Proposed Rulemaking.

Table 5-1
Proposal: revise the Target UA trade-off baseline as follows to reinstate the wall U-0.044 which has been in the Energy Code since 1991,

TABLE 5-1
TARGET COMPONENT VALUES FOR SINGLE-FAMILY RESIDENTIAL

Component	Climate Zone 1	Climate Zone 2
Glazing % Floor Area	15%	15%
Vertical Glazing U-Factor	U = 0.300	U = 0.300
Overhead Glazing U-Factor	U = 0.50	U = 0.50
Doors	U = 0.200	U = 0.200
Ceilings	U = 0.027	U = 0.027
Walls	U = 0.056	U = ~~0.056~~ 0.044
Floors	U = 0.029	U = 0.029
(no changes to remainder of table)		

Rationale: In 1990, nineteen years ago, the Washington State Legislature passed Substitute House Bill (SHB) 2198 (the vote being 91-3 in the House) directing the Council to adopt an updated Energy Code, specifying that "for the purpose of determining equivalent thermal performance, the wall U-value shall be…0.044 in zone 2" for residential buildings with electric resistance space heat. This provision was incorporated into the 1991 Washington State Energy Code, and has been in every State Energy Code since then. In 2006, the Council simplified the Energy Code by eliminating the building envelope distinctions based on space heating energy type and established U-0.044 as the baseline for determining equivalent thermal performance for all residential buildings in zone 2. Just this year in 2009, the Washington State Legislature passed SB 5854. SB 5854 specifies that the baseline "for residential buildings shall be the 2006 edition of the Washington state energy code". Consequently, the State Energy Code criteria cannot be less stringent than the 2006 State Energy Code.

However, the public review draft for the 2009 State Energy Code would reduce stringency for walls in the coldest part of the State by raising the target value for the Target UA trade-off calculations to U-0.056 (the same as for walls in the warmest part of the State). This does not make sense for a number of reasons and goes against the Washington State Legislature's guidance:

1. The proposed U-0.056 would allow a 25% higher heat loss through the opaque wall area in the baseline in Climate Zone 2 than the U-0.044 in the current 2006 State Energy Code. In a time of concern about the impacts of energy consumption and increasing interest in energy-efficiency

due to benefits to the local and State economy, it is illogical for the opaque wall criteria to be going in the opposite direction by allowing a 25% increase in heat loss.

2. Climate Zone 2 (Eastern Washington) is colder than Climate Zone 1 (Western Washington). Heating degree days (HDD) are commonly used as a means to indicate the severity of a climate. Looking at the two largest cities in each climate zone: Seattle in Climate Zone 1 has approximately 4800 HDD, while Spokane in Climate Zone 2 has approximately 6800 HDD, roughly 1-1/2 times as many. Even without this quantification, everyone understands that the Spokane climate is more severe. Consequently, starting with the first comprehensive Energy Code in 1980, every State Energy Code has had multiple climate zones for Washington State with different building envelope requirements

3. The Washington State Legislature has provided direction on climate differences. The 1990 legislation mentioned above (SHB 2198) also states "The Washington state energy code shall take into account regional climatic conditions" and specifically divided Washington State into two climate zones. SB 5854 passed by the Washington State Legislature in 2009 retained this section of the RCW without modifications. Consequently, the Council should honor these climate distinctions and not provide the same criteria for all components of the building envelope.

4. The IECC has multiple climate zones for Washington State. Of the eight total climate zones, the IECC assigns different counties in Washington State to climate zones 4, 5, and 6. As the Council has expressed interest in using the IECC as the format for a future State Energy Code, it would make more sense for the Council to be moving towards multiple climate zones, rather than shifting to one climate zone for all single-family residential buildings.

5. By making the target values for walls in the coldest part of the State the same as the target value for walls in the warmest part of the State, the result is that the target values for the entire building envelope (not only the walls) for trade-offs are identical for both Climate Zone 1 and Climate Zone 2. In effect, this makes all of Washington into a single climate zone for single-family residential buildings. This is inconsistent with the past practice noted in #2, the Washington State Legislature's guidance noted in #3, and the Council's future intent noted in #4.

Table 6-1

Proposal: revise the Prescriptive compliance option as follows either:
(#1) to eliminate the unlimited glazing option; or
(#2) to make the glazing criteria in the unlimited glazing option as stringent as it was in the 1997 Washington State Energy Code,

#1: revise glazing area in Options I and II to match the 2006 State Energy Code, replace unlimited with 25% for Option III.

TABLE 6-1
PRESCRIPTIVE REQUIREMENTS[0,1] FOR SINGLE-FAMILY RESIDENTIAL CLIMATE ZONE 1 AND 2

Option	Glazing Area[10]: % of Floor	Glazing U-Factor		Door[9] U-Factor	Ceiling[2]	Vaulted Ceiling[3]	Wall[12] Above Grade	Wall int[4] Below Grade	Wall ext[4] Below Grade	Floor[5]	Slab[6] on Grade
		Vertical	Overhead[11]								
I.	~~13%~~ 10%	0.34	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
II.*	~~25%~~ 15%	0.32	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
III.	~~Unlimited~~ 25%	0.30	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'

#2: revise glazing area in Options I and II to match the 2006 State Energy Code, replace unlimited with 25% for Option III, and add Option IV with unlimited glazing area and U-factor as stringent as it was in the 1997 Washington State Energy Code.

