ORDINANCE No. 119081

COUNCIL BILL No. 112230

Law Department

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ORDINANCE _____

AN ORDINANCE relating to energy-efficiency and energy conservation: amending Section 22.700.010 Seattle Municipal Code ("SMC") to adopt by reference the 1997 Washington State Energy Code (WAC 51-11) and to repeal the 1994 Washington State Energy Code and amendments thereto; amending 1997 Washington State Energy Code Sections 1132.3, 1144, 1150, 1161, 1162, 1310.2, 1311.6, 1323, 1402, 1411.2, 1412.4, 1412.6, 1414.2, 1421, 1432.2, 1436, 1438, 1513.6, 1521, 1530, and Tables 13-1, 15-1, and 20-6; and adding to the 1997 Washington State Energy Code new Sections 1144.1, 1144.2, 1144.3, 1144.4, 1144.5, 1144.6, 1144.7, 1411.5, 1412.8, 1416, 1421.1, 1431.2, 1438.1, 1452, and 1513.7.

Honorable President:

Your Committee on

to which was referred the within Coun
report that we have considered the sa

COMPTROLLER FILE No.

Introduced: JUN 29 1998	By: DRAGO
Referred: JUN 29 1998	To: Business, Economic & Community Development Committee
Referred:	To:
Reported: 7-13-98	Second Reading:
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Passed over Veto:	Veto Sustained:

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Department

The City of Seattle--Legislative Department

REPORT OF COMMITTEE

Date Reported and Adopted

ible President:

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h was referred the within Council Bill No.

that we have considered the same and respectfully recommend that the same:

Recommend Approval 5-0

3-98 For Council Action: Passed 9-0

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Committee Chair

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ORDINANCE 119081

AN ORDINANCE relating to energy-efficiency and energy conservation: amending Section 22.700.010 Seattle Municipal Code ("SMC") to adopt by reference the 1997 Washington State Energy Code (WAC 51-11) and to repeal the 1994 Washington State Energy Code and amendments thereto; amending 1997 Washington State Energy Code Sections 1132.3, 1144, 1150, 1161, 1162, 1310.2, 1311.6, 1323, 1402, 1411.2, 1412.4, 1412.6, 1414.2, 1421, 1432.2, 1436, 1438, 1513.6, 1521, 1530, and Tables 13-1, 15-1, and 20-6; and adding to the 1997 Washington State Energy Code new Sections 1144.1, 1144.2, 1144.3, 1144.4, 1144.5, 1144.6, 1144.7, 1411.5, 1412.8, 1416, 1421.1, 1431.2, 1438.1, 1452, and 1513.7.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.700.010, SMC, as last amended by Ordinance 117698 is further amended as follows:

22.700.010 Adoption of the ((~~1994~~)) 1997 Washington State Energy Code and local amendments.

The ((~~1994~~)) 1997 Washington State Energy Code (WAC 51-11) and the amendments thereto adopted by Ordinance ((~~117698~~)) 119081 incorporating the Seattle Amendments, copies and amendments made by the Washington State Building Code Council to the ((~~1994~~)) 1997 Washington State Energy Code filed ((~~December 21, 1994 (WSR 95-01-126)~~)) January 8, 1998 (WSR 98-03-003), copies of which are filed with the City Clerk in C.F. ((~~300684~~)) 302729, are hereby adopted and by this reference made a part of this subtitle and shall constitute the official Energy Code of the City. The ~~Model~~ 1994 Washington State Energy Code, ((~~1989 Edition~~)) and amendments thereto, are hereby repealed.

Section 2. Section 1132.3 of the 1997 Washington State Energy Code is amended as follows:

1132.3 Lighting and Motors: Tenant improvements, alterations or repairs where 60% or more of the fixtures are new shall comply with Sections 1531 and 1532. Where less than 60% of the fixtures are new, the installed lighting wattage shall be maintained or reduced. Where 60% or more of the lighting fixtures in a suspended ceiling are new, and the existing insulation is on the suspended ceiling, the roof/ceiling assembly shall be insulated according to the provisions of Chapter 13, Section 1311.2.

Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections 1513.1 through 1513.5. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall comply with Section 1513.6.

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

Section 3. Section 1144 of the 1997 Washington State Energy Code is amended as follows:

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

Section 4. The 1997 Washington State Energy Code is amended by adding new Sections 1144.1, 1144.2, 1144.3, 1144.4, 1144.5, 1144.6, and 1144.7 to read as follows:

1144.1 Violations. It shall be a violation of this code for any person, firm or corporation to erect, construct, enlarge, repair, move, improve, remove, convert, demolish, equip, occupy, inspect or maintain any building or structure in the City, contrary to or in violation of any of the provisions of this code.

It shall be a violation of this code for any person, firm or corporation to knowingly aid, abet, counsel, encourage, hire, commend, induce or otherwise procure another to violate or fail to comply with this code.

It shall be a violation of this code for any person, firm or corporation to use any material or to install any device, appliance or equipment which does not comply with applicable standards of this code or which has not been approved by the building official.

1144.2. Notice of Violation. If after investigation the building official determines that standards or requirements of this code have been violated, the building official may serve a notice of violation upon the owner or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance. The notice shall be served upon the owner or other responsible person by personal service, certified mail with return receipt requested or registered mail with return receipt requested or registered mail addressed to the last known address of such person. In addition, a copy of the notice may be posted at a conspicuous place on the property. The notice of violation shall be considered an order of the building official. Nothing in this subsection shall be deemed to limit or preclude any action or proceeding pursuant to Sections 102, 103 or 104 of the Seattle Building Code, and nothing in this section shall be deemed to obligate or require the building official to issue a notice of violation prior to the imposition of civil or criminal penalties in this section.

1144.3 Civil Penalties. Any person, firm or corporation failing to comply with the provisions of this code shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the building official has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

1144.4 Criminal Penalty. Anyone who violates or fails to comply with any order issued by the building official pursuant to this code or who removes, mutilates, destroys or conceals a

notice issued or posted (i.e., affixed to the structure in a conspicuous place) by the building official shall, upon conviction thereof, be punished by a fine of not more than $1,000 or by imprisonment for not more than 360 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

Anyone violating or failing to comply with any of the provisions of this code and who within the past five years has had a judgment against them for civil penalties arising from a violation of the building code, shall upon conviction thereof, be fined in a sum not to exceed $500 or by imprisonment for not more than 180 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

1144.5 Additional Relief. The building official may seek legal or equitable relief to enjoin any acts or practices and abate any condition which constitutes a violation of this code when civil or criminal penalties are inadequate to effect compliance.

1144.6 Notices. It shall be unlawful for any person to remove, mutilate, destroy or conceal any notice issued or posted by the building official pursuant to the provisions of this code, or any notice issued or posted by the building official in response to a natural disaster or other emergency.

The building official may record a copy of any order or notice with the Department of Records and Elections of King County.

The building official may record with the Department of Records and Elections of King County a notification that a permit has expired without a final inspection after reasonable efforts have been made to provide a final inspection.

1144.7 Review By The Director

1144.7.1. Any party affected by a notice of violation issued by the Director pursuant to Section 1144.2 may obtain a review of the notice by requesting such review in writing within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, federal or City holiday, the period shall run until 5:00 p.m. of the next business day. Upon receipt of a request, the Director shall notify the person requesting the review of the date, time and place of the Director's review. The review shall be not less than ten nor more than twenty days after the request is received, unless otherwise agreed by the person requesting the review. Any person affected by the notice of violation may submit any written material to the Director for consideration on or before the date of the review.

1144.7.2 The review will consist of an informal review meeting held at the Department. A representative of the Director who is familiar with the case and the applicable ordinances will attend. The Director's representative shall explain the reasons for the issuance of the notice of violation and will consider any information presented by the persons attending. At or after the review, the Director shall:

1. Sustain the notice of violation; or
2. Withdraw the notice of violation; or
3. Continue the review to a future date; or
4. Amend the notice of violation.

1144.7.3. The Director shall issue an Order of the Director containing the decision within a reasonable time after the completion of the review, and shall cause it to be mailed by regular first-class mail to the person or persons named in the notice of violation.

Section 5. Section 1150 of the 1997 Washington State Energy Code is amended as follows:

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

This Code is intended to supplement the provisions of the Seattle Building Code, the Seattle Mechanical Code, and the Seattle Electrical Code, and in cases of conflict between this Code and any of those codes, the provisions of those codes shall apply.

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

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

Section 6. Section 1161 of the 1997 Washington State Energy Code is amended as follows:

1161 Severability: If any provision of this Code or its application to any person or circumstance is held invalid, the remainder of this Code or the application of the provision to other persons or circumstances is not affected.

The legislative body hereby declares that it would have passed this Code, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, and phrases be declared unconstitutional.

Section 7. Section 1162 of the 1997 Washington State Energy Code is amended as follows:

1162 Liability: Nothing contained in this Code is intended to be nor shall be construed to create or form the basis for any liability on the part of ((~~any city or county~~)) the City or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this Code, or by reason of or in consequence of any inspection, notice, order, certificate, permission of approval authorized or issued or done in connection with the implementation or enforcement of this Code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this Code or by its officers or agents. The building official or any employee charged with the enforcement of this Code, acting in good faith and without malice for the City in the discharge of his/her duties, shall not thereby render himself/herself liable personally and he/she is hereby relieved from all personal liability for any damage that may accrue to

persons or property as a result of any act required or by reason of any act or omission in the discharge of his/her duties.