TABLE 6-1
PRESCRIPTIVE REQUIREMENTS[0,1] FOR SINGLE-FAMILY RESIDENTIAL CLIMATE ZONE 1 AND 2

Option	Glazing Area[10]: % of Floor	Glazing U-Factor		Door[9] U-Factor	Ceiling[2]	Vaulted Ceiling[3]	Wall[12] Above Grade	Wall int[4] Below Grade	Wall ext[4] Below Grade	Floor[5]	Slab[6] on Grade
		Vertical	Overhead[11]								
I.	~~13%~~ 10%	0.34	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
II.*	~~25%~~ 15%	0.32	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
III.	~~Unlimited~~ 25%	0.30	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
IV.	Unlimited	0.25	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'

(no changes to remainder of table)

Rationale: The energy impacts of the huge differences in glazing area between the proposed Options I, II, and III in the public review draft for the 2009 State Energy Code are not compensated for by the very minor differences in the proposed glazing U-factor and need to be rectified. For example, proposed Option I would allow a 13% glazing area, while proposed Option II would allow a 25% glazing area, nearly double. Yet, the improvement in glazing U-factor is only from U-0.34 to U-0.32, a mere 1/16th improvement. Similarly, proposed Option III would allow an unlimited (100%) glazing area, yet the improvement in glazing U-factor is only from U-0.32 to U-0.30, again a mere 1/16th step.

#1 would take a step to address these disparities: by modifying the proposed Options I and II in the public review draft for the 2009 State Energy Code to use the same glazing area percentages for Options I (10%) and II (15%) as exist now in the 2006 State Energy Code; and by modifying the proposed Option III in the public review draft for the 2009 State Energy Code to use a 25% glazing area percentage. While this still does not achieve energy equivalence between all the options, it does bring them closer to energy parity.

#2 would take the same steps as #1 to address these disparities. However, #2 would add a new Option IV allowing an unlimited glazing area at a glazing U-factor of U-0.25. This U-0.25 is the same glazing U-factor as contained in the unlimited glazing area option in the 1997 State Energy Code. Certainly, the 2009 State Energy Code should contain glazing criteria at least as stringent as the State Energy Code from 1997, one dozen years ago.

In addition, note that Option II is the reference case, which is mentioned in Chapter 1 in relation to existing buildings. The glazing area of the reference case has always been set at 15% of the floor area in previous State Energy Codes. The public review draft for the 2009 State Energy Code would change the reference case for the first time to a 25% glazing area. It is not clear whether this impact was considered when the glazing area in proposed Option II was changed. However, this would result in a reduction in stringency for existing buildings. This is another reason why the glazing area in Option II in the public review draft for the 2009 State Energy Code should be revised to match the 15% glazing area that now exists in the 2006 State Energy Code. Also, as noted above, just this year in 2009, the Washington State Legislature passed SB 5854. SB 5854 specifies that the baseline "for residential buildings shall be the 2006 edition of the Washington state energy code". Consequently, the State Energy Code criteria cannot be less stringent than the 2006 State Energy Code.

Table 6-1

Proposal: revise footnote 4 as follows for consistency with the 2006 State Energy Code,

4. Below grade walls shall be insulated either on the exterior to a minimum level of ~~R-5~~ R-10 in Climate Zone 1 and R-12 in Climate Zone 2, continuous or on the interior ~~as a framed wall~~ to the same level as walls above grade. Exterior insulation installed on below grade walls shall be a water resistant material, manufactured for its intended use, and installed according to the manufacturer's specifications. See Section 602.2.

Rationale: In 1990, nineteen years ago, the Washington State Legislature passed Substitute House Bill (SHB) 2198 (the vote being 91-3 in the House) directing the Council to adopt an updated Energy Code, specifying that "Below grade walls, … if insulated on the exterior side, to a level of R-10 in zone 1 and R-12 in zone 2 (R value includes insulation only);" This provision was incorporated into the 1991 Washington State Energy Code, and has been in every State Energy Code since then. Just this year in 2009, the Washington State Legislature passed SB 5854. SB 5854 specifies that the baseline "for residential buildings shall be the 2006 edition of the Washington state energy code". Consequently, the State Energy Code criteria cannot be less stringent than the 2006 State Energy Code.

However, the public review draft for the 2009 State Energy Code would reduce the insulation requirements for below-grade walls to R-5 if insulated on the exterior. This does not make sense for a number of reasons and goes against the Washington State Legislature's guidance:

1. The proposed R-5 insulation for below-grade walls insulated on the exterior is one-half or less of the minimum R-10 required in Climate Zone 1 and minimum R-12 required in Climate Zone 2

in the current 2006 State Energy Code. In a time of concern about the impacts of energy consumption and increasing interest in energy-efficiency due to benefits to the local and State economy, it is illogical for the criteria for below-grade walls insulated on the exterior to be going in the opposite direction by cutting the insulation requirements in half.

2. There should be separate building envelope criteria for Climate Zone 1 and Climate Zone 2. Eastern Washington is colder than Western Washington, the Washington State Legislature in SHB 2198 specified that the State Energy Code was to take into account regional climatic conditions, and the IECC has multiple climate zones. For more detailed discussion of these points, see items 2, 3, and 4 under the rationale for modifications recommended for Table 5-1.

Table 6-2

Proposal: reinstate Table 6-2 including footnotes from the 2006 State Energy Code, modified to incorporate changes to ceiling and vaulted ceiling insulation to bring these requirements up to the level in proposed Table 6-1, and to incorporate a small improvement in glazing U-factor in recognition of the more severe weather in Climate Zone 2 (and make necessary editorial changes to text to refer to both Tables 6-1 and 6-2),

TABLE 6-1
PRESCRIPTIVE REQUIREMENTS[0,1] FOR SINGLE-FAMILY RESIDENTIAL
CLIMATE ZONE 1 ~~AND 2~~

(no changes to remainder of table)

TABLE 6-2
PRESCRIPTIVE REQUIREMENTS[0,1] FOR SINGLE-FAMILY RESIDENTIAL
CLIMATE ZONE 2

Option	Glazing Area[10]: % of Floor	Glazing U-Factor		Door[9] U-Factor	Ceiling[2]	Vaulted Ceiling[3]	Wall[12] Above Grade	Wall int[4] Below Grade	Wall ext[4] Below Grade	Floor[5]	Slab[6] on Grade
		Vertical	Overhead[11]								
I.	12%	0.32	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-12	R-30	R-10 2'
II.*	15%	0.32	0.50	0.20	R-49 or R-38 adv	R-38	R-19 + R-5[8]	R-21 TB	R-12	R-30	R-10 2'
III.	17%	0.30	0.50	0.20	R-49 or R-38 adv	R-38	R-19 + R-5[8]	R-21 TB	R-12	R-30	R-10 2'
IV.	Unlimited	0.25	0.50	0.20	R-49 or R-38 adv	R-38	R-19 + R-5[8]	R-21 TB	R-12	R-30	R-10 2'

* Reference Case

0. Nominal R-values are for wood frame assemblies only or assemblies built in accordance with Section 601.1.

1. Minimum requirements for each option listed. For example, if a proposed design has a glazing ratio to the conditioned floor area of 13%, it shall comply with all of the requirements of the 15% glazing option (or higher). Proposed designs which cannot meet the specific requirements of a listed option above may calculate compliance by Chapters 4 or 5 of this Code.

2. Requirement applies to all ceilings except single rafter or joist vaulted ceilings complying with note 3. 'Adv' denotes Advanced Framed Ceiling.

3. Requirement applicable only to single rafter or joist vaulted ceilings.

4. Below grade walls shall be insulated either on the exterior to a minimum level of R-12, continuous or on the interior to the same level as walls above grade. Exterior insulation installed on below grade walls shall be a water resistant material, manufactured for its intended use, and installed according to the manufacturer's specifications. See Section 602.2.

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5. Floors over crawl spaces or exposed to ambient air conditions.
6. Required slab perimeter insulation shall be a water resistant material, manufactured for its intended use, and installed according to manufacturer's specifications. See Section 602.4. For slabs inside a foundation wall, the insulation shall be installed to provide a thermal break between the slab edge and the foundation. Monolithic slabs shall include insulation, installed outside the foundation wall, and shall extend downward from the top of the slab for a minimum distance of 24 inches or downward and then horizontally for a minimum combined distance of 24 inches. Monolithic slabs shall also include R-10 insulation under the non-load bearing portions of the slab.
7. Int. denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.
8. This wall insulation requirement denotes R-19 wall cavity insulation plus R-5 foam sheathing.
9. Doors, including all fire doors, shall be assigned default U-factors from Table 10-6C.
10. Where a maximum glazing area is listed, the total glazing area (combined vertical plus overhead) as a percent of gross conditioned floor area shall be less than or equal to that value. Overhead glazing with U-factor of U = 0.35 or less is not included in glazing area limitations.
11. Overhead glazing shall have U-factors determined in accordance with NFRC 100 or as specified in Section 502.1.5.
12. Log and solid timber walls with a minimum average thickness of 3.5" are exempt from this insulation requirement.

(Note: While all of Table 6-2 and footnotes is shown as a change because it was not included in the public review draft for the 2009 State Energy Code, most of this language exists in the 2006 State Energy Code, other than the modifications summarized above under "Proposal".)

Rationale: In 1990, nineteen years ago, the Washington State Legislature passed Substitute House Bill (SHB) 2198 (the vote being 91-3 in the House) directing the Council to adopt an updated Energy Code, specifying that "The Washington state energy code shall take into account regional climatic conditions" and specifically divided Washington State into two climate zones.

In addition, SHB 2198 specified that "The Washington state energy code for residential buildings shall require:… in zone 2 walls insulated to a level of R-24 (R value includes insulation only)…" for residential buildings with electric resistance space heat. This R-24 wall insulation requirement (commonly understood to be R-19 cavity insulation plus R-5 foam sheathing) was the counterpart in the Prescriptive compliance option to the U-0.044 wall criteria in the Target UA compliance option mentioned in the comments above related to Table 5-1. These provisions were incorporated into the 1991 Washington State Energy Code, and have been in every State Energy Code since then. In 2006, the Council simplified the Energy Code by eliminating the building envelope distinctions based on space heating energy type and established R-19 + R-5 insulation as the reference case for opaque walls for all residential buildings in zone 2. Just this year in 2009, the Washington State Legislature passed SB 5854. SB 5854 specifies that the baseline "for residential buildings shall be the 2006 edition of the Washington state energy code". Consequently, the State Energy Code criteria cannot be less stringent than the 2006 State Energy Code.