Section 8. Section 1310.2 of the 1997 Washington State Energy Code is amended as follows:

1310.2 Semi-Heated Spaces: All spaces shall be considered conditioned spaces, and shall comply with the requirements in Section 1310.1 unless they meet the following criteria for semi-heated spaces. The installed heating equipment output, in Climate Zone 1, shall be 3 Btu/(h • ft^2) or greater but not greater than 8 Btu/(h • ft^2) and in Climate Zone 2, shall be 5 Btu/(h • ft^2) or greater but not greater than 12 Btu/(h • ft^2). Heating shall be controlled by a thermostat mounted not lower than the heating unit and capable of preventing heating above 44° space temperature. For semi-heated spaces, the only prescriptive, component performance or systems analysis building envelope requirement shall be that:

Climate Zone 1

a. U-0.10 maximum for the roof assembly.((~~or~~)) Prescriptively this can be achieved by options b, c, or d for totally opaque roofs or option e for roofs with skylights:
b. continuous R-9 insulation installed entirely outside of the roof structure, or
c. R-11 insulation installed inside or within a wood roof structure, or
d. R-19 insulation installed inside or within a metal roof structure, or
e. for roofs with skylights,
   i. maximum skylight area of 2% of the gross roof area and U-1.45 maximum, and
   ii. R-21 minimum insulation (metal roofs to have a minimum 1 inch rigid insulation thermal block between the metal structure and the metal roofing).

Climate Zone 2

a. U=0.07 maximum for the roof assembly, or
b. continuous R-14 insulation installed entirely outside of the roof structure, or
c. R-19 insulation installed inside or within a wood roof structure, or
d. R-25 insulation installed inside or within a metal roof structure.)

Section 9. Section 1311.6 of the 1997 Washington State Energy Code is amended as follows:

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

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

Section 10. Section 1323 of the 1997 Washington State Energy Code is amended as follows:

1323 Glazing: Glazing shall comply with Section 1312 and Tables 13-1 or 13-2. All glazing shall be, at a minimum, double glazing.

EXCEPTIONS:

1. Vertical glazing located on the street level story of a retail occupancy or where there is a street level transparency requirement in the Seattle Land Use Code provided the glazing is double-glazed with a minimum 1/2 inch airspace and does not exceed 75% of the gross exterior wall area of the street level story which does not exceed 20 feet in height. When this exception is utilized, separate calculations shall be performed for these sections of the building envelope and these values shall not be averaged with any others for compliance purposes. The 75% area may be exceeded on the street level, if the additional glass area is provided from allowances from other areas of the building.
2. Single glazing for ornamental, security, or architectural purposes shall be included in the percentage of total glazing area, U-factor calculation and SHGC as allowed in the Tables 13-1 or 13-2. The maximum area allowed for the total of all single glazing is 1% of the gross exterior wall area.

Section 11. Table 13-1 of the 1997 Washington State Energy Code is amended as follows:

TABLE 13-1
BUILDING ENVELOPE REQUIREMENTS
FOR CLIMATE ZONE 1

MINIMUM INSULATION R-VALUES OR
MAXIMUM COMPONENT U-FACTORS FOR ZONE 1

Building Components

Space Heat Type	Components					
	Roofs Over Attic	All Other Roofs	Opaque Walls[1,2]	Opaque Doors	Floor Over Uncond Space	Slab On Grade[5]
1. Electric resistance heat	R-38 or U=0.031	R-30 or U=0.034	R-19 or U=0.062[3]	U=0.60	R-30 or U=0.029	R-10 or F=0.54
2. All others including Heat pumps and VAV	R-30 or U=0.036	R-21 or U=0.050	R-11 or U=0.14	U=0.60	R-19 or U=0.056	R-10 or F=0.54

MAXIMUM GLAZING AREAS AND U-FACTORS AND MAXIMUM GLAZING SOLAR HEAT GAIN COEFFICIENTS FOR ZONE 1

Glazing

Maximum Glazing Area as % of Wall	0% to 15%			>15% to 20%			>20% to 30%			>30% to 40%		
	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]
	VG	OG		VG	OG		VG	OG		VG	OG	
1. Electric resistance heat	0.40	0.80	1.0	0.40	0.80	1.0	PRESCRIPTIVE PATH NOT ALLOWED					
2. All others including Heat pumps and VAV	0.90	1.45	1.0	0.75	1.40	1.0	0.60	1.30	0.65	0.50	1.25	0.45

Footnotes

1. Below Grade Walls:

When complying by the prescriptive approach, Section 1322:

a) walls insulated on the interior shall use opaque wall values,

b) walls insulated on the exterior shall use a minimum of R-10 insulation,

c) those portions of below grade walls and footings that are more than 10 feet **below** grade, and not included in the gross exterior wall area, may be left uninsulated.

When complying by the component performance approach, Section 1331:

a) walls insulated on the interior shall use the opaque wall values when determining U_{bgwt} ,

b) walls insulated on the exterior shall use a target U-factor of U=0.070 for U_{bgwt} ,

c) those portions of below grade walls and footings that are more than 10 feet below grade, and not included in the gross exterior wall area, need not be included when determining A_{bgwt} and A_{bgw}.

2. Concrete Masonry Walls: If the area weighted heat capacity of the total opaque above grade wall is a minimum of 9.0 Btu/ft^2 • °F, then the U-factor may be increased to 0.19 for interior insulation and 0.25 for integral and exterior insulation for insulation position as defined in Chapter 12.

Individual walls with heat capacities less than 9.0 Btu/ft^2 • °F and below grade walls shall meet opaque wall requirements listed above. Glazing shall comply with the following:

Maximum Glazing Area as % of Wall	0 to 10 %			>10 to 15 %			>15% to 20 %			>20% to 25 %		
	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]
	VG	OG		VG	OG		VG	OG		VG	OG	
1. Electric resistance heat	0.40	0.80	1.0	0.40	0.80	1.0	0.40	0.80	1.0	NOT ALLOWED		
2. All others including Heat pumps and VAV	0.90	1.45	1.0	0.75	1.40	1.0	0.65	1.30	0.80	0.60	1.30	0.65

3. Metal Stud Walls: For metal stud construction U=0.11.

4. SHGC (Solar Heat Gain Coefficient per Section 1312.2): May substitute

Maximum Shading Coefficient (SC) for SHGC (See Section 1210 for definition of Shading Coefficient).

5. Radiant Floors: Where insulation is required under the entire slab, radiant floors shall use a minimum of R-10 insulation or F=0.55 maximum. Where insulation is not required under the entire slab, radiant floors shall use R-10 perimeter insulation according to Section 1311.6 or F=0.78 maximum.

6. Prescriptive Alternate: For the prescriptive building envelope option only, for other than electric resistance heat only, glazing may comply with either of the following:

Maximum Glazing Area as % of Wall: >40% to 60%	Maximum U-Factor VG	OG	Max. SHGC[4]
alternate a	0.40	0.80	0.30
alternate b	0.35	0.80	0.35

For glazed wall systems, assemblies with all of the following features are deemed to satisfy the vertical glazing U-factor requirement of U-0.40:

a. Double glazing with a minimum 1/2 inch gap width, having a low-emissivity coating with e=0.10 maximum, with 90% minimum argon gas fill, and a non-aluminum spacer (as defined in footnote 1 to Table 10-6B), and

b. Frame that is thermal break aluminum (as defined in footnote 9 to Table 10-6B), wood, aluminum clad wood, vinyl, aluminum clad vinyl, or reinforced vinyl.

Section 12. Section 1402 of the 1997 Washington State Energy Code is amended as follows:

1402 Mechanical Ventilation: The minimum requirements for ventilation shall comply with the ((~~Washington State Ventilation and Indoor Air Quality Code (WAC51-13)~~)) Seattle Mechanical Code.

Section 13. Section 1411.2 of the 1997 Washington State Energy Code is amended as follows:

1411.2 Rating Conditions: Cooling equipment shall be rated at ARI test conditions and procedures when available. Where no applicable procedures exist, data shall be furnished by the equipment manufacturer.

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

Section 14. The 1997 Washington State Energy Code is amended by adding a new Section 1411.5 as follows:

1411.5 Heating Systems in Unenclosed Spaces. Where heating is provided to unenclosed spaces, only radiant heating systems shall be used unless otherwise approved by the building official. An unenclosed space is one that is not substantially surrounded by solid surfaces such as walls, floors, roofs, and openable devices such as doors and operable windows. Warehouses and repair garages are considered enclosed spaces.

Section 15. Section 1412.4 of the 1997 Washington State Energy Code is amended as follows:

1412.4 Setback and Shut-Off: HVAC systems shall be equipped with automatic controls capable of accomplishing a reduction of energy use through control setback or equipment shutdown during periods of non-use or alternate use of the spaces served by the system. The automatic controls shall have a minimum seven-day clock and be capable of being set for seven different day types per week.