However, the public review draft for the 2009 State Energy Code would reduce stringency for walls in the coldest part of the State by reducing the wall requirements for the reference case to R-21 insulation with intermediate framing (the same as for walls in the warmest part of the State). Further, the public review draft for the 2009 State Energy Code would allow up to a 25% glazing area with U-0.32 glazing, whereas the 2006 State Energy Code only allows up to 17% glazing area with U-0.32 glazing for Climate Zone 2. This does not make sense for a number of reasons and goes against the Washington State Legislature's guidance:

1. The proposed R-21 insulation with intermediate framing (U-0.056) would allow a 25% higher heat loss through the opaque wall area in the reference case in Climate Zone 2 than the R-19 + R-5 insulation (U-0.044) in the current 2006 State Energy Code. In a time of concern about the impacts of energy consumption and increasing interest in energy-efficiency due to benefits to the

local and State economy, it is illogical for the opaque wall criteria to be going in the opposite direction by allowing a 25% increase in heat loss.

In addition, the proposed 25% glazing area for U-0.32 glazing would allow a 50% higher heat loss through the glazing than would take place with the 17% glazing area for U-0.32 glazing in the current 2006 State Energy Code. As noted above, the State Energy Code criteria cannot be less stringent than the 2006 State Energy Code. Both of these problems arise from the proposal to shift to one climate zone for all single-family residential buildings.

2. Climate Zone 2 (Eastern Washington) is colder than Climate Zone 1 (Western Washington). Heating degree days (HDD) are commonly used as a means to indicate the severity of a climate. Looking at the two largest cities in each climate zone: Seattle in Climate Zone 1 has approximately 4800 HDD, while Spokane in Climate Zone 2 has approximately 6800 HDD, roughly 1-1/2 times as many. Even without this quantification, everyone understands that the Spokane climate is more severe. Consequently, starting with the first comprehensive Energy Code in 1980, every State Energy Code has had multiple climate zones for Washington State with different building envelope requirements

3. The Washington State Legislature has provided direction on climate differences. The 1990 legislation mentioned above (SHB 2198) also states "The Washington state energy code shall take into account regional climatic conditions" and specifically divided Washington State into two climate zones. SB 5854 passed by the Washington State Legislature in 2009 retained this section of the RCW without modifications. Consequently, the Council should honor these climate distinctions and not provide the same criteria for all components of the building envelope.

4. The IECC has multiple climate zones for Washington State. Of the eight total climate zones, the IECC assigns different counties in Washington State to climate zones 4, 5, and 6. As the Council has expressed interest in using the IECC as the format for a future State Energy Code, it would make more sense for the Council to be moving towards multiple climate zones, rather than shifting to one climate zone for all single-family residential buildings.

5. By making the Prescriptive wall insulation R-values and the glazing U-factors in the coldest part of the State the same as the wall insulation R-values and the glazing U-factors in the warmest part of the State, the result is that the insulation R-values and glazing U-factors for the entire building envelope (not only the opaque walls and glazing) for the Prescriptive option are identical for both Climate Zone 1 and Climate Zone 2. In effect, this makes all of Washington into a single climate zone for single-family residential buildings. This is inconsistent with the past practice noted in #2, the Washington State Legislature's guidance noted in #3, and the Council's future intent noted in #4.

Table 10-6B:
Proposal: revise as follows to use "spacer" terminology from the 2006 State Energy Code, and to provide explanation of the term, clarify use of "deemed to comply" glazing,

Vertical Glazing Description			
Panes	**Low-e[1]**	**Spacer**	**Fill**
Double[3]	A	Any	Argon
	B	Any	Argon
	C	Any	Argon
	C	~~High Performance~~ Low conductance[6]	Argon

…
5. The "~~D~~deemed to comply" glazing option is for prescriptive compliance only, and shall not be used for performance compliance.
6. Low-conductance means a non-aluminum spacer. Acceptable spacer materials may include but is not limited to fiberglass, wood and butyl or other material with an equivalent thermal performance.

(no changes to remainder of table)

Rationale: "Low-conductance" is the term previously used in footnote 1 to the Table 10-6B in the 2006 State Energy Code. Footnote 6 being added here for the 2009 State Energy Code simply carries over the existing explanation. "Low-conductance" is a more-appropriate term than "high-performance" as it conveys the thermal properties that are important in this situation.

Footnote 5 is editorially revised to state what the "deemed to comply" glazing option is intended to be used for.

Section 1201
Proposal: revise as follows to require totalizing meter for entire building,

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

~~EXCEPTIONS: 1. Group R occupancies.~~
~~2. Tenant spaces with utility-provided meters.~~

Rationale: To have effective energy management, it is necessary to know what the total energy consumption is on the site. Exemptions defeat the purpose.

Table 12-2
Proposal: revise as follows to clarify that lighting threshold is for the entire building,

TABLE 12-2
Component Energy Master Submetering Thresholds

Component Submetering	**Threshold**
…	
Total ~~G~~general area lighting ~~circuits~~	> 15 kVA

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(no changes to remainder of table)

Rationale: To have effective energy management, it is necessary to know what the total energy consumption is on the site. Exemptions defeat the purpose.