EXCEPTIONS:

1. Systems serving areas which require continuous operation at the same temperature setpoint.
2. Equipment with full load demands of 2 kW (6,826 Btu/h) or less may be controlled by readily accessible manual off-hour controls.

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

EXCEPTIONS:

1. Systems serving areas which require continuous operation.
2. Combustion air intakes.
3. Gravity (non-motorized) dampers are acceptable in buildings less than 3 stories in height.

1412.4.2 Optimum Start Controls. Heating and cooling systems with design supply air capacities exceeding 10,000 cfm shall have optimum start controls. Optimum start controls shall be designed to automatically adjust the start time of an HVAC system each day to bring the space to desired occupied temperature levels immediately before scheduled occupancy. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint and the amount of time prior to scheduled occupancy.

Section 16. Section 1412.6 of the 1997 Washington State Energy Code is amended as follows:

1412.6 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.
3. Equipment up to 450,000 Btu/h where sizing calculations are done in accordance with Section 1431.2 and the equipment is sized not greater than 150% of the design load.

Section 17. The 1997 Washington State Energy Code is amended by adding a new Section 1412.8 as follows:

1412.8 Enclosed Parking Garage Ventilation. Garage ventilation fan systems with a total design capacity greater than 30,000 cfm shall have at least one of the following:

(a) An automatic control that is capable of staging fans or modulating fan volume as required to maintain carbon monoxide (CO) concentration below a level of 50 ppm as stated in ASHRAE Standard 62. This option only applies to garages used predominantly by gasoline powered vehicles.

(b) An automatic control that is capable of shutting off fans or reducing fan volume during periods when the garage is not in use. The system shall be equipped with at least one of the following:

(i) An automatic timeclock that can start and stop the system under different schedules for seven different day-types per week, is capable of retaining programming and time setting during loss of power for a period of at least 10 h, and includes an accessible manual override that allows temporary operation of the system for up to 2 h.

(ii) An occupant sensor.

Section 18. Section 1414.2 of the 1997 Washington State Energy Code is amended as follows:

1414.2 Insulation. Ducts and plenums that are constructed and function as part of the building envelope, by separating interior space from exterior space, shall meet all applicable requirements of Chapter 13. These requirements include insulation installation, moisture control, air leakage, and building envelope insulation levels. ((~~Unheated equipment rooms with combustion air louvers shall be isolated from the conditioned space by insulating interior surfaces to a minimum of R-11 and any exterior envelope surfaces per Chapter 13.~~)) Outside air ducts serving individual supply air units with less than 2,800 cfm of total supply air capacity shall be insulated to a minimum of R-7 and are not considered building envelope. Other ~~O~~outside air duct runs are considered building envelope until they,

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

Once outside air ducts meet the above listed requirements, any runs within conditioned space must comply with Table 14-5 requirements. Other ducts and plenums shall be thermally insulated per Table 14-5.

EXCEPTIONS:

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

Section 19. The 1997 Washington State Energy Code is amended by adding a new Section 1416 as follows:

1416 Completion Requirements

1416.1 Drawings. Construction documents shall require that within 90 days after the date of system acceptance, record drawings of the actual installation be provided to the building owner. Record drawings shall include as a minimum the location and performance data on each piece of equipment, general configuration of duct and pipe distribution system, including sizes, and the terminal air and water design flow rates.

> The building official should check only to be sure that the construction documents require this information be transmitted to the owner. Copies of these materials transmitted to the owner are not required to be sent to the builing official.

1416.2 Manuals. Construction documents shall require an operating manual and maintenance manual be provided to the building owner. The manual shall be in accordance with industry accepted standards and shall include, at a minimum, the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Operation and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Names and addresses of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field determined set points shall be permanently recorded on control drawings at control devices, or, for digital control systems, in programming comments.
5. A complete narrative of how each system is intended to operate including suggested set points.

> The building official should check only to be sure that the construction documents require this information be transmitted to the owner. Copies of these materials transmitted to the owner are not required to be sent to the builing official.

1416.3 System Balancing

1416.3.1 General. Construction documents shall require that all HVAC systems be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within 10% of design rates,

except variable flow distribution systems need not be balanced upstream of the controlling device (for example, VAV box or control valve). Construction documents shall require a written balance report be provided to the owner.

> The building official should check only to be sure that the construction documents require this information be transmitted to the owner. Copies of these materials transmitted to the owner are not required to be sent to the builing official.

1416.3.2 Air System Balancing. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp, fan speed shall be adjusted to meet design flow conditions.

1416.3.3 Hydronic System Balancing. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the ability to measure pressure across the pump, or test ports at each side of each pump.

EXCEPTIONS:

1. Pumps with pump motors of 10 hp or less.
2. When throttling results in no greater than 5% of the nameplate horsepower draw above that required if the impeller were trimmed.

1416.4 Systems Commissioning

1416.4.1 Simple Systems: For simple systems, as defined in Section 1421, and for warehouses and semiheated spaces, HVAC control systems shall be tested to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accord with approved plans and specifications. Sequences of operation shall be functionally tested to ensure they operate in accord with approved plans and specifications. A complete report of test procedures and results shall be prepared and filed with the owner. Drawing notes shall require commissioning in accordance with this paragraph.

1416.4.2 Other Systems: All other HVAC control systems, and other automatically controlled systems for which energy consumption, performance, or mode of operation are regulated by this code, shall be tested to ensure that control devices, equipment and systems are calibrated, adjusted and operate in accord with approved plans and specifications. Sequences of operation shall be functionally tested to ensure they operate in accord with approved plans and specifications.

1416.4.2.1 Documentation: Drawing notes shall require commissioning in accordance with this section. Drawing notes may refer to specifications for further commissioning requirements. Plans and specifications shall require tests mandated by this section be performed and the results recorded. Plans and specifications shall require preparation of preliminary and final reports of test procedures and results as described in 1416.4.2.2. Plans and specifications shall identify the following for each test:

1. Equipment and systems to be tested, including the extent of sampling tests,
2. Functions to be tested (for example calibration, economizer control, etc.),
3. Conditions under which the test shall be performed (for example winter design conditions, full outside air, etc.),

4. Measurable criteria for acceptable performance.

1416.4.2.2 Commissioning Reports

1416.4.2.2.1 Preliminary Commissioning Report: A preliminary commissioning report of test procedures and results shall be prepared. The preliminary report shall identify:

1. Deficiencies found during testing required by this section which have not been corrected at the time of report preparation and the anticipated date of correction.
2. Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.
3. Climatic conditions required for performance of the deferred tests, and the anticipated date of each deferred test.

1416.4.2.2.2 Final Commissioning Report: A complete report of test procedures and results shall be prepared and filed with the owner.

1416.4.2.3 Acceptance: Buildings or portions thereof, required by this code to comply with this section, shall not be issued a final certificate of occupancy until such time that the building official determines that the preliminary commissioning report required by this section has been completed.

The building official should check only to see that commissioning instructions are provided in plans or specifications, and that the preliminary report has been prepared. The building official need not witness the tests nor are copies of the commissioning instructions required to be sent to the building official.

Section 20. Section 1421 of the 1997 Washington State Energy Code is amended as follows:

1421 System Type: To qualify as a simple system, systems shall be one of the following:

a. Air cooled, constant volume packaged equipment, which provide heating, cooling or both, and require only external connection to duct work and energy services <u>with cooling capacity of 135,000 Btu/h or less</u>.
b. Air cooled, constant volume split systems, which provide heating, cooling or both, with cooling capacity of 84,000 Btu/h or less.
c. Heating only systems which have a capacity of less than 5,000 cfm or which have a minimum outside air supply of less than 70% of the total air circulation.

All other systems shall comply with Sections 1430 through 1438.

Section 21. The 1997 Washington State Energy Code is amended by adding a new Section 1421.1 as follows:

1421.1 System Sizing Limits: Installed space heating equipment output shall not exceed 30 Btu per square foot of gross conditioned floor area and installed space cooling equipment output shall not exceed 30 Btu per square foot of gross conditioned floor area.

EXCEPTIONS:

1. For equipment which provides both heating and cooling in one package unit, compliance need only be demonstrated for either the space heating or space cooling system size.
2. Equipment sized in accordance with Section 1431.2.

Section 22. The 1997 Washington State Energy Code is amended by adding a new Section 1431.2 as follows:

1431.2 System Sizing Limits: Heating and cooling design loads for the purpose of sizing systems shall be determined in accordance with one of the procedures described in Chapter 28 of Standard RS-27 listed in Chapter 17 or an equivalent computation procedure. For interior temperatures, 70°F shall be used for heating and 75°F for cooling. For exterior temperatures, 24°F shall be used for heating and 82°F drybulb and 66°F wetbulb for cooling.

Building mechanical systems for all buildings which provide space heating and/or space cooling shall be sized no greater than 150% of the design load as calculated above. No additional safety factor is allowed.