Table 13-1
Proposal: revise as follows so that the insulation R-value requirements for mass walls in nonresidential buildings are no less stringent than the 2009 IECC,

TABLE 13-1
BUILDING ENVELOPE REQUIREMENTS FOR CLIMATE ZONE 1

	Nonresidential		**Residential, Other than Single-Family**	
Opaque Elements	**Assembly Max. U-factor**	**Insulation Min. R-Value**	**Assembly Max. U-factor**	**Insulation Min. R-Value**
…				
Walls, Above Grade				
Mass	U-0.090	~~R-10~~ R-11.4 c.i.		
Metal building	U-0.064	R-13 + R-7.5 c.i.		
Steel framed	U-0.064	R-13 + R-7.5 c.i.		
Wood framed and other	U-0.057	R-21		
…				

(no changes to remainder of table)

Rationale: As can be seen in Table 13-1 from the public review draft for the 2009 State Energy Code, the proposed minimum insulation requirement for mass walls is significantly less stringent than that for other wall types. The proposed mass wall requirements in the public review draft for the 2009 State Energy Code do not even comply with the 2009 IEEC. Table 502.2(1) of the 2009 IECC specifies R-11.4 continuous insulation (c.i.) for mass walls.

It is important that there be more of a parity between insulation requirements for different wall types. As the Council has expressed interest in using the IECC as the format for a future State Energy Code, there is no reason that the 2009 State Energy Code requirements should be any less stringent than the requirements in the 2009 IECC.

Table 13-1
Proposal: revise as follows so wood frame wall requirements for multifamily residential buildings are no less stringent than the 2009 IECC,

TABLE 13-1
BUILDING ENVELOPE REQUIREMENTS FOR CLIMATE ZONE 1

	Nonresidential		Residential, Other than Single-Family	
Opaque Elements	**Assembly Max. U-factor**	**Insulation Min. R-Value**	**Assembly Max. U-factor**	**Insulation Min. R-Value**
…				
Walls, Above Grade				
Mass			U-0.057	R-16 c.i.
Metal building			U-0.057	R-19 + R-8.5 c.i.
Steel framed			U-0.057	R-19 + R-8.5 c.i.
Wood framed and other			~~U-0.057~~ U-0.051	~~R-13 + R-6 c.i.~~ R-13 + R-7.5 c.i. OR R-21 + R-2.5 c.i.
…				

(no changes to remainder of table)

Rationale: The proposed wood frame wall requirements for residential buildings in the public review draft for the 2009 State Energy Code do not even comply with the 2009 IEEC. Table 502.1.2 of the 2009 IECC specifies U-0.051 maximum for the overall assembly for wood frame walls in Group R occupancy. The equivalent insulation R-value is R-13 cavity insulation + R-7.5 continuous insulation (c.i.).

As the Council has expressed interest in using the IECC as the format for a future State Energy Code, there is no reason that the 2009 State Energy Code requirements should be any less stringent than the requirements in the 2009 IECC.

In addition, note that the public review draft for the 2009 State Energy Code contains no proposed increases in stringency for the U-factors for either the opaque wall or for metal frame windows for multifamily residential buildings. (This is in contrast to single-family residential buildings and nonresidential buildings where there are proposed increases in stringency for the U-factors for opaque walls and for windows.) As the gross wall area (opaque wall plus window area) is usually the largest portion of the building envelope for multistory buildings, it is important that energy-efficiency improvements not be missed in these areas, again especially when it is a matter of simply stepping up to the criteria in the 2009 IECC.

Section 1311.5
Proposal: revise as follows to correspond with changes to Section 502.1.4.8,

"**1311.5 Slab-On-Grade Floor:** Slab-on-grade insulation ~~installed~~ shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab 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

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inches. ~~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. A 2-inch by 2-inch (maximum) nailer may be placed at the finished floor elevation for attachment of interior finish materials.

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

Rationale: The improved language for Section 502.1.4.8 (residential) should also be inserted here in the companion section for nonresidential.

Section 1322

Proposal: revise as follows to delete Exception 2,

"**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….

EXCEPTION~~S~~: ~~1.~~ Opaque smoke vents are not required to meet insulation requirements.

~~2. For prescriptive compliance only, for glazing areas that are 30% and less of the gross wall area, the insulation of the perimeter edge of an above grade floor slab which penetrates the exterior wall may be reduced to R-5 provided the glazing U-factor is reduced to U-0.05 below that required in Tables 13-1 and 13-2.~~

Rationale: This exception should be deleted for several reasons.

1. The exception is a loophole. If one has an almost entirely opaque building, such as a multiplex theater or mini-storage warehouse, this exception would allow the insulation to be reduced for all the edges of the intermediate floor slabs simply by installing a single, tiny window with a better-than-average U-factor. This would not achieve comparable energy-efficiency and should not be allowed.

2. The Prescriptive compliance criteria are straightforward. Target UA calculations can be done where the design does not comply with the Prescriptive criteria.

Section 1323

Proposal: revise new exception 3 as follows to add further explanation from Std. 90.1-2007,

"**1323.3 Solar Heat Gain Coefficient:** The area-weighted average solar heat gain coefficient of all glazing shall not be greater than that specified in Tables 13-1 or 13-2 for the appropriate area and U-factor.

EXCEPTIONS: …

3. For demonstrating compliance for vertical 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 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.

Rationale: The additional language explains how to treat louvered or glazed overhangs.

Section 1412.4.1

Proposal: revise to address assembly occupancies and use thresholds consistent with the IBC,

"**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.

Group A occupancies, ~~C~~classrooms, gyms, auditoriums and conference rooms larger than ~~500~~ 750 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."

Rationale: Group A (assembly) occupancies have the types of uses that would benefit from this control of outside air dampers when spaces are unoccupied. The IBC uses a 750 square foot threshold for determining when a room used for assembly purposes is actually considered Group B occupancy.

Section 1412.5

Proposal: revise for consistency with proposed changes to Section 503.8.3.5,

"**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.

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Rationale: Provide the same control requirements.

Section 1413.1

Proposal: revise as follows to clarify terminology,

"**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.…"

Rationale: The term "design supply air" is used but not explained. The explanation here is taken from the User's Manual for ANSI/ASHRAE/IESNA Standard 90.1-2007 (p. 6-67).

Section 1414.1

Proposal: revise as follows to clarify terminology,

"**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 columns. All other duct work shall be considered low-pressure."

Rationale: The duct sealing and test requirements in the subsections to 1414.1 vary by whether the duct work is low pressure or high pressure. The terms are defined in the main section to clarify the intent. The breakpoint of 3-inches is taken from the text in 1414.1.3.

Section 1414.1.3

Proposal: revise as follows to specify testing for all sections of high-pressure duct work, or specify criteria for selecting representative sections,

"**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 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."

OR

"**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 shall be leak-tested in accordance with SMACNA Duct Leakage Test Procedures - 1985. Representative sections with a representative assortment of straight sections and elbows 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."

Rationale: As duct leakage is a significant cause of heating and cooling energy loss, all sections of high-pressure ductwork should be tested. If only a portion is to be tested, the basis for selecting that portion should be specified.

Section 1416.4
Proposal: revise Commissioning Compliance Form as follows to add the date by which deficiencies will be corrected,

FIGURE 14B
COMMISSIONING COMPLIANCE CHECKLIST

Certification	I hereby certify that all requirements for commissioning have been completed in accordance with the Washington State Energy Code, including all items above, and that the deficiencies will be corrected by the date shown in the report. Building Owner or Owner's Representative Date:

(no changes to remainder of form)

Rationale: It is important that deficiencies be corrected so that the building is capable of being operated in an energy-efficient manner.

Section 1432.4
Proposal: revise as follows to specify when DDC systems are required,

"**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 exceed~~ing~~ 780,000 Btu/hr (2,662 kW) and shall have the following capability…"
(no changes to remainder of section)

Rationale: This provides a requirement which is clearer to designers, plan reviewers, and inspectors.

Section 1433
Proposal: revise as follows to parallel insertion of new Exception 10 for VRF systems,

"**Section 1433 Economizers**…

Exception 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. For VRF systems, the capacity is based on the outside unit size."

Rationale: Now that there is a new Exception 10 specifically added for VRF systems, VRF systems should generally use the criteria in Exception 10. Exception 8 should only be used for very small systems.

Section 1433
Proposal: revise as follows to clarify that the reference is to air economizers,

"**Section 1433 Economizers**…

Exception 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."

Rationale: As the intent is that this exception applies to air economizer, the language should clearly state that.

Section 1433

Proposal: revise as follows to clarify application of heat recovery and limits on data centers,

"**Section 1433 Economizers**…

Exception 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) 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."

Rationale: In terms of the text on recovered energy, since the primary benefit of the VRF system is to transfer heat from zones with excess heat to zones that could use heat, it is important that it is clear that the system is to be configured so that all zones have this capability.

The premise of Exception 10 is that the energy savings due to heat recovery from internal zones to provide heating to perimeter zones, and for preheating of outside air, offsets the energy losses by not using outside air for cooling. Exception 10 is in effect, a pre-calculated performance trade-off. However, cooling loads from data centers tend to be significantly larger on a square-foot basis than cooling loads in typical office space, for example. As a result, these data center loads can dwarf the typical balance of heating and cooling loads. With large data centers, then the total cooling loads are much more significant, and so are the benefits of air economizer (due to longer operating hours, and due to more operating hours at night when outside air temperatures are cooler). Consequently, the floor area occupied by data centers in this exception needs to be limited, so that the overall loads represent more typical buildings.

Section 1435

Proposal: revise as follows to clarify that the intent is ground-coupled systems and that the reset requirements in Section 1432.2 are applicable,

"**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.
…"

> **Exception 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."

Rationale: The intent is to address simultaneous heating and cooling when the source is below ground. However, most of these systems do not actually use ground water for cooling, instead they use a recirculating hydronic loop that does not draw water from the ground. A better description would be something to the effect of ground-coupled hydronic loops.

Text is added to Exception 2 so that it is clear that that reset requirements in Section 1432.2 are applicable here in Section 1435.

Section 1436.4

Proposal: revise as follows to clarify heat recovery capacity required,

"**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 ft^2 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."

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

Section 1438

Proposal: revise as follows to clarify that parking garage ventilation fans are included,

"**1438 System criteria.** For fans and pumps 7.5 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:…"
(no changes to remainder of section)

Rationale: While parking garage ventilation fans are within the systems listed, a specific reference would help with clarifying the intent.

Section 1513.3
Proposal: revise as follows to add exceptions for restaurants and residential other than single-family,

"1513.3 Daylight Zone Control:…
EXCEPTIONS: The following are exempt from the requirements for automatic daylighting controls in Section 1513.3, but shall have manual or automatic 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 1513.3.2 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. Residential other than single family.
(no changes to remainder of section)

Rationale: Language needs to be added to clarify that the exemptions are only from the automatic switching requirements. The lighting in daylight zones still needs to be circuited separately from interior zones, consistent with State Energy Code requirements dating back to the first comprehensive State Energy Code in 1980.