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

1. For a single piece of equipment which has both heating and cooling capability, only one function, either the heating or the cooling, need meet the requirements of this section. Capacity for the other function shall be, within available equipment options, the smallest size necessary to meet the load.
2. (Reserved.)
3. Stand-by equipment may be installed if controls and devices are provided which allow redundant equipment to operate automatically only when the primary equipment is not operating.
4. Multiple units of the same equipment type, such as multiple chillers and boilers, with combined capacities exceeding the design load may be specified to operate concurrently only if controls are provided that sequence or otherwise optimally control the operation of each unit based on load.

Section 23. Section 1432.2 of the 1997 Washington State Energy Code is amended as follows:

1432.2 Systems Temperature Reset Controls

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

EXCEPTION: Where specified humidity levels are required to satisfy process needs, such as computer rooms or museums.

1432.2.2 Hydronic Systems. Systems with a design capacity of 600,000 Btu/h or greater supplying heated or mechanically refrigerated water to comfort conditioning systems shall include controls which automatically reset supply water temperatures by representative building loads (including return water temperature) or by outside air temperature. Temperature shall be reset by at least 25% of the design supply-to-return water temperature differences.

EXCEPTION: Hydronic systems that use variable flow devices complying with Section 1438 to reduce pumping energy.

Section 24. Section 1436 of the 1997 Washington State Energy Code is amended as follows:

1436 Heat Recovery: Fan systems which have both a capacity of 5,000 cfm or greater and which have a minimum outside air supply of 70% or greater of the total air circulation shall have a heat recovery system with at least 50% recovery effectiveness. 50% heat recovery effectiveness shall mean an increase in the outside air supply temperature at design heating conditions of one half the difference between the outdoor design air temperature and 65°F. Provision shall be made to bypass or control the heat recovery system to permit air economizer operation as required by Section 1433. Heat recovery energy may be provided from any site-recovered or site-solar source.

EXCEPTIONS:

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

Exhibit 14-1

INSTRUCTIONS TO OPERATOR

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

2. Systems serving spaces heated to less than 60°F.
3. Systems which can be shown to use as much energy with the addition of heat recovery equipment as without it.
4. Systems exhausting toxic, flammable, paint exhaust or corrosive fumes making the installation of heat recovery equipment impractical.
5. Type I commercial kitchen hoods.

Section 25. Section 1438 of the 1997 Washington State Energy Code is amended as follows:

1438 Variable Flow Systems and System Criteria: For fans and pumps greater than 10 hp where the where the application involves variable flow, there shall be

1. variable frequency drives or
2. other controls and devices that will result in fan and pump motor demand of no more than 30% of design wattage at 50% of design air volume for fans when static pressure set point equals 1/3 the total design static pressure, and 50% of design water flow for pumps, based on manufacturer's certified test data.

At the time this code was adopted, very few technologies could be shown to meet the criteria in option 2.

((~~variable flow devices installed. Acceptable variable flow devices include variable inlet vanes, variable blade pitch and variable fan geometry. T~~)) Variable inlet vanes, throttling valves (dampers), scroll dampers or bypass circuits shall not be allowed.

Section 26. The 1997 Washington State Energy Code is amended by adding a new Section 1438.1 as follows:

1438.1 Cooling Towers: All cooling towers with a total fan motor horsepower greater than 10 hp shall be equipped with a pony motor of a rated hp no greater than 1/3 of the hp of the primary motor or with a two-speed motor. The cooling tower control shall provide two-stage operation of fans and shall bring on the pony motor to operate without the primary

motor or for a two-speed motor run at the lower speed when possible while meeting the condenser water return setpoint.

EXCEPTION: Cooling towers with variable frequency drive.

Section 27. The 1997 Washington State Energy Code is amended by adding a new Section 1452 as follows:

1452 Pool Water Heaters: Pool water heaters using electric resistance heating as the primary source of heat are prohibited for pools over 2,000 gallons.

Section 28. Section 1513.6 of the 1997 Washington State Energy Code is amended as follows:

1513.6 Automatic Shut-Off Controls, Interior. Office buildings greater than ~~25,000~~ 5,000 ft^2. and all school classrooms shall be equipped with separate automatic controls to shut off the lighting during unoccupied hours. Automatic controls may be an occupancy sensor, time switch or other device capable of automatically shutting off lighting.

EXCEPTIONS:

1. Areas that must be continuously illuminated, or illuminated in a manner requiring manual operation of the lighting.
2. Emergency lighting systems.
3. Switching for industrial or manufacturing process facilities as may be required for production.

1513.6.1 Occupancy Sensors: Occupancy sensors shall be capable of automatically turning off all the lights in an area, no more than 30 minutes after the area has been vacated.

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

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

a. is readily accessible;
b. is located so that a person using the device can see the lights or the areas controlled by the switch, or so that the area being illuminated is annunciated;
c. is manually operated;
d. allows the lighting to remain on for no more than 2 hours when an over-ride is initiated; and
e. controls an area not exceeding 5,000 ft^2 or 5% of footprint for footprints over 100,000 ft^2, whichever is greater.

Section 29. The 1997 Washington State Energy Code is amended by adding a new Section 1513.7 as follows:

1513.7 Commissioning Requirements: For lighting controls which include daylight or occupant sensing automatic controls, automatic shut-off controls, occupancy sensors, or automatic time switches, the lighting controls shall be tested to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accord with approved plans and specifications. Sequences of operation shall be functionally tested to ensure they operate in accord with approved plans and specifications. A complete report of test procedures and results shall be prepared and filed with the owner. Drawing notes shall require commissioning in accordance with this paragraph.

> The building official should check only to be sure that the construction documents require this information be transmitted to the owner. Copies of these materials transmitted to the owner are not required to be sent to the builing official.

Section 30. Section 1521 of the 1997 Washington State Energy Code is amended as follows:

1521 Prescriptive Interior Lighting Requirements: Spaces for which the Unit Lighting Power Allowance in Table 15-1 is 0.80 W/ft^2 or greater may use unlimited numbers of lighting fixtures and lighting energy, provided that the installed lighting fixtures are one- or two-lamp (but not three- or more lamp) non-lensed, fluorescent fixtures fitted with type T-2, T-4, T-5, T-6, T-8 or ~~PL type~~ compact fluorescent lamps from 5 ~~to 50~~ 60 watts and hard-wired electronic ballasts.

EXCEPTIONS:

1. Up to a total of 5% of installed lighting fixtures need not be ballasted and may use any type of lamp.
2. Clear safety lenses are allowed in food prep and serving areas and patient care areas in otherwise compliant fixtures.

Section 31. Section 1530 of the 1997 Washington State Energy Code is amended as follows:

1530 LIGHTING POWER ALLOWANCE OPTION: The installed lighting wattage shall not exceed the lighting power allowance. Lighting wattage includes lamp and ballast wattage. Wattage for fluorescent lamps and ballasts shall be tested per ANSI Standard C82.2-1984.

The wattage used for any unballasted fixture shall be the maximum UL listed wattage for that fixture regardless of the lamp installed. The wattage used for track lighting shall be:

a. for line voltage track, 50 watts per lineal foot of track or actual luminaire wattage, whichever is greater.

b. for low voltage track (less than 30 volts), 25 watts per lineal foot of track or the VA rating of the transformer, whichever is greater.

No credit towards compliance with the lighting power allowances shall be given for the use of any controls, automatic or otherwise.

Section 32. Table 15-1 of the 1997 Washington State Energy Code is amended as follows:

TABLE 15-1
Unit Lighting Power Allowance (LPA)

Use[1]	LPA[2] (W/ft^2)
Painting, welding, carpentry, machine shops	2.30
Barber shops, beauty shops	2.00
Hotel banquet/conference/exhibition hall[3,4]	2.00
Laboratories	2.00
Aircraft repair hangars	1.50
Cafeterias, fast food establishments[5]	1.50
Factories, workshops, handling areas	1.50
Gas stations, auto repair shops[6]	1.50
Institutions	1.50
Libraries[5]	1.50
Nursing homes	1.50
Wholesale stores (pallet rack shelving)	1.50
Mall concourses	1.40
School buildings, school classrooms, day care centers	1.35
Laundries	1.30
Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches)[5,7]	1.20
Police and fire stations[8]	1.20
Atria (atriums)	1.00
Assembly spaces[9], auditoriums, gymnasia[9], theaters	1.00
Process plants	1.00
Restaurants/bars[5]	1.00
Retail A[10]	1.00
Retail B[10], retail banking	1.50

Locker and/or shower facilities	0.80
Warehouses[11], storage areas	0.50
Aircraft storage hangars	0.40
Parking garages	See Section 1532
Plans Submitted for Common Areas Only[7]	
Common area, corridors, lobbies (except mall concourse)	0.80
Toilet facilities, washrooms	0.80

Footnotes for Table 15-1

1. In cases in which a use is not mentioned specifically, the *Unit Lighting Power Allowance* shall be determined by the building official. This determination shall be based upon the most comparable use specified in the table. See Section 1512 for exempt areas.
2. The watts per square foot may be increased, by 2% per foot of ceiling height above 20 feet, unless specifically directed otherwise by subsequent footnotes.
3. The watts per square foot of room may be increased by 2% per foot of ceiling height above 12 feet.
4. For all other spaces, such as seating and common areas, use the *Unit Lighting Power Allowance* for assembly.
5. The watts per square foot of room may be increased by 2% per foot of ceiling height above 9 feet.
6. Includes pump area under canopy.
7. In cases in which a lighting plan is submitted for only a portion of a floor, a *Unit Lighting Power Allowance* of 1.35 may be used for usable office floor area and 0.80 W/ft^2 shall be used for the common areas, which may include elevator space, lobby area and rest rooms. Common areas, as herein defined do not include mall concourses.
8. For the fire engine room, the *Unit Lighting Power Allowance* is 1.00 W/ft^2.
9. For indoor sport tournament courts with adjacent spectator seating, the *Unit Lighting Power Allowance* for the court area is 2.6 W/ft^2.
10. For both *Retail A* and *Retail B*, light for free-standing display, building showcase illumination and display window illumination installed within two feet of the window are exempt.