Restaurants are similar to retail and should be included in exemption for lighting next to windows.

Now that residential other than single family is included in Chapter 15, an exemption should be added for these particular requirements.

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Section 1521
Proposal: revise as follows to correspond with changes to Section 1531,

"**1521 Prescriptive interior lighting requirements.** Spaces for which the Unit Lighting Power Allowance in Table 15-1A or 15-1B is 0.8 watts per square foot 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~~two- or more lamp); …"
(no changes to remainder of section)

Rationale: The values in the Lighting Power Allowance compliance option in Section 1531 were changed, 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.

Section 1532

Proposal: revise as follows to carryover residential requirements to Chapter 15,

"**1532 Exterior lighting power allowance. …**

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

…

~~j. Group U Occupancy accessory to Group R-3 or R-4 Occupancy.…"~~

(no changes to remainder of section)

Luminaires providing outdoor lighting and permanently mounted to a residential building or to other buildings on the same lot shall be high efficacy luminaires.

EXCEPTIONS: 1. Permanently installed outdoor luminaires that are not high efficacy shall be allowed provided they are controlled by a motion sensor(s) with integral photocontrol photosensor.
2. Permanently installed luminaires in or around swimming pools, water features.

Rationale: The exterior lighting requirements for residential buildings need to be carried over to Chapter 15 from Section 505 now that only single-family residential is included in Chapters 1-10. This will ensure that the 2009 State Energy Code is no less stringent than the 2006 State Energy Code which is specified as the baseline in SB 5854.

Table 15-1A

Proposal: revise as follows to retain warehouse lighting power allowance,

TABLE 15-1A
Unit Lighting Power Allowance (LPA)

Use[1]	**LPA**[2] **(watts/sq. ft.)**
Warehouses	~~0.66~~ 0.50

(no changes to remainder of table)

Rationale: The lighting designs submitted are typically achieving the 0.50 W/ft^2 without using footnote 11. Consequently, the LPA can remain at the 0.50 W/ft^2 in the 2006 State Energy Code.

EDITORIAL COMMENTS

Chapter 2 definitions

"air-impermeable insulation": Add I-P units.

"design cooling conditions" and "design heating conditions": Correct to simply cross-reference to Section 302 where conditions are now specified,

DESIGN COOLING CONDITIONS: ~~The cooling outdoor design temperature from the 0.5% column for summer from the Puget Sound Chapter of ASHRAE publication "Recommended Outdoor Design Temperatures, Washington State, ASHRAE."~~ The temperatures specified in Section 302.

DESIGN HEATING CONDITIONS: ~~The heating outdoor design temperature from the 0.6% column for winter from the Puget Sound Chapter of ASHRAE publication "Recommended Outdoor Design Temperatures, Washington State, ASHRAE."~~ The temperatures specified in Section 302.

Table 5-1: Correct by deleting extra table entries,

TABLE 5-1
TARGET COMPONENT VALUES FOR SINGLE-FAMILY RESIDENTIAL

Component	Climate Zone 1	Climate Zone 2
Glazing % Floor Area	15%	15%
Vertical Glazing U-Factor	U = 0.300	U = 0.300
~~Vertical Glazing U-Factor~~	~~U = 0.300~~	~~U = 0.400~~ ~~U = 0.350~~ ~~U = 0.300~~

Table 6-1: Correct typos and insert footnote references for consistency,

TABLE 6-1
PRESCRIPTIVE REQUIREMENTS[0,1] FOR SINGLE-FAMILY RESIDENTIAL
CLIMATE ZONE 1 AND 2

Option	Glazing Area[10]: % of Floor	Glazing U-Factor		Door[9] U-Factor	Ceiling[2]	Vaulted Ceiling[3]	Wall[12] Above Grade	Wall int[4] Below Grade	Wall ext[4] Below Grade	Floor[5]	Slab[6] on Grade
		Vertical	Overhead[11]								
I.	13%	0.34	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
II.*	25%	0.32	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'
III.	Unlimited	0.30	0.50	0.20	R-49 or R-38 adv	R-38	R-21 int[7]	R-21 TB	R-10	R-30	R-10 2'

6. Required slab perimeter insulation shall be a water resistant material, manufactured for its intended use, and installed according to manufacturer's specifications. See Section 602.4. For slabs inside a foundation wall, the insulation shall be installed to provide a thermal break (TB) between the slab edge and the foundation. Monolithic slabs shall include insulation, installed outside the foundation wall, and

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shall extend downward from the top of the slab for a minimum distance of 24 inches or downward and then horizontally for a minimum combined distance of 24 inches. Monolithic slabs shall also include R-10 insulation under the non-load bearing portions of the slab.

Tables 10-6A, 10-6C, 10-6D, and 10-6E: Revise titles for consistency with code change proposal,

TABLE 10-6A
~~GROUP R OCCUPANCY~~ SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR VERTICAL GLAZING

TABLE 10-6C
~~GROUP R OCCUPANCY~~ SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR DOORS

TABLE 10-6D
~~GROUP R OCCUPANCY~~ SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR GLAZED DOORS
(See Table 10-6C)

TABLE 10-6E
~~GROUP R OCCUPANCY~~ SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR OVERHEAD GLAZING

Table 10-6C: Revise title of third portion of the table to be more generic,

TABLE 10-6C
SINGLE-FAMILY RESIDENTIAL:
DEFAULT U-FACTORS FOR DOORS

DOUBLE-SKIN STEEL ~~EMERGENCY EXIT~~ SWINGING DOORS *(third portion)*

Section 1100: Revise for editorial consistency with changes to Section 101.3 and to correspond with defined term in Chapter 2,

"Chapters 11 through 20 of this Code shall be known as the "Washington State Nonresidential and Multifamily Energy Code" and may be cited as such…"

Section 1120: Revise for editorial consistency with changes to Section 101.3,

"This Code sets forth minimum requirements for the design and commissioning of new or altered buildings and structures or portions thereof that provide facilities or shelter for public assembly, educational, business, mercantile, institutional, storage, factory, and industrial occupancies, and other non-IRC occupancies…"

Section 1331: Revise for editorial consistency with changes to Section 101.3,

"…

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~~ residential occupancies other than single-family."

Tables 13-1 & 13-2: correct the title in the column headings,

	Nonresidential		**Residential, Other than Single-Family**	
Opaque Elements	**Assembly Max. U-factor**	**Insulation Min. R-Value**	**Assembly Max. U-factor**	**Insulation Min. R-Value**
…				

Tables 13-1 & 13-2:
(1) delete references to Sections 1323.4 & 1323.5 since these proposals were not adopted;
(2) combine SHGC cells as shown below so that the SHGC options apply to all U-factor options for both vertical fenestration and for skylights (as published, it appears that there are separate SHGC options for each U-factor criteria and that some fenestration has no SHGC criteria),

	Nonresidential		**Residential, Other than Single-Family**	
Fenestration 0-40% of Wall	**Assembly Max. U-factor**	**Assembly Max. SHGC**	**Assembly Max. U-factor**	**Assembly Max. SHGC**
Vertical Fenestration		~~(See sections 1323.4 and 1323.5)~~		~~(See sections 1323.4 and 1323.5)~~
Nonmetal framing: All	U-0.32	SHGC-0.40 all, OR SHGC-0.45 all PLUS permanent PF > 0.50 on west, south, and east	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-0.50	SHGC-0.35 all	U-0.50	SHGC-0.35 all
With curb (i.e., individual unit skylights)	U-0.60		U-0.60	

Table 13-3: Add temperature ranges to table for ease of use,

SPACE	**SURFACE**	**MINIMUM R-VALUE**
Frozen Storage Spaces (28-45< °F)	Exterior Roof/Ceiling	R-36
	Exterior Wall	R-36
	Exterior Floor	R-36
	Interior Partition[1]	R-28
Cold Storage Spaces (<28 °F)	Exterior Roof/Ceiling	R-28
	Exterior Wall	R-28
	Interior Partition[1]	R-19

Section 1421: Change "must" to "shall",
"**1421 System type.** To qualify as a simple system, systems ~~must~~ shall have no active…"

Section 1421.1: Insert verbs,
"**1421.1 System Sizing Limits:** Installed space heating equipment output ~~that does~~ shall not exceed 10 Btu/h per square foot of gross conditioned floor area and installed space cooling equipment output ~~that does~~ shall not exceed 15 Btu/h per square foot of gross conditioned floor area. No additional safety factor is allowed."

Section 1432.1: Limit reference to previous (but renamed) table so as to maintain current intent,
"**1432.1 Setback and Shutoff:** Systems that serve zones with different uses, as defined in Table 15-1A ~~or Table 15-1B~~.
1. Shall be served by separate systems, or
2. Shall include isolation devices and controls to shut off or set back the supply of heating and cooling to each zone independently."

Section 1439.1: Delete unnecessary word,
"**1439.1 Kitchen Hoods.** Each kitchen ~~area~~ with total exhaust…"

Table 14-1A: Verify whether IPLV for the last two entries in the table should become IEER.

Table 14-1C: Verify whether IPLV for the column headings in the table should become NPLV.

Section 1513.3: Correct section reference in Exception 4,
"**Exception 4.** The following spaces are exempt from the requirements for automatic daylighting controls in Section 1513.3~~.2~~ provided that they have occupancy sensor …"

Section 1513.7: Delete redundant language already moved to Section 1412.4,
"**1513.7 Lighting Controls:** Hotel and motel guest rooms and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles. In addition, a minimum of one of the following control technologies shall be required in hotel/motel guest rooms with over 50 guest rooms such that all the power to the lights and switched outlets in a hotel or motel guest room would be turned off when the occupant is not in the room ~~and the space temperature would automatically setback (winter) or set up (summer) by no less than 3 C (5°F)~~:…"

Table 15-1B: Delete extra decimal point for LPA for performing arts,
"For performing arts theater 2. ~~.~~01"

RS-29, Section 1.2: Update to correspond with new sections in Chapters 12-15,
"**1.2 Performance Rating.** This performance rating method requires conformance with the following provisions:
All requirements of Sections 1201-1202, Sections 1310 through 1314, 1410 through 1416, 1440 through ~~1443~~1446, 1450 through ~~1454~~ 1455, 1460 through 1465, 1510 through 1514, ~~and~~ 1540, and 1550 are met. These sections contain the mandatory provisions of the standard and are prerequisites for this rating method..."