Retail A allows a *Unit Lighting Power Allowance* of 1.00 W/ft^2. Merchandise display luminaires which meet both of the following criteria are exempt:

(a) Ceiling mounted adjustable, and
(b) tungsten halogen, fluorescent, and HID (high intensity discharge) ~~((merchandise display luminaires are exempt)).~~

Generally, track lighting and fixtures adjustable in both horizontal and vertical axes are considered adjustable.

Retail B allows a *Unit Lighting Power Allowance* of 1.5 W/ft^2, including all ceiling mounted merchandise display luminaires.

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

Section 33. Table 20-6 of the 1997 Washington State Energy Code is amended as follows:

TABLE 20-6
Default U-Factors for Vertical Glazing, Overhead Glazing and Opaque Doors

Vertical Glazing

	U-Factor		
	Any Frame	Aluminum w/thermal break	Vinyl/WoodFrame
Single	1.45	1.45	1.45
Double	0.90	0.85	0.75
½ Inch Air, Fixed	0.75	0.70	0.60
½ Inch Air, Low-e (0.40), Fixed	0.60	0.55	0.50
½ Inch Air, Low-e (0.10), Fixed	0.55	0.50	0.45
½ Inch Argon, Low-e (0.30), Fixed	0.55	0.50	0.45
½ Inch Argon, Low-e (0.10), Fixed	0.50	0.45	0.40

The category for aluminum frame with a thermal break is as defined in footnote 9 to Table 10-6B.

Overhead Glazing

	U-Factor	
	Any Frame	Vinyl/Wood Frame
Single	2.15	2.15
Double	1.45	1.00
Low-e(0.40) or Argon	1.40	0.95
Low-e(0.40) + Argon	1.30	0.85
Low-e(0.20) Air	1.30	0.90
Low-e(0.20) + Argon	1.25	0.80
Triple	1.25	0.80

Opaque Doors

	U-Factor
Uninsulated Metal	1.20
Insulated Metal (Including Fire Door and Smoke Vent)	0.60
Wood	0.50

NOTES:

Where a gap width is listed (i.e.: 1/2 inch), that is the minimum allowed.

Where a low-emissivity emittance is listed (i.e.: 0.40, 0.30, 0.20, 0.10), that is the maximum allowed.

Where a gas other than air is listed (i.e.: argon), the gas fill shall be a minimum of 90%.

Where an operator type is listed (i.e.: fixed), the default is only allowed for that operator type.
Where a frame type is listed (i.e.: wood/vinyl), the default is only allowed for that frame type.
Wood/Vinyl frame includes reinforced vinyl and aluminum-clad wood.

Section 34. The Director of the Department of Construction and Land Use shall for a period of 60 days following the effective date of this ordinance, approve applications that comply with either the requirements of this Ordinance or with the requirements of Ordinance 117081 as amended by Ordinance 117698.

Section 35. This ordinance shall take effect and be in force thirty (30) days from and after its approval by the Mayor, but if not approved and returned by the Mayor within ten (10) days after presentation, it shall take effect as provided by Municipal Code Section 1.04.020.

Passed by the City Council the 13th day of July, 1998, and signed by me in open session in authentication of its passage this 13th day of July, 1998.

President of the City Council

Approved by me this 16th day of July, 1998.

Paul Schell, Mayor

Filed by me this 16 day of July, 1998.

City Clerk

(SEAL)

City of Seattle

Paul Scheli, Mayor

Department of Construction and Land Use
R. F. Krochalis, Director

MEMORANDUM

TO: Sue Donaldson, President
Seattle City Council

FROM: R.F. Krochalis, Director
Department of Construction and Land Use

DATE: June 16, 1998

SUBJECT: Adoption of Revisions to the Seattle Energy

With this memorandum we are transmitting to you revisions to the Seattle Energy Code. This proposal will incorporate revisions made to the Washington State Energy Code by the Washington State Building Code Council in late 1997 and Seattle amendments. Attached are a summary of key changes in the Washington State Energy Code and a summary of the Seattle amendments.

The proposal has been reviewed by the DCLU Construction Codes Advisory Board and they recommended approval on March 19, 1998. The proposal has also been reviewed by Seattle City Light. A SEPA determination of DNS is expected to be published on June 18, 1998. The City Council Business, Economic and Community Development Committee chaired by Councilmember Jan Drago has agreed to take up the ordinance.

This revision is driven by the 1997 update to the Washington State Energy Code (WSEC). The overall changes are nominal. We are proposing that Seattle adopt the 1997 Washington State Energy Code with limited Seattle amendments. This serves two goals. First, it continues Seattle's role as a regional and national leader by retaining key requirements which we have had in our energy code since 1991 that are over and above the 1997 WSEC, while at the same time incorporating updates being considered for the ASHRAE/IES Standard 90.1. Second, at the same time, it supports regulatory reform by minimizing the differences between Seattle and WSEC requirements. This reaffirms a decision made when the 1994 Seattle Energy Code was adopted.

If you have any questions, please call John Hogan, project manager, at 386-9145 or his supervisor Diane Sugimura at 233-3882.

RFK:jhh

SUMMARY OF KEY CHANGES ADOPTED FOR THE WASHINGTON STATE ENERGY CODE

In November 1997, the Washington State Building Code Council made modifications and adopted the new State codes, including the 1997 Washington State Energy Code. The revisions were published in January in the Washington State Register 98-03-003. The 1997 State codes will take effect statewide on 1 July 1998.

A summary of key changes follows below. This summary does not list all the changes. A number of other minor changes have been made for clarification, to update standards to the current versions, and for consistency between the Residential and Nonresidential Energy Code requirements. The summary is organized, first, by occupancy (residential vs. nonresidential), and then, by design expertise (building envelope, mechanical systems, service water heating, and lighting). A more detailed, section-by-section listing follows the summary.

RESIDENTIAL ENERGY CODE

(Chapters 1-10, applies to all Group R occupancy - single family, multi-family, guest rooms in hotels and motels, both low-rise and high-rise)

Building Envelope:

- Separate glazing U-factors established for skylights (Table 5-1, Tables 6-1 to 6-6). *This parallels what was done in the Nonresidential Energy Code in 1994. It recognizes that skylights with the same type of glass as a vertical window will have a higher U-factor because the skylight projects out beyond the roof and has a larger surface area for heat loss. Using these more realistic values will encourage manufacturers to get NFRC ratings for their products.*
- Unlimited glazing option added for spaces with "Other" space heat, i.e. not electric resistance (Tables 6-2, 6-4, and 6-6). *Unlimited glazing allowed for spaces with gas/oil/heat pump provided: area weighted glazing U-factor is U-0.25 or less, and insulation complies with the requirements in the 30% glazing option.*
- Deemed-to-satisfy option offered for U-0.40 glazing for glazed wall systems and overhead glazing ONLY (502.1.5). *This interim option allows manufacturers of curtainwalls and skylights a way to achieve U-0.40 without having an NFRC rating.*
- Garden windows exempted from U-factor requirements in the prescriptive option provided that they have a wood or vinyl frame, are double glazed, don't exceed 1% of the floor area, and their area is doubled for the purpose of glazing area calculations (602.7.2. *Garden windows rarely comply with the U-factor requirements because of their large surface area relative to the rough opening in the wall. This exception provides an alternate means of compliance.*
- Expanded table of default U-factors for walls with metal studs (Table 10-5A). *Current table has very limited set of values. Revised version is based on Washington State University fact sheet and has a very complete range of cavity insulation and insulated sheathing.*
- Defaults added for garden windows (Table 10-6A) and overhead glazing (Table 10-6E). *New defaults added for consistency with changes to Chapters 5 and 6.*

Mechanical Systems:

- Space heating and space cooling equipment sizing limit increased to 200% (503.2.2). *Current code sets a limit at 150% of the load. Because the load has decreased due to a more energy efficient building envelope while the mass of the structure has*

remained relatively unchanged, it was felt that the 150% limit did not allow a space to be brought up to temperature quickly enough during morning warmup.

- Space heating and space cooling systems not specifically addressed in Section 503 are now subject to the requirements in Chapter 14 (503.3, 503.4.5, 503.7). *The Residential Energy Code only has requirements for simple mechanical systems. While this addresses most cases, high-rise multi-family buildings and hotels have more complicated systems. These projects are now referred to appropriate requirements in the Nonresidential Energy Code.*

Service Water Heating:

- Combination service water heating/space heating equipment to comply with minimum Energy Factor (EF) or minimum Combined Annual Efficiency (CAE) determined in accordance with ASHRAE Standard 124. *Minimum EF range from 0.55 to 0.58 and minimum CAE range from 0.70 to 0.71 based on size in gallons of water heater.*

NONRESIDENTIAL ENERGY CODE

(Chapters 11-20, applies to all other occupancies)

Building Envelope:

- New SHGCA formula added (1311). *This allows trade offs like the Target UA formula, but only includes fenestration.*
- Area weighted averaging allowed for SHGC requirements (1323.3). *Greater flexibility.*
- Expanded table of default U-factors for walls with metal studs (Table 20-5A). *Matches Table 10-5A. See description above.*
- Default U-factors added for metal buildings (Table 20-5A). *The current code does not address this common building type.*
- Default U-factors added for vertical glazing with vinyl/wood frame (Table 20-6). *The current code provides one set of defaults for vertical glazing regardless of frame type with values based on metal frames. Additional defaults now give credit for more energy efficient frame materials.*

Mechanical Systems:

- R-7 established as duct insulation requirement for outside air ducts within the conditioned space (Table 14-5). *Current code does not address this issue clearly.*
- Clarification that economizer requirements apply to all single package unitary fan cooling units (1433). *Current code language refers to roof top units.*
- Duct tape not allowed as the primary sealant where static pressure is 1 inch or greater (1414.1). *This is similar to a current Seattle amendment (though the 1998 Model Energy Code will not allow it for all duct systems).*

Lighting:

- Permanently ballasted track lighting to be calculated at 25 W/lineal foot (1530). *This establishes a second category of track lighting. Unballasted track lighting to remain unchanged at 50 W/lin.ft.*
- Exterior walkway and pathway lighting must be permanently ballasted to be exempted from lighting wattage limits (1512.2). *Clarification of current code.*

DETAILED SUMMARY OF CHANGES FOR THE 1997 WASHINGTON STATE ENERGY CODE

Below is a section-by-section summary of changes for the 1997 Washington State Energy Code. Editorial changes which have been made throughout the code are listed in the beginning.

Section	Subject	Summary
All		Editorial changes for terminology and language including: references to UBC/UMC/WAC updated, U-value changed to U-factor, F-value changed to F-factor, shading coefficient changed to solar heat gain coefficient, NFRC model sizes AA and BB changed to residential and nonresidential, errors in section references corrected, typos corrected.
RESIDENTIAL		
101.3.2.5	Exist. Bldgs.	Exception 1 now cites reference case in Tables 6-1 to 6-6 for U-factors for replacement glazing. *(Necessary because U-factors vary between vertical and overhead glazing.)*
201.1	Definitions	Definitions added for Garden window, Glazed wall system, NFRC, Solar heat gain coefficient; definition deleted for AAMA.
502.1.1	General	Table of parallel path R-values for metal stud walls expanded and roof/ceilings added.
502.1.4.1	Insulation	R-value markers required for blown-in insulation to allow verification by inspectors.
502.1.5	Glazing	Exceptions added to provide a deemed-to-satisfy option for glazed wall systems and skylights.
502.1.5.1	Glazing	Revised references for defaults for products without NFRC ratings.
502.4.3	Sealing	Housewrap allowed as sealing technique.
503.2.2	Sizing limits	Space heating and cooling equipment sizing limits increased to 200%.
503.4.4	Simul.htg&clg.	Reference made to Nonresidential Energy Code for consistency.
503.4.5	HVAC effic.	Reference made to Nonresidential Energy Code for consistency.
503.7	Economizer	Reference made to Nonresidential Energy Code for consistency.
504.2.1	SWH perf.	Combination space heating and service water heating units to comply with minimum EF or CAE.
Equations 1 & 3		Equations revised to incorporate overhead glazing.
Table 5-1	Target UA	U-factor criteria added for overhead glazing.

Table 5-12	Pipe insulation	Table changed to be identical to Nonresidential Energy Code for consistency.
602.7.2	Glazing	Exception allows alternate compliance option for garden windows.
Table 6-1	Prescr.-electric	Separate criteria established for overhead glazing.
Table 6-2	Prescr.-other	Separate criteria established for overhead glazing, unlimited glazing path added.
Tables 6-3 to 6-6		Separate criteria established for overhead glazing for all tables, unlimited glazing path added for Tables 6-4 and 6-6.
701	Standards	Standards and accredited authoritative agencies updated to current versions.
800	Software	List of acceptable software for annual energy analysis updated.
Table 10-4A		New default U-factor table for exposed floors added identical to Nonresidential Energy Code for consistency.
1005.3	Walls	Text added for metal stud walls.
Table 10-5A		Expanded default U-factor table for metal stud walls.
Table 10-6A		Default U-factors added for garden windows.
Table 10-6E		New default U-factor table added for overhead glazing.
1007.2	Roof/ceilings	Text added for metal truss roofs.
Tables 10-7A to E		New default U-factor tables added for metal truss roofs.

NONRESIDENTIAL

1120	Scope	Temporary plastic growing structures exempt.
1133	Change of use	Now specifically addresses semiheated spaces.
1210	Definitions	Gross exterior wall area modified to address semiheated space.
1323.3	SHGC prescr.	Combine all glazing for SHGC calculations.
1334	SHGC comp.	New equations 13-3 and 13-4 added for SHGC tradeoffs.
Table 13-1		Clarification of below grade wall requirements in footnote 1.
1414	Ducting	Limits use of duct tape for sealing (matches existing Seattle Energy Code), insulation requirements for outside air ducts clarified.
1421	System type	Split systems up to 84,000 Btuh included as simple systems.
1422	Controls	Simultaneous heating and cooling prohibited for simple systems.
1423/33	Economizer	Applies to all package units not just rooftop, exceptions allowed up to 10% of cooling capacity.
1452	Pool heaters	Electric resistance heat limitation eliminated.
Table 14-5		Duct insulation table reformatted.

1512	Exempt ltg.	Clarifications for security lighting and exterior lighting.
1530	Light. power	Low voltage track lighting rated lower than line voltage.
1701	Standards	Standards and accredited authoritative agencies updated to current versions.
Table 20-5A		New default U-factor table for metal buildings.
Table 20-6		New default U-factors for vinyl/wood frame vertical glazing.
2007.2	Roof/ceilings	Text added for metal truss roofs.
Tables 20-7A to E		New default U-factor tables added for metal truss roofs.
RS-29	Software	List of acceptable software for annual energy analysis updated.

SUMMARY OF 1997 SEATTLE AMENDMENTS TO THE 1997 WASHINGTON STATE ENERGY CODE

Seattle amendments to the 1997 Washington State Energy Code (WSEC) were developed in a collaborative process. As in the past, City staff researched other documents and brought forward material that was reviewed by the Construction Code Advisory Board (CCAB) and by other members of the public in an open process. The CCAB unanimously approved a set of recommendations for draft Seattle amendments at the CCAB meeting on 19 March 1998. The City staff recommendations concur with the CCAB recommendations, with one exception that staff believes that the City should maintain penalties for violations of the code.

The recommendations were developed by the CCAB Energy Committee. The CCAB Energy Committee had six meetings - 24 February 1998 and 3, 5, 13, 17, and 18 March 1998. The committee also was briefed on the Puget Sound Chapter of ASHRAE meeting to discuss the draft amendments on 11 March 1998 and received copies of written comments submitted to DCLU (the written comment deadline was 12 March 1998). The CCAB Energy Committee supported much of the initial staff proposal, but also made recommendations to modify a number of sections.

As is the case with the current Seattle Energy Code, there are no proposed Seattle residential amendments to the Washington State Energy Code (though the Washington State Building Code Council did adopt residential amendments which will be in the 1997 WSEC). All of the Seattle amendments are to the nonresidential portions (Chapters 11-20).

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

- **Section number and title.**
- *Discussion:* This contains a summary of the issues and the source of the language if it has been taken from another document, such as the Second Public Review Draft of ASHRAE/IESNA Standard 90.1, which is the update to Standard 90.1-1989. (Standard 90.1-1989 is cited in the 1992 National Energy Policy Act as the basis for Energy Codes in all 50 states. Previous versions of the Seattle Energy Code have drawn substantially from this document and its predecessors.) "No changes" indicates that the 1997 Seattle amendment is the same as an existing 1994 Seattle amendment.

1132.3 Lighting and Motors.

Discussion: In an existing buildings, automatic lighting controls are required where there is a new panel with all new raceway and conductor wiring. The intent is clarified that, for other major remodels where there is all new raceway and conductor wiring and the panel is moved but not replaced, automatic controls are also required.

1144 Violations and Penalties.

Discussion: Revise to parallel the Seattle Building Code and the Seattle Mechanical Code.

1150 Conflicts With Other Codes.
Discussion: City Light reference changed to an informative note.

1161 Severability.
Discussion: no changes.

1162 Liability.
Discussion: no changes.

1310.2 Semi-Heated Spaces.
Discussion: Add a prescriptive alternate (e) for semiheated spaces with skylights so that applicants are not required to do calculations and the intent is clear. The language in subsection (e) was a proposal included in the rulemaking for the 1997 Washington State Energy Code.

1311.6 Radiant Floors.
Discussion: no changes.

1323 Glazing.
Discussion: no changes.

Table 13-1 Building Envelope Requirements.
Discussion: This provides both a precalculated prescriptive option for up to 60% glazing and a prescriptive way to achieve U-0.40. The U-0.40 prescriptive alternate is taken from a new amendment for curtainwall systems in the residential portion of the 1997 Washington State Energy Code.

1402 Mechanical Ventilation.
Discussion: no changes.

1411.2 Rating Conditions.
Discussion: no changes.

1411.5 Heating Systems in Unenclosed Spaces.
Discussion: Adds requirement that radiant systems be used in outdoor areas and ensures that wasteful air systems are not used. The above material is modified from the Second Public Review Draft for ASHRAE/IESNA 90.1, the draft update for the basis of the Seattle Energy Code from 1980 to present. (Section 6.3.8 of the ASHRAE/IESNA document reads "Unless approved otherwise by the building official, radiant heating systems shall be used in lieu of convective or all-air heating systems to heat loading docks and all unenclosed spaces including garages." and has an exception for loading docks equipped with air curtains.)

1412.4.1 Dampers.
Discussion: Clarify that gravity dampers are not adequate for closure except for low-rise buildings where stack effect is less of a problem. The language with requirements for dampers on stair and elevator shafts is proposed to be retained in the Seattle Energy Code. Because it will not be included in the 1997 WSEC, Seattle will need to adopt it as an amendment. It was deleted in the 1997 WSEC primarily because of concerns about perceived conflicts with the Building Code, yet Washington State modifications to Section 3004 of the Building Code have addressed this: "Vents shall be capable of only manual operation or controlled by a manual switch mounted in an approved location."

1412.4.2 Optimum Start Controls.

Discussion: Add requirements for optimum start controls. The language is slightly modified from the Second Public Review Draft for ASHRAE/IESNA 90.1, the draft update for the basis of the Seattle Energy Code from 1980 to present. These controls are readily available. Here is the intent from the ASHRAE/IESNA document: "This limitation is intended to allow the use of some commercially available electronic thermostats that use an "intelligent start" feature based simply on space temperature and time before scheduled occupancy. More sophisticated algorithms that also consider building heat capacity and system cooling/heating capacity, perhaps self-tuned based on historical trends, should improve performance but are not required to meet this section." (Section 6.2.3.2.3 of the ASHRAE/IESNA document reads "Heating and cooling systems with design supply air capacities exceeding 10,000 cfm shall have optimum start controls. Optimum start controls are designed to automatically adjust the start time of an HVAC system each day with the intention of bringing the space to desired occupied temperature levels immediately before scheduled occupancy. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint and the amount of time prior to scheduled occupancy.")

1412.6 Combustion Heating Equipment Controls.

Discussion: no changes.

1412.8 Enclosed Parking Garage Ventilation.

Discussion: Add requirements for efficient use of parking garage ventilation fans. The language is slightly modified from the Second Public Review Draft for ASHRAE/IESNA 90.1, the draft update for the basis of the Seattle Energy Code from 1980 to present. These controls are readily available. Here is the intent from the ASHRAE/IESNA document regarding paragraph (a): "Diesel and electric vehicles, and possibly other fossil fuel fired vehicles, generate other pollutants in addition to or in lieu of CO that may make CO controls inappropriate." (Section 6.2.3.5 of the ASHRAE/IESNA document reads "Garage ventilation fan systems with a total design capacity greater than 30,000 cfm shall have at least one of the following: (a) An automatic control that is capable of staging fans or modulating fan volume as required to maintain carbon monoxide (CO) concentration below levels in *ASHRAE Standard 62*. This option only applies to garages used predominantly by gasoline powered vehicles. (b) An automatic control complying with 6.2.3.2.1 that is capable of shutting off fans or reducing fan volume during periods when the garage is not in use." Section 6.2.3.2.1 reads "Automatic Shutdown. HVAC systems shall be equipped with at least one of the following: (a) An automatic timeclock that can start and stop the system under different schedules for seven different day-types per week, is capable of retaining programming and time setting during loss of power for a period of at least 10 h, and includes an accessible manual override that allows temporary operation of the system for up to 2 h. (b) An occupant sensor. (c) A manually-operated timer capable of being adjusted to operate the system for up to two hours. (d) An interlock to a security system that shuts the system off when the security system is activated.")

1414.2 Insulation.
Discussion: Delete confusing sentence in the 1997 WSEC and provide an alternate for small outside air ducts.

1416 Completion Requirements.
Discussion: Add provisions to ensure that designers and contractors provide the necessary information to the owner so that systems and equipment perform as designed. Research shows that building systems which have not been commissioned consume more energy than they were designed for. Commissioning energy conservation measures has proven to be cost effective based on reduction of energy consumption alone.

The proposed language does not mandate how commissioning is to be accomplished, nor by whom. The owner, together with their design and construction professionals determine the method of commissioning appropriate to the specific project.

The proposed language does require closure of the commissioning process. A preliminary report is a condition of issuance of the final certificate of occupancy. Recognizing that final completion of the commissioning tests may not occur for some months following occupancy, it would be inappropriate to require the final report as a condition of the certificate of occupancy. However, the contract documents should require that a final report be prepared and delivered to the owner.

The proposed language is taken in large part from the ASHRAE 90.1 review draft, and draws from the smoke system testing and reporting requirements in UBC 905.15.

1421 System Type.
Discussion: no changes.

1421.1 System Sizing Limits.
Discussion: no changes.

1431.2 System Sizing Limits.
Discussion: no changes.

1432.2.2 Hydronic Systems.
Discussion: Add chilled water systems to the list of those that need to have reset requirements. The Second Public Review Draft for ASHRAE/IESNA 90.1 applies the reset requirements to chilled water systems.

1436 Heat Recovery.
Discussion: no changes.

1438 Variable Flow Systems and System Criteria.
Discussion: Add pumps back in for consistency with the Washington State Energy Code. Delete the W/cfm calculation exception for more consistent implementation. Add alternate from Second Public Review Draft of ASHRAE/IESNA 90.1.

1438.1 Cooling Towers.
Discussion: no changes.

1452 Pool Water Heaters.
Discussion: Retain existing requirement (no changes). This requirement was deleted from the 1997 WSEC because it was argued that there were areas in Washington State that were not served by gas lines. This is not the situation in Seattle.

1513.6 Automatic Shut-Off Controls, Interior.

Discussion: Reduce threshold for automatic controls in office buildings to 5,000 square feet from 25,000 square feet. Occupancy sensors and automatic control systems have become more common and are of better quality. The threshold is from the Second Public Review Draft for ASHRAE/IESNA 90.1, the draft update for the basis of the Seattle Energy Code from 1980 to present.

1513.7 Commissioning Requirements (Lighting Controls).

Discussion: This is a companion change to 1416 that adds provisions to ensure that designers and contractors provide the necessary information to the owner so that systems and equipment perform as designed. Research shows that building systems which have not been commissioned consume more energy than they were designed for. Commissioning energy conservation measures has proven to be cost effective based on reduction of energy consumption alone.

The proposed language does not mandate how commissioning is to be accomplished, nor by whom. The owner, together with their design and construction professionals determine the method of commissioning appropriate to the specific project.

1521 Prescriptive Interior Lighting.

Discussion: Clarify and fine-tune language and expand the list of equipment to include new technologies. The goal of this language is to encourage new lamp technologies (T-2 and T-4), to include all types of compact fluorescents (twin tube, three tube, quad tube, and 2D, not just PL). Increasing the wattage to 60 watts allows 55 watt 2D lamps. It also allows regular 8 foot long T-8 lamps at 60 watts, but not the HO lamps at 75 watts. The language clarifies that the electronic ballasts must be permanent, it is not acceptable to use screw-in compact fluorescents where the ballast is removed when the lamp is removed. The new exception allows clear safety lenses in a few limited areas to comply with health requirements.

1530 Lighting Power Allowance Option.

Discussion: Clarify what low voltage means for consistent implementation.

Table 15-1, Unit Lighting Power Allowance.

Discussion: Clarify that the luminaires mentioned in Retail A need to be ceiling mounted AND adjustable to be exempt.

Table 20-6 Default U-Factors for Vertical Glazing.

Discussion: Add new defaults for site-built glazing products. The current defaults are limited to those that show compliance with the prescriptive options in Table 13-1. However, some applicants want to do component performance calculations and there are not many NFRC rated products for site-built glazing products. Adding these additional default options provides more flexibility for designers.

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No. ORDINANCE IN

Affidavit of Publication

The undersigned, on oath states that he is an authorized representative of The Daily Journal of Commerce, a daily newspaper, which newspaper is a legal newspaper of general circulation and it is now and has been for more than six months prior to the date of publication hereinafter referred to, published in the English language continuously as a daily newspaper in Seattle, King County, Washington, and it is now and during all of said time was printed in an office maintained at the aforesaid place of publication of this newspaper. The Daily Journal of Commerce was on the 12th day of June, 1941, approved as a legal newspaper by the Superior Court of King County.

The notice in the exact form annexed, was published in regular issues of The Daily Journal of Commerce, which was regularly distributed to its subscribers during the below stated period. The annexed notice, a

CT:ORD 119081

was published on

07/28/98

The amount of the fee charged for the foregoing publication is the sum of $, which amount has been paid in full.

K. Patterson

Subscribed and sworn to before me on

07/28/98

M. Alvarez

Notary Public for the State of Washington,
residing in Seattle

ceipt requested or registered mail addressed to the last known address of such person. In addition, a copy of the notice may be posted at a conspicuous place on the property. The notice of violation shall be considered an order of the building official. Nothing in this subsection shall be deemed to limit or preclude any action or proceeding pursuant to Sections 102, 103 or 104 of the Seattle Building Code, and nothing in this section shall be deemed to obligate or require the building official to issue a notice of violation prior to the imposition of civil or criminal penalties in this section.

1144.3 CIVIL PENALTIES. Any person, firm or corporation failing to comply with the provisions of this code shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the building official has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

1144.4 CRIMINAL PENALTY. Anyone who violates or fails to comply with any order issued by the building official pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted (i. e., affixed to the structure in a conspicuous place) by the building official shall, upon conviction thereof, be punished by a fine of not more than $1,000 or by imprisonment for not more than 360 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

Anyone violating or failing to comply with any of the provisions of this code and who within the past five years has had a judgment against them for civil penalties arising from a violation of the building code, shall upon conviction thereof, be fined in a sum not to exceed $500 or by imprisonment for not more than 180 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

1144.5 ADDITIONAL RELIEF. The building official may seek legal or equitable relief to enjoin any acts or practices and abate any condition which constitutes a violation of this code when civil or criminal penalties are inadequate to effect compliance.

1144.6 NOTICES. It shall be unlawful for any person to remove, mutilate, destroy or conceal any notice issued or posted by the building official pursuant to the provisions of this code, or any notice issued or posted by the building official in response to a natural disaster or other emergency.

The building official may record a copy of any order or notice with the Department of Records and Elections of King County.

The building official may record with the Department of Records and Elections of King County a notification that a permit has expired without a final inspection after reasonable efforts have been made to provide a final inspection.

1144.7 REVIEW BY THE DIRECTOR.

1144.7.1. Any party affected by a notice of violation issued by the Director pursuant to Section 1144.2 may obtain a review of the notice by requesting such review in writing within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, federal or City holiday, the period shall run until 5:00 p. m. of the next business day. Upon receipt of a request, the Director shall notify the person requesting the review of the date, time and place of the Director's review. The review shall be not less than ten nor more than twenty days after the request is received, unless otherwise agreed by the person requesting the review. Any person affected by the notice of violation may submit any written material to the Director for consideration on or before the date of the review.

1144.7.2. The review will consist of an informal review meeting held at the Department. A representative of the Director who is familiar with the case and the applicable ordinances will attend. The Director's representative shall explain the reasons for the issuance of the notice of violation and will consider any information presented by the persons attending. At or after the review, the Director shall:

1. Sustain the notice of violation; or

2. Withdraw the notice of violation; or

3. Continue the review to a future date; or

1. Electric resistance heat	0.40	0.80	1.0	0.40	0.80	1.0	0.60	1.30	0.65	0.50	1.25	0.45
2. All others including Heat pumps and VAV	0.90	1.45	1.0	0.75	1.40	1.0						

FOOTNOTES

1. BELOW GRADE WALLS:

WHEN COMPLYING BY THE PRESCRIPTIVE APPROACH, SECTION 1322:

a) walls insulated on the interior shall use opaque wall values.

b) walls insulated on the exterior shall use a minimum of R-10 insulation.

c) those portions of below grade walls and footings that are more than 10 feet BELOW grade, and not included in the gross exterior wall area, may be left uninsulated.

WHEN COMPLYING BY THE COMPONENT PERFORMANCE APPROACH, SECTION 1331:

a) walls insulated on the interior shall use the opaque wall values when determining U_{bwall}.

b) walls insulated on the exterior shall use a target U-factor of $U=0.070$ for U_{bwall}.

c) those portions of below grade walls and footings that are more than 10 feet below grade, and not included in the gross exterior wall area, need not be included when determining A_{bwall} and A_{fbgw}.

2. CONCRETE MASONRY WALLS: If the area weighted heat capacity of the total opaque above grade wall is a minimum of 9.0 Btu/ft² a degrees F, then the U-factor may be increased to 0.19 for interior insulation and 0.25 for integral and exterior insulation for insulation position as defined in Chapter 12.

Individual walls with heat capacities less than 9.0 Btu/ft² a degrees F and below grade walls shall meet opaque wall requirements listed above. Glazing shall comply with the following:

Maximum Glazing Area as % of Wall	0 to 10 %			>10 to 15 %			>15% to 20 %			>20% to 25 %		
	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]	Maximum U-Factor		Max. SHGC[4]
	VG	OG		VG	OG		VG	OG		VG	OG	
1. Electric resistance heat	0.40	0.80	1.0	0.40	0.80	1.0	0.40	0.80	1.0	NOT ALLOWED		
2. All others including Heat pumps and VAV	0.90	1.45	1.0	0.75	1.40	1.0	0.65	1.30	0.50	0.60	1.30	0.65

3. METAL STUD WALLS: For metal stud construction $U=0.11$.

4. SHGC (SOLAR HEAT GAIN COEFFICIENT PER SECTION 1312.2): May substitute Maximum Shading Coefficient (SC) for SHGC (See Section 1210 for definition of Shading Coefficient).

5. RADIANT FLOORS: Where insulation is required under the entire slab, radiant floors shall use a minimum of R-10 insulation or $F=0.55$ maximum. Where insulation is not required under the entire slab, radiant floors shall use R-10 perimeter insulation according to Section 1311.6 or $F=0.78$ maximum.

6. PRESCIPTIVE ALTERNATE: For the prescriptive building envelope option only, for other than electric resistance heat only, glazing may comply with either of the following:

Maximum Glazing Area as % of Wall:	Maximum U-Factor VG	Maximum U-Factor OG	Max. SHGC
>40% to 60%	0.40	0.80	0.30
alternate a	0.35	0.80	0.35
alternate b			

For glazed wall systems, assemblies with all of the following features are deemed to satisfy the vertical glazing U-factor requirement of U-0.4:

a. Double glazing with a minimum 1/2 inch gap width, having a low emissivity coating with $e \leq 0.10$ maximum, with 90% minimum argon gas fill and a non-aluminum spacer (as defined in footnote 3 to Table 10-5B), and

b. Frame that is thermal break aluminum (as defined in footnote 5 to Table 10-5B) wood, aluminum clad wood, vinyl, aluminum clad vinyl, or reinforced vinyl.

SECTION 12. Section 1402 of the 1997 Washington State Energy Code is amended as follows:

1402 MECHANICAL VENTILATION. The minimum requirements for ventilation shall comply with tha ((Washington State Ventilation and Indoor Air Quality Code (WAC61-131)) Seattle Mechanical Code.

SECTION 13. Section 1411.2 of the 1997 Washington State Energy Code is amended as follows:

1411.2 RATING CONDITIONS. Cooling equipment shall be rated at ARI test conditions and procedures when available. Where no applicable procedures exist, data shall be furnished by the equipment manufacturer.

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

SECTION 14. The 1997 Washington State Energy Code is amended by adding a new Section 1411.5 as follows:

1411.5 HEATING SYSTEMS IN UNENCLOSED SPACES: Where heating is provided to unenclosed spaces, only radiant heating systems shall be used unless otherwise approved by the building official. An unenclosed space is one that is not substantially surrounded by solid surfaces such as walls, floors, roofs, and openable devices such as doors and operable windows. Warehouses and repair garages are considered enclosed spaces.

SECTION 15. Section 1412.4 of the 1997 Washington State Energy Code is amended as follows:

1412.4 SETBACK AND SHUT-OFF. HVAC systems shall be equipped with automatic controls capable of accomplishing a reduction of energy use through control setback or equipment shutdown during periods of non-use or alternate use of the spaces served by the system. The automatic controls shall have a minimum seven day clock and be capable of being set for seven different day types per week.

EXCEPTIONS:

1. Systems serving areas which require continuous operation at the same temperature setpoint.

2. Equipment with full load demands of 2kW (6,826 Btu/h) or less may be controlled by readily accessible manual off-hour controls.

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

EXCEPTIONS:

1. Systems serving areas which require continuous operation.

2. Combustion air intakes.

3. Gravity (non-motorized) dampers are acceptable in buildings less than 3 stories in height.

1412.4.2 OPTIMUM START CONTROLS. Heating and cooling systems with design supply air capacities exceeding 10,000 cfm shall have optimum start controls. Optimum start controls shall be designed to automatically adjust the start time of an HVAC system each day to bring the space to desired occupied temperature levels immediately before scheduled occupancy. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint and the amount of time prior to scheduled occupancy.

SECTION 16. Section 1412.6 of the 1997 Washington State Energy Code is amended as follows